Wilmot Woods Subdivision

Hydrogeological Assessment Report

Project Location:
Lot 20, German Block South Concession, south of Snyder's Road, New Hamburg, ON

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Engineers, Scientists, Surveyors.

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Executive Summary

MTE Consultants Inc. (MTE) was retained by Wilmot Woods Development Inc. to complete a Hydrogeological Assessment Report within the lands encompassing Lot 20 in the German Block South Concession south of Snyder's Road in the Town of New Hamburg, Ontario (Subject Lands). The Subject Lands are bounded by Waterloo Street to the north, agricultural lands to the east, Forest Glen residential development to the west, and the CN Railway (CNR) tracks to the south as shown on **Figure 1**. This hydrogeological assessment report supports a Draft Plan of Subdivision application (prepared by MHBC and dated February 3, 2023) for the proposed Wilmot Woods Residential Subdivision in the Township of Wilmot comprising 37.19 hectares (ha). Development plans include the construction of street-oriented residential units, three multiple residential blocks, parks lands and Stormwater Management (SWM) facilities with the required roads, municipal services (storm, sanitary, and water), and open space blocks.

The Hydrogeological Assessment Report summarizes existing site geology and hydrogeology for the purposes of helping guide the development of a Hydrogeological Conceptual Site Model (HCSM) that describes the relationship between the local and regional groundwater flow systems. The HCSM will be used to aid decision support initiatives related to groundwater management needs with respect to local and regional groundwater flow conditions, groundwater-surface water interactions, and Source Water Protection (SWP) issues with respect to the proposed residential development, underground municipal services, and stormwater management (SWM) facilities. The following summarizes the conclusions and recommendations from the Hydrogeological Assessment Report:

- The subsurface sediment stratigraphy can be summarized as primarily being silty to clayey silt material up to 12m bgs. The primary aquifer of interest is focused on the shallow overburden aquifer deposit (Upper Waterloo Moraine Aquifer or Regional Aquifer 1).
- Groundwater flow is interpreted to flow northward toward Waterloo Street and south toward Wilmot Employment Lands (WEL) from the topographic high in the central region of the Subject Lands, which coincides with the subwatershed boundary.
- Vertical hydraulic gradients are downward at the interpreted groundwater divide that coincides with the subwatershed boundary between the Upper and Lower Nith subwatersheds.
- Groundwater levels were encountered at a depth range of 0.1m bgs to 6.0m bgs.
- On-going groundwater monitoring will be continued at 13 monitoring well locations and 1 mini-piezometer.
- If required, an evaluation of construction dewatering volumes will need to be conducted during detailed design to support a construction dewatering plan that may include an Environmental Activity and Sector Registry (EASR) submittal or Permit to Take Water (PTTW) approval.

1.0 Introduction

MTE Consultants Inc. (MTE) was retained by Wilmot Woods Development Inc. to complete a Hydrogeological Assessment Report within the lands encompassing Lot 20 in the German Block South Concession south of Snyder's Road in the Town of New Hamburg, Ontario (Subject Lands). The Subject Lands are bounded by Waterloo Street to the north, agricultural lands to the east, Forest Glen residential development to the west, and the CN Railway (CNR) tracks to the south as shown on **Figure 1**. The Hydrogeological Assessment Report supports a Draft Plan of Subdivision application (prepared by MHBC and dated February 3, 2023) for the proposed Wilmot Woods Residential Subdivision in the Township of Wilmot comprising 37.19 hectares (ha).

The Hydrogeological Assessment Report summarizes existing subsurface geology and hydrogeology to assist with developing a Hydrogeological Conceptual Site Model (HCSM) to aid decision support initiatives related to groundwater management needs with respect to local and regional groundwater flow conditions, groundwater-surface water interactions, and Source Water Protection issues.

1.1 Development Considerations

A revised Draft Plan for the proposed development was prepared by MHBC, dated February 3, 2023. The current Draft Plan includes residential blocks, three multiple residential blocks, two stormwater management (SWM) blocks, one park block, a service corridor, four open space blocks, trail and walkway blocks as well as road allowances. The proposed development will be serviced with municipal water and sanitary sewers. A copy of the Draft Plan is provided in **Appendix A**. The Hydrogeological Assessment Report will support the Draft Plan of Subdivision application prepared by MHBC (MHBC Drawing 1, File No. 2123A), for the proposed residential subdivision identified as the Wilmot Woods Subdivision (WWS).

This Hydrogeological Assessment Report makes use of findings from previous geotechnical investigations conducted by Peto MacCallum Limited (PML) in 2019 and finalized in 2022 with supplemental field data collected by MTE since Winter 2021. This report addresses potential concerns with respect to managing groundwater resources to the satisfaction of the Township of Wilmot, among other stakeholders, and has sufficient regard for relevant portions of the *Draft Hydrogeological Study Standards*[1] and the *Provincial Policy Statement*[2]. More specifically, the Hydrogeological Assessment Report demonstrates a sufficient regard for matters related to potential groundwater issues, such as, but not limited to, seasonal groundwater level fluctuations, infiltration concerns, source water supply issues, and short-term construction dewatering, if required, through the assessment of the following:

1. Interpretation of the groundwater flow direction beneath the Subject Lands.
2. Differentiating between a shallow groundwater condition and the regional water table.
3. Addressing groundwater flow with respect to the closest municipal water supply wells and Source Water Protection.
4. Water quality analysis to benchmark groundwater quality.

The Hydrogeological Assessment Report should be read in conjunction with MTE's Preliminary Stormwater Management (SWM) report entitled, "*Wilmot Woods Subdivision Preliminary Stormwater Management Report, New Hamburg, Ontario*" dated March 2023, and MTE's

[1] Township of Wilmot and Woolwich Township, No Date or Page Numbers.

[2] Provincial Policy Statement, 2014. Section 2.2.

Functional Servicing Report (FSR) entitled, "*Wilmot Woods Subdivision Functional Servicing Report, New Hamburg, Ontario*", dated March 2023.

An *Enhanced Master Drainage Plan* (EMDP) was undertaken for the Wilmot Employment Lands (WEL), located south of the CN railway corridor, by the Township in 2012. The EMDP was approved by the Township, the Region of Waterloo (ROW), the Grand River Conservation Authority (GRCA), and the Ministry of Transportation of Ontario (MTO). The purpose of the EMDP was to prepare a comprehensive SWM strategy for the contributing subwatershed (of which a portion of the Wilmot Woods subdivision is a part of). As part of the design considerations presented in MTE's Final SWM report for the WEL (located directly south of the subject lands between the CN railway and Highway 7/8), storm servicing outlets were proposed for the subject lands through the WEL property. Furthermore, a communal quantity and quality control SWM Facility (SWMF) adjacent to Highway 7/8 is proposed to provide quality control for the upstream lands.

The preliminary design strategies for stormwater management within the subject lands have been developed to be in accordance with the recommended solutions within the EMDP and MTE's design submissions for the WEL.

The proposed development is comprised of residential land use with two SWM blocks (SWMF1 and SWMF2). SWMF1 is located along the western property line between Charles Young Avenue and Ingold Avenue. It will discharge across Street Two, and through the open space block via a constructed swale to the existing IGMD to the east, which then drains under Waterloo Street. Drainage from a small portion of the northern end of Street Two that is unable to be directed towards SWMF1, will be directed towards an Oil-Grit Separator (OGS) and infiltration gallery treatment train prior to outletting to the IGMD.

SWMF2 is centrally located along the south property line, immediately east of the existing woodlot/wetland. This facility will discharge to an existing 900mm diameter culvert beneath the CN railway corridor and then to an existing watercourse immediately downstream of the railway crossing. A new conveyance channel constructed within the WEL development will pick up this watercourse and will convey storm drainage to the proposed SWMF located along the north side of Highway 7/8.

1.2 Purpose and Objectives

The purpose of the Hydrogeological Assessment is to develop a comprehensive HCSM, which captures the local scale geologic and hydrogeologic framework, to help identify and address potential areas of concern related to the proposed future development. The objectives of the Hydrogeological Assessment are:

- Describe the local scale geology and hydrogeology in relation to the regional scale context;
- Assess hydraulic conditions and functions of the local scale water features (i.e. wetland areas);
- Assess permeability of subsurface sediment conditions; and
- Evaluate background water quality conditions.

1.3 Scope of Work

The scope of work includes a review of regional and local scale geology (i.e. surficial and subsurface geology), physical characteristics of regional aquifer and aquitard units, evaluation of the groundwater flow system, summary of groundwater takings near the Subject Lands,

estimates of groundwater recharge, and groundwater-surface water interaction between the local surface water features and the regional overburden aquifer system.

To facilitate readability and use of this document, the Hydrogeological Assessment Report is divided into a number of sections[3], described below:

- Section 1 presents an Introduction to the study, including development considerations, purpose, objectives and scope of work;
- Section 2 reviews the Investigation Methods used to carry out the Hydrogeological Assessment Report;
- Section 3 summarizes the Existing Conditions that describes the geology and hydrogeology of the Subject Lands and surrounding area;
- Section 4 presents the Hydrogeological Conceptual Site Model, which is used to conceptualize the relationship between the local and regional groundwater system;
- Section 5 provides the Impact Assessment that details the potential future development impacts;
- Section 6 delivers the Conclusions at the Subject Lands;
- Section 7 provides the Recommendations for future work that will address ongoing monitoring needs; and
- Section 8 and Section 9 provides the Limitations and lists all References, respectfully, used in the Hydrogeological Assessment Report.

1.4 Previous Studies

In addition to the fieldwork program completed as part of this study, MTE reviewed a number of reports and/or documents applicable to the Subject Lands regarding the physical framework and hydrologic characteristics, some regional in nature and some site specific. Each investigation contributed to an improved understanding of the HCSM within the limitations of the scope of this Hydrogeological Assessment. A background review of previous studies was completed for this report using the following:

- Ontario Geological Survey, *Three-dimensional Mapping of Surficial Deposits in the Regional Municipality of Waterloo, Southwestern Ontario, Groundwater Resource Study 3*, (Bajc and Shirota, 2007).
- Lake Erie Region Source Protection Committee (LERSPC). *Grand River Source Protection Area Proposed Assessment Report*. February 2, 2021.
- Peto MacCallum Ltd. Geotechnical Investigation Proposed Wilmot Woods Development, New Hamburg, Ontario. PML Reference 18KF031, Report 1. February 24, 2022a.
- Peto MacCallum Ltd. Geotechnical Investigation Proposed Wilmot Woods Development, CN Railway Crossing, New Hamburg, Ontario. PML Reference 18KF031, Report 2. February 24, 2022b.
- Peto MacCallum Ltd. Monitoring Well Water Level Reading Proposed Wilmot Woods Development, New Hamburg, Ontario. PML Reference 18KF031, Report 3. February 24, 2022c.

[3] Hydrogeological Assessment Submissions, 2013, pp.8-22.

The Ontario Geological Survey (OGS) developed a three-dimensional (3-D) conceptual geological model of overburden sediments within the Region of Waterloo (ROW)[4]. The OGS's conceptual geological model is comprised of 19 stratigraphic layers, which are summarized in **Table 3.1,** below. Overburden sediments encountered beneath the Subject Lands have been separated into 12 stratigraphic units based on their properties and depth. The OGS geological model was used to aid in our understanding of the lateral extent of various regional geological and hydrogeological units beyond the Subject Lands boundary.

The Ministry of Environment, Conservation, and Parks (MECP) Water Well Record Database (WWRD) was also used as a source of geologic information. However, the locations and elevations of the MECP well records are not always accurate but they were still plotted to assist with local and regional hydrogeologic characterization of the Subject Lands.

1.5 Study Area and Subject Lands Description

The Subject Lands have an area of approximately 37.19ha (~92 acres). They are bounded by Waterloo Street to the north, agricultural lands to the east, Forest Glen residential development to the west, and the CNR tracks to the south (**Figure 1**). Existing topographic conditions for the Subject Lands are illustrated in **Figure 2**. The topographic contours are sloped toward Waterloo Street to the north and the railway track to the south, from a topographic high of approximately 348 metres above mean sea level (m amsl) to 340m amsl in the north region of the Subject Lands and to an elevation of approximately 342m amsl south of the Subject Lands. Under existing conditions, the subject lands are moderately sloped throughout most of the site (generally between 1.0% and 6.0%). The northern portion of the Subject Lands drains towards the Ivan Gingerich Municipal Drain (IGMD) and flows northward, through a culvert beneath Waterloo Street, eventually reaching the Nith River approximately 700m away. The southern portion of the Subject Lands primarily drains to an adjacent woodlot and locally significant wetland feature along the CNR railway, as illustrated in **Figure 2**. This wetland feature has a positively draining surface outlet, through the existing 900mm diameter culvert under the CN railway and flows south through the remainder of the wetland towards the WEL.

The Subject Lands bisects the Nith River Upper subwatershed to the north and the Nith River Lower subwatershed to the south. The GRCA delineated a small locally significant wetland south of the Subject Lands just beyond the railway line[5] (**Figure 1**).

The Subject Lands is situated in the physiographic region known as the undrumlinized Stratford Till Plain, which consists of a broad clay plain extending from London in the south to Blyth and Listowel in the north. The till is uniform and consists of brown, calcareous silty clay[6].

Climate in the study area is termed "humid continental". The temperature high averages to about 12^{o}C and the lows average to approximately 2^{o}C[7]. Historical average precipitation (1951 to 2005) is 844.8mm from the Waterloo Wellington airport weather station. Most precipitation falls as snow from November to March.

[4] Bajc and Shirota, 2007.

[5] https://maps.grandriver.ca, November 2, 2021.

[6] Chapman and Putnam, 1984.

[7] Environment Canada: Climate Normals 1951-2005. https://climate.weather.gc.ca/climate_normals/, November 2, 2021.

2.0 Investigation Methods

Investigative sampling and monitoring tools were employed to collect detailed geologic and hydrogeologic information to supplement existing local scale knowledge. An initial desktop hydrogeological review was completed prior to commencing the field work program in 2021. The fieldwork program assisted our evaluation of the shallow regional groundwater condition beneath the Subject Lands as part of the Draft Plan of subdivision process. Results from this work improved upon our HCSM understanding of the Subject Lands from previous investigations[8]. Investigation methods completed between March 2021 and the present included the following components:

- Review of secondary sources of geologic information (Section 1.4). Source Water Protection (Tier 3) documents and other historical hydrogeological studies in the surrounding area were also reviewed.
- Drilling of four new boreholes between March 31, 2021, and April 1, 2021 with monitoring well installation in each borehole to varying depths from 6.1m bgs to 12.8m bgs, which were used for groundwater level monitoring and water quality sampling.
- Manual groundwater level measurements and installation of 13 electronic data loggers to measure continuous groundwater levels. An on-going groundwater monitoring program was implemented for the Subject Lands in 2021 to document pre-construction groundwater levels.
- Single well hydraulic response testing in 13 monitoring wells (slug testing).
- Abandoning one monitoring well drilled by Peto MacCallum Ltd. (PML) that was damaged (MW103) and re-drilling a new monitoring well to replace it (MW202-21) in April 2021.
- Collect four groundwater samples from MW102 (relabeled as MW102-18 within this report), MW107 (relabeled as MW107-18 within this report), MW202-21, and MW203B-21 for water quality analysis.

2.1 Well Drilling and Construction

2.1.1 Peto MacCallum Ltd. Well Construction

Peto MacCallum Ltd. (PML) was retained by the IBI Group Inc. on behalf of NH Properties Inc. (previous owners) to conduct a drilling program comprised of 22 boreholes (identified as BH1 to BH12 and MW101 to MW110) between July 30, 2018, and October 15, 2018 using the Continuous Flight Solid Stem Augers technique. The drilling depths ranged from 6.5m bgs to 12.6m bgs with monitoring wells installed in ten of the boreholes (MW101 to MW110)[9]. For the purpose of this Hydrogeological Assessment Report, MTE labeled PML's monitoring wells with the sequential number (MW101) followed by the year indicating date of well completion (e.g. MW101-18 indicates MW101 was drilled in 2018, see Table 2.1). The borehole and monitoring well locations are displayed on **Figure 2**. The borehole logs are attached in **Appendix B**. The monitoring wells were equipped with 50mm diameter schedule 40 PVC pipe with a slotted 1.5m long well screen. A sand pack was installed in the borehole annulus across the screened interval and bentonite seals were placed between the top of the sand pack and ground surface.

[8] Peto MacCallum Ltd., 2022a. Report 1.

[9] Peto MacCallum Ltd., 2022a, Report 1, pp. 3.

Locked mount steel protective surface casings were placed over each monitoring well to ensure their safety and integrity according to Ontario Regulation 903 (as amended).

Prior to initiating the groundwater level monitoring program, monitoring wells MW101-18, MW102-18 and MW104-18 through MW110-18 were developed by hand using Waterra tubing with an attached foot valve to remove any fine-grained material from around the well screen interval.

2.1.2 MTE Consultants Inc. Well Construction

MTE was retained by Wilmot Woods Development Inc. to follow-up with additional drilling for the Subject Lands comprised of four monitoring wells (MW201-21, MW202-21, and MW203A,B-21) between March 31, 2018 and April 1, 2021 using the continuous flight hollow stem augers technique. The drilling depths ranged from 6.1m bgs to 12.8m bgs. The borehole and monitoring well locations are displayed on **Figure 2**. The borehole logs are attached in **Appendix B**. The monitoring well construction details are summarized in Table 2.1.

Table 2.1: PML and MTE Monitoring Well Construction Details

Well ID	MTE ID[a]	Easting	Northing	Ground Elevation[c]	Top of Casing[c]	Screened Interval	Screened Lithologic Unit
		(m)	(m)	(m amsl)	(m amsl)	(m bgs)	
MW101	MW101-18	523684	4804596	339.20	340.12	4.6 – 6.1	Clayey silt
MW102	MW102-18	523788	4804395	340.15	341.11	4.5 – 6.0	Sandy silt
MW103	MW103-18	524180	4803929	343.31	344.24	4.5 – 6.0	Clayey silt
MW104	MW104-18	524179	4803928	344.95	345.88	4.5 – 6.0	Clayey silt
MW105	MW105-18	524125	4804436	341.08	342.16	4.5 – 6.0	Clayey silt
MW106	MW106-18	524545	4804377	342.96	344.13	4.5 – 6.0	Clayey silt
MW107	MW107-18	524733	4804138	347.01	348.06	4.5 – 6.0	Clayey silt
MW108	MW108-18	524541	4804122	345.30	346.42	4.5 – 6.0	Clayey silt
MW109	MW109-18	524438	4803983	340.06	340.92	8.5 – 10.0	Clayey silt
MW110	MW110-18	524498	4803958	340.04	340.75	10.9 – 12.4	Clayey silt
MW201-21	MW201-21	523913	4804244	343.52	344.38	4.6 – 6.1	Clayey silt
MW202-21	MW202-21	524057	4804308	342.08	343.13	4.5 – 6.0	Silty sand
MW203A-21	MW203A-21	524301	4804219	344.73	345.70	10.6 – 12.1	Clayey silt
MW203B-21	MW203B-21	524300	4804221	344.77	345.72	4.6 – 6.1	Silt

Note:
a. MTE re-labeled the historical monitoring wells using MTE's nomenclature labeled "MW" with the year and number indicating date of completion (e.g. MW101-18 represents monitoring well number "101" drilled in 2018).

MTE Monitoring wells were labeled "MW" with the sequential number and year indicating date of completion (i.e. MW201-21 represents monitoring well number 201 drilled in 2021). Monitoring wells labeled with a letter identifier indicates the order and depth of installation ("A" being the first and deepest well). Similarly, boreholes and/or monitoring wells drilled and installed by other consultants for a specific year are named by the same procedure. The monitoring wells were equipped with 50mm diameter schedule 40 PVC casing and a #10 slotted 1.52m long PVC well

screen. A sand pack was installed in the borehole annulus across the screened interval and bentonite seals were placed between the top of the sand pack and ground surface. Locked mount steel protective surface casings were placed over each monitoring well to ensure their safety and integrity according to Ontario Regulation 903 (as amended).

Prior to initiating the groundwater level monitoring program, monitoring wells MW201-21 through MW203B-21 were developed by hand using Waterra tubing with an attached foot valve to remove any fine-grained material from around the well screen interval.

2.1.3 MTE Consultants Inc. Mini-Piezometer Installation

In January 2022 a drive-point mini-piezometer (MP01-22) was installed within the wetland area near MW109 to assess groundwater conditions. The location of the MP01-22 is located on **Figure 2**, with a copy of the log is in **Appendix B**. The mini piezometer was installed by threading the manufactured 1-foot screen to the riser using a coupler and pounding it into the ground to the desired depth. A soil probe was inserted into the ground to the completion depth to log the sediments the mini piezometer was installed within.

2.2 Groundwater Level Monitoring

MTE performed an initial field reconnaissance prior to the late March and early April 2021 drilling program to determine the accessibility of the PML drilled monitoring wells for incorporation into the groundwater monitoring program. MTE collected manual groundwater level measurements between March 2021 and February 2023.

Pressure transducers (data loggers) were installed by MTE in March and April 2021 in 13 monitoring wells. The data loggers collect groundwater levels at hourly intervals. The purpose of the continuous groundwater level monitoring is to:

- Observe on-going groundwater level trends;
- Assess factors contributing to groundwater level fluctuations;
- Assess horizontal and vertical hydraulic gradients;
- Determine the direction of groundwater flow and average linear groundwater velocity across the Subject Lands; and
- Assess the separation distance between the groundwater table and proposed final grade surface.

Manual and automatic water level measurements were recorded as metres below top of casing (m btoc). The ground surface elevation and top of casing elevation at each monitoring well was surveyed by MTE staff to a geodetic elevation and are summarized in Table 2.1.

2.3 Hydraulic Testing

Hydraulic conductivity (K) estimates for subsurface sediment were locally estimated by MTE through single well hydraulic response tests (slug testing) on April 20, June 2, November 23, and November 25, 2021. Slug tests were performed on 13 monitoring well locations: MW101-18, MW102-18, MW104-18 through MW107-18, MW109-18, MW110-18, MW201-21 through MW203B-21. Monitoring well MW108-18 could not be tested as the water level within this well was too low to complete a slug test, recovery test or a proper falling head test as much of the sediment surrounding the well screen is unsaturated and these tests are used to assess saturated conditions.

Either a slug of known displacement was rapidly introduced (falling head test) or removed (rising head test) from the monitoring well as a means of inducing an immediate water level response.

In many cases, a monitoring well was purged dry and allowed to recover to complete the testing due to the low permeable environment. A data logger was programmed to collect groundwater level measurements during the hydraulic response testing. Data was analyzed using Aquifer Test Pro software[10] with the Bouwer & Rice (1976) method. The analysis and resultant K values are presented in **Appendix C**.

Lastly, MTE also empirically derived the hydraulic conductivity of the saturated sediments using available particle size distribution curves obtained from the screened intervals of monitoring wells. The resultant K values are presented in **Appendix C**.

2.4 Groundwater Quality Analysis

On April 19, 2021, MTE collected groundwater samples from three monitoring wells (MW102-18, MW202-21, and MW203B-21) and one sample (MW107-18) was collected on November 23, 2021, to establish background groundwater quality. Groundwater samples were collected again on April 18, 2022, and February 6, 2023 as part of the ongoing groundwater quality monitoring program. A minimum of three well volumes were removed during purging to remove any fine-grained sediment material from the well screen interval prior to water quality sampling to ensure representative samples were collected. Water samples were collected in pre-cleaned laboratory supplied sample bottles and stored in coolers with ice before being delivered to ALS Laboratories – Environmental Division of Waterloo, Ontario under Chain of Custody documentation for analysis. The Laboratory Certificates of Analysis are provided in **Appendix D**.

2.5 Private Well and Septic System Survey

In accordance with the Township of Wilmot and Woolwich Township's *Draft Hydrogeological Study Standards* (Chapter 13 of the Engineering Design Manual), a private well and septic system study was conducted. Due to the COVID-19 Global Pandemic, a questionnaire was mailed to properties within a 500m radius of the property to confirm whether the property was connected to municipal water and sewer. The questionnaire was mailed in March 2021 and again in November 2021. Properties located along Hostetler Road, Laschinger Boulevard, Nithview Court, Ritz Crescent, Ingold Avenue, Charles Young Avenue, Captain McCallum Drive, and addresses along Waterloo Street located south of Hostetler Road were excluded from the circulation as these properties are located within municipally serviced areas. It is noted however, that properties along Hamilton Street were included if a private well or septic system was located on their property for industrial purposes. A copy of the questionnaire is in **Appendix E.**

3.0 Existing Conditions

Characterizing existing conditions is necessary for planning and protecting the ecological and hydrogeological integrity within a watershed. Provided that a detailed local characterization is established, an integrated and long-term monitoring plan can then consider potential negative cumulative impacts of development.

3.1 Regional Geology Setting

An extensive amount of work on the Quaternary geology in the Region of Waterloo (ROW) was completed since the 1950's. The current regional Quaternary geologic review is based on the following information:

[10] Waterloo Hydrogeologic Inc., 2020.

- Quaternary Geology, Stratford-Conestogo Area[11];
- Quaternary Geology of the Hamilton-Cambridge Area[12]; and
- Ontario Geological Survey (OGS) three-dimensional (3-D) geologic conceptual model[13].

To understand and recognize the geological and hydrogeological terms, the reader is referred to Table 3.1, below.

3.1.1 Quaternary Geology

The ROW has relatively thick glacial overburden deposits overlying bedrock attaining thicknesses in excess of 100m. At the Subject Lands the overburden thickness is in excess of 40m thick based on the OGS three-dimensional (3-D) conceptual geological model. In general, silty to clayey till was deposited as extensive sheets during different periods of glacial ice advance. Granular materials, such as outwash and kame sand, gravels and glaciolacustrine fine-grained deposits (such as silt and clay), were deposited during the ice retreat[14]. The Quaternary Geology Map (**Figure 3**) identifies regional surficial deposits of clay to silt-textured till with pockets of ice-contact stratified deposits of sand and gravel with minor silt, clay and till. Important hydrostratigraphic units are found in **Table 3.1** from a groundwater recharge and flow perspective are:

- Youngest tills represented by the Upper Maryhill Till & equivalents (ATB1: Regional Aquitard 1);
- Shallow aquifer overburden deposit identified as the Upper Waterloo Moraine Aquifer (AFB1: Regional Aquifer 1);
- Lower, older till units (Lower Maryhill Till (ATB3: Regional Aquitard 2) and Catfish Creek Till (ATC1: Regional Aquitard 3); and
- Deep regional aquifer unit of the Pre-Catfish Creek Sand and Gravel and Canning Drift Till (AFD1: Regional Aquifer 3). The Canning Drift Till and Pre-Canning aquifers are a part of Regional Aquifer 3, which rests on the bedrock surface.

The Maryhill Till is a fine textured clay rich till closely associated with glaciolacustrine sediments and is further subdivided into three units (Upper, Middle, and Lower Maryhill Till). The Lower Maryhill Till is considered to be a regionally significant aquitard and will “act as a significant barrier to vertical water movement where present in a thickness greater than 5 metres”[15]. The Lower Maryhill Till is compositionally distinct and can be observed to a large degree across the ROW[16] .

Underlying these younger tills is the Catfish Creek Till, a stoney, silty to sandy diamicton, which is often over consolidated and forms an important marker horizon beneath Regional Aquifer 1 within the ROW[17]. As a result of these characteristics, it is often referred to as “hardpan” by water well drillers. The Catfish Creek Till acts as an important, relatively continuous regional aquitard that is compositionally distinct and is widely distributed across the ROW.

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[11] Karrow, 1993
[12] Karrow, 1997
[13] Bajc and Shirota, 2007
[14] Karrow, 1993.
[15] Terraqua Ltd., 1995.
[16] Farvolden et al., 1987.
[17] Bajc and Shirota, 2007. pp.15.

Table 3.1: Regional Geological and Hydrogeological Framework

OGS Nomenclture[1]	Regional Unit	Hydrogeological Unit	Geologic Description[1]
ATA1		Whittlesey Clay	Composed primarily of sands.
AFA1		Whittlesey Sand	Composed primarily of silts and clays.
ATA2		Wentworth Till	Stratified deposits of sand and cobble-boulder gravel.
AFA2		Grand River valley	Outwash deposits consisting of well bedded sands and gravels.
ATA3		Lower Grand River Valley	Silt and clay valley fill.
ATB1	**Aquitard 1**	Upper Maryhill Till, Port Stanley Till, Tavistock Till, Mornington Till	Silty to clayey tills (Upper Maryhill Till) and silty to sandy and more transmissive (Port Stanley Till).
AFB1	**Aquifer 1**	Upper Waterloo Moraine	Consists primarily of fine to medium sand with localized accumulations of gravel.
ATB2	Aquitard 1	Middle Maryhill Till	Till or glaciolacustrine sediments.
AFB2	Aquifer 1	Middle Waterloo Moraine	Aquifer and equivalents.
ATB3	**Aquitard 2**	Lower Maryhill Till	Fine-textured glaciolacustrine sediments. This unit acts as a significant regional aquitard.
AFB3	Aquifer 2	Lower Waterloo Moraine aquifer or Catfish Creek Till outwash	Sand and gravel.
ATC1	**Aquitard 3**	Upper/Main Catfish Creek Till	Stoney, silty to sandy diamicton.
AFC1		Middle Catfish aquifer	Glaciofuvial deposits.
ATC2	Aquitard 3	Lower Catfish Creek Till	Till is stoney with a silty to sandy matrix.
AFD1	**Aquifer 3**	Pre-Catfish Creek Sands and Gravels	Stratified sand and gravel.
ATE1		Canning Drift	Till and associated fine-textured (silt to clay) lake deposits.
AFF1		Pre-Canning aquifers	Sand & gravel.
ATG1	**Aquitard 4**	Pre-Canning aquitards	Stony, silty to sandy till.
Bedrock	**Aquifer 4**	Silurian and Lower Devonian	Weathered bedrock, carbonates and shales.

Note:
Grey highlighted areas interpreted to be present beneath the Subject Lands.
1. Ontario Geological Survey naming convention and geologic description (Bajc and Shirota, 2007).

3.1.2 Paleozoic Bedrock Geology

The ROW is located on the eastern rim of the Michigan Basin. The Paleozoic bedrock dips gently to the southwest towards the centre of this basin. The regional bedrock mapping surface by the OGS indicates bedrock subcrops the Subject Lands at elevations in the 295m amsl to 305m amsl range. The ROW is underlain, east to west and oldest to youngest, by Silurian age Guelph (dolostone), Salina (dolostone, shale, salt, and gypsum) and Bass Islands (dolostone) Formations. Bedrock underlying the Subject Lands is the Salina Formation of the Silurian Period. The Salina Formation consists of interlayered green shale and brown dolomite and contains abundant evaporite minerals such as gypsum ($CaSO_4 \cdot 2H_2O$). There were no boreholes or monitoring wells drilled into the bedrock as part of this Hydrogeological Assessment Report. However, according to the depth to bedrock reported in the NH03 municipal well it is anticipated bedrock will be encountered at approximately 57m bgs.

3.2 Regional Hydrogeologic Setting

Groundwater flow within the Subject Lands is controlled by topography, geology, aquifer thickness, and hydrostratigraphic structure. The north region of the Subject Lands was identified as a Significant Groundwater Recharge Area (SGRA)[18] primarily in the permeable ice-contact sand deposit. Further to the south to southeast, there is an increased occurrence of low permeability till materials near ground surface and at depth, resulting in less water infiltrating and more evapotranspiration and surface water runoff. In these low recharge/low permeable environments groundwater may discharge to surface water features such as the IGMD or local wetland areas.

The shallow groundwater system is primarily composed of Upper Waterloo Moraine sediments extending across a large portion of the ROW with intervening fine-grained units of till. The Upper Waterloo Moraine aquifer (Regional Aquifer 1) deposit overlies the Lower Maryhill Till (Regional Aquitard 1) and Catfish Creek Till (Regional Aquitard 3) and consist primarily of fine to medium sand with localized accumulations of gravel and isolated lenses of muddy glaciolacustrine sediments and diamicton[19]. Moraine topography, surficial geology, aquifer thickness, and hydrostratigraphic structure control the path of infiltrating water from ground surface downwards and laterally to the water table in Regional Aquifer 1.

Within the Subject Lands, the regional groundwater flow direction is inferred to be primarily from the topographic high represented by the subwatershed boundary forming a groundwater divide. Groundwater flow is toward the north and south of the Subject Lands from the interpreted groundwater divide.

3.3 Local Geologic and Hydrogeologic Setting

Previously drilled boreholes and installed monitoring wells by PML, MECP Water Well Records, and MTE monitoring wells (MW201-21 to MW203A, B-21) were used to interpret local hydrostratigraphic units and generate three geological cross-sections through the Subject Lands (**Figure 2**). Regional Geological Cross-Section A-A' is presented on **Figure 4**. Local Geological Cross-Sections (Cross-Section B-B' and C-C') are presented on **Figure 5** and **Figure 6**, respectively. The HCSM interprets the local subsurface sediments as follows:

- 0 – 0.8m bgs: Topsoil material consisting of some organics and some fill; and
- 0.8 – 12.8m bgs: Extensive silt to clayey silt sediment to the borehole termination depths at all borehole locations.

[18] https://maps.grandriver.ca, November 2, 2021.

[19] Bajc and Shirota, 2007, pp.32-33.

There were localized lenses of silty sand to sand sediment encountered above and below the predominately clayey silt material, particularly in the north region of the Subject Lands. The geologic interpretation is used to determine the extent and continuity of the underlying aquifer and aquitard units beneath the Subject Lands. All cross-sections illustrate the locations of boreholes and monitoring wells available from previous geotechnical and hydrogeological studies. In addition to this borehole information, geological model layer surfaces from the OGS geological model[20] were also incorporated into the HCSM. The well name or MECP well record number are displayed on the top of the cross-section line, followed by the offset distance in metres between the well and the cross-section line. Wells that are further away from the cross-section line may display as being above or below the cross-section line because the elevations of the hydrostratigraphic layers are displayed along the cross-section line, whereas the wells/boreholes are overlain on the cross-sections. Therefore, there may be variability in the elevation of the various hydrostratigraphic units along the cross-section at individual boreholes.

Geological Cross-section A-A' (**Figure 4**):

- Extends approximately 2.5km northeast to southwest through the Subject Lands (from Nith River in the north to the Hwy 7/8 in the south).
- Illustrates a variable topography from a low of 333m amsl in the north near the Nith River to a high of approximately 345m amsl near BH6.
- The depth to the water table ranges from approximately 1.4m bgs to 2.6m bgs across the Subject Lands within Regional Aquifer 1 (~337m amsl to 342m amsl).
- A relatively thick upper aquitard material of silt to clayey silt, identified as Upper Maryhill Till and equivalents (Regional Aquitard 1), is between 3m to 8m thick.
- Portrays a relatively thick subsurface sequence of overburden material (Regional Aquifer 1) that is composed primarily of silty fine sand with overlying discontinuous lenses of low permeable material (primarily silt to clayey silt) with thicknesses ranging from 5m to 20m.
- A relatively thick aquitard material, identified as Lower Maryhill Till (Regional Aquitard 2), is between 3m to 9m thick.

Geological Cross-section B-B' (**Figure 5**):

- Extends approximately 1.2km south to north through the Subject Lands (from the CN railway south of the Subject Lands boundary adjacent to the local PSW to Waterloo Street).
- Illustrates a relative variable topographical change from a central topographic high of 345m amsl at the subwatershed boundary separating the Upper and Lower Nith subwatersheds forming a groundwater divide, leading to topographic lows to the north (~343m amsl) and to the north (~340m amsl).
- The depth to the water table ranges from approximately 1.4m bgs to 3.2m bgs within Regional Aquifer 1 (~337m amsl to 342m amsl)[21].

[20] Bajc and Shirota, 2007. pp13-16.

[21] Peto MacCallum Ltd., 2022c, Table 1.

- Portrays sequences of alternating aquitard and aquifer overburden deposits reflecting discontinuous deposits of Regional Aquitard 1 (ATB1), a relatively thick subsurface sequence of overburden aquifer material identified as Regional Aquifer 1 (AFB1), and Regional Aquitard 2 (Lower Maryhill Till or ATB3).

Geological Cross-section C-C' (**Figure 6**):

- Extends approximately 550m east of the IGMD to the western boundary of the Subject Lands.
- Illustrates a slightly undulating topography from approximately 345m amsl to a low of 341m amsl.
- The depth to the water table is approximately 2m bgs within Regional Aquifer 1 (~342m amsl).
- Portrays a subsurface sequence of overburden material (Regional Aquifer 1) that is composed primarily of silty fine sand with overlying discontinuous lenses of low permeable material (primarily silt to clayey silt) with thicknesses ranging from 5m to 8m.
- The Lower Maryhill Till (Regional Aquitard 2) is approximately 3m thick.

3.4 Local Hydrogeologic Setting

The Hydrogeological Assessment Report focuses on a detailed examination of the various factors controlling the movement of groundwater within Regional Aquifer 1. The detailed field data collected from the Subject Lands improves our understanding of the overburden aquifer system and the interpretation of local geology and hydrogeology within a regional scale context.

3.4.1 Hydraulic Conductivity

Qualitatively, hydraulic conductivity (K) is a parameter describing the ease with which groundwater flow occurs through a porous medium. Permeable aquifer deposits like sand and gravel have relatively large K values, less permeable material like silt or clay have relatively small K values. Representative values for hydraulic conductivity for various sediment types are presented in Freeze and Cherry (1979).

MTE completed single well hydraulic response tests (slug tests) for the following monitoring wells: MW101-18, MW102-18, MW104-18 through MW107-18, MW109-18, MW110-18, MW201-21 through MW203B-21. The slug tests were analyzed using the Bouwer & Rice (1976) method. Slug test assumptions and analysis are provided in **Appendix C**.

The resultant K values estimated by MTE based on slug testing ranged from 7.1×10^{-5}m/sec to 2.2×10^{-8}m/sec.

The lowest K value (6.8×10^{-8}m/sec) was observed at MW110-18, which was screened within a silt to clayey silt material located on the south side of the CN line, which is representative of the Upper Maryhill Till & equivalents (**Figure 2**). Typical K values in literature for silt vary between 1.0×10^{-6}m/sec to 1.0×10^{-9}m/sec[22].

The highest K value (7.1×10^{-5}m/sec) was observed in the north portion of the Subject Lands at MW202-21 where it is screened within the ice-contact stratified deposits to 6.7m depth (Regional Aquifer 1), composed primarily of silty fine sand. This regional overburden aquifer is a thick laterally extensive unit and can vary from a layered silt to silty fine sand throughout the

[22] Freeze and Cherry, 1979, Table 2.2, pp.29.

north portion of the Subject Lands. Typical K values in literature for fine sand vary between $1.0x10^{-4}$ m/sec to $1.0x10^{-6}$m/sec[23].

The resulting particle size distribution curves from MTE's 2021 drilling program as well as the particle size distribution curves from MW101-18, MW102-18, MW104-18, MW105-18, MW107-18 and MW109-18 drilled under PML's geotechnical investigation in 2018 were used to empirically derive hydraulic conductivity estimates by using the Beyer and Kaubisch formulae, where applicable. The resultant K values empirically derived ranged between $5.5x10^{-5}$m/sec to $2.8x10^{-11}$m/sec with a geometric mean of $2.8x10^{-10}$m/sec.

Overall, the estimated K values across the Subject Lands using both in-situ and empirically derived methodologies ranged from $7.1x10^{-5}$m/sec to $2.8x10^{-11}$m/sec with a geometric mean of $1.5x10^{-8}$m/sec. The resulting particle size distribution curves are in **Appendix C** and the K values are summarized in Table C.1.

3.4.2 Local Groundwater Flow System

Historical groundwater monitoring data for monitoring wells MW101-18 through MW110-18 is found in Table 1 of PML's report[24] and provided for in **Appendix F**. Manual groundwater levels were collected by MTE between March 2021 and October 2021 and are summarized in Table F.1. A steady-state groundwater flow map, using the average groundwater level values from both manual and continuously recorded water levels, is depicted on **Figure 7**. Groundwater is depicted to flow from a topographic high in the middle of the Subject Lands, representing a groundwater divide, toward groundwater lows near Waterloo Street in the north and the CN to the south.

One of the monitoring well locations (MW203A,B-21) are identified as a well cluster pair, which indicates that a shallow and deep monitoring well was installed at that location to evaluate vertical hydraulic gradients along the subwatershed divide. Data loggers installed in each monitoring well record groundwater levels on an hourly basis to capture the seasonal high water table, which is displayed on **Figure 8**. Hydrographs (Hydrograph 1 to Hydrograph 13) are presented in **Appendix F**. The groundwater levels exhibit seasonally high water levels in response to spring freshet and precipitation events. It is noted that the high water levels are temporary and decline over a short period of time to water level lows in the summer time.

The field data shows that the depth to groundwater ranges from approximately 0.1m bgs to 6m bgs (~337m amsl to 345m amsl). The greatest depth to groundwater occurs near the topographic high in the south region at MW108-18 (**Figure 9**). The shallowest depth occurs adjacent to the CN and local wetland in the southern most region of the Subject Lands (at MW109-18). The estimated horizontal hydraulic gradient (i) of the overburden aquifer system (Regional Aquifer 1) is estimated from **Figure 7** and is approximately 0.007m/m. The hydraulic gradient suggests that the overburden aquifer is a moderately transmissive unit in this region. The measured vertical hydraulic gradient at MW203A,B-21 was downward in the central region of the Subject Lands along the subwatershed divide that bisects the Upper and Lower Nith subwatersheds, which was derived from the GRCA drainage mapping.

The average linear groundwater velocity was estimated based on three input variables: hydraulic conductivity (K), horizontal hydraulic gradient (i), and effective porosity (n_e). The equation for calculating groundwater velocity is:

$$q = Ki/n_e \qquad \text{[Eq. 1.]}$$

[23] Freeze and Cherry, 1979, Table 2.2, pp.29.

[24] Peto MacCallum Ltd., 2022c, Table 1.

Where: q = groundwater velocity (m^3/m^2/unit of time)
K = effective hydraulic conductivity (m/sec)
i = horizontal hydraulic gradient (dh/dl) (m/m)
n_e = effective soil porosity

Utilizing a measured geometric mean K value of $5.4x10^{-7}$m/sec for the overburden aquifer; an aquifer porosity of 0.25, and a horizontal hydraulic gradient of 0.007m/m, the average horizontal linear groundwater velocity (q) using Darcy's Law (Eq.1) was estimated to be approximately 0.5m/year.

A pre-development, during construction and post-development groundwater level monitoring program is described Section 6.0 below.

Based on a review of the Ministry of Agriculture, Food and Rural Affair's online mapping system, portions of the Subject Lands are classified as systematically tiled, while other portions are classified as randomly tiled. It is likely the tile system is discharging to the on-site local wetland feature.

3.4.3 Groundwater-Surface Water Interactions

The on-site wetland likely receives some groundwater contributions through the discharging drainage tiles and during the seasonal high groundwater periods. To confirm the presence of groundwater in the on-site local wetland, a mini piezometer (MP01-22) was installed. The manual water level measurement taken on January 24, 2022, was 340.35m amsl and is generally characterized as a predominately-surface water driven feature with no substantive groundwater inputs. Based on the surface water elevation in the IGMD located near Waterloo Street (337.56m amsl) and the average groundwater elevation at MW101-18 (337.63m amsl) it is concluded that the IGMD is receiving, in part, some groundwater contributions. A data logger was installed in MP01-22 as part of the long-term groundwater monitoring program so that groundwater inputs to the local wetland can be better assessed. It is noted that the datalogger is removed from the mini piezometer during periods of consistent below freezing temperatures to avoid damage to the datalogger and incorrect readings.

3.4.4 Source Water Protection Considerations

The Clean Water Act[25] (CWA), passed by the Ontario legislature, protects drinking water at its source throughout Ontario. Protecting water at its source ensures safe drinking water for all. The task of developing Source Protection Plans (SPP) within the Grand River watershed was guided by the Lake Erie Region Source Protection Committee (LERSPC) and included the involvement of the Region of Water (ROW), among other stakeholders. Prior to the development of the SPP, several technical groundwater and surface water studies were completed. An Assessment Report[26] was completed by the LERSPC that included results from the groundwater and surface water technical studies. The Assessment Report identified regional municipal drinking water sources and described how vulnerable they were to contamination. The closest municipal water supply wells to the Study Area are identified as the New Hamburg Municipal Well Field (NH03 and NH04), located approximately 2.2km southwest of the Subject Lands. The supply wells have an open hole interval in the regional bedrock aquifer (Regional Aquifer 4) from approximately 57 metres below ground surface (m bgs) to 76m bgs[27]. The Subject Lands does not fall within the Wellhead Protection Area (WHPA) of NH03 or NH04 as depicted on **Figure 10**.

[25] Ministry of the Environment, Conservation, and Parks. 2006.
[26] LERSPC, 2021.
[27] LERSPC, 2021, pp. 8-433.

The Intrinsic Vulnerability aquifer mapping describes how easily a well can become polluted by a contaminant. An aquifer that can easily become contaminated is a Highly Vulnerable Aquifer (HVA), which is not present on the Subject Lands. The vulnerability assessment shows that the Subject Lands is predominately rated as a low vulnerability with only a small portion of the land in the southwest rated as medium vulnerability as depicted on **Figure 11**.

A small portion of the Subject Lands to the north is found to be within a SGRA with a mapped low vulnerability score of 2 as depicted on **Figure 12**. Finally, the Subject Lands is not located within an Issue Contributing Area (ICA) that may identify where a SPP policy may apply[28].

3.4.5 Groundwater Quality

Natural groundwater quality is important to benchmark prior to development to help address potential impact issues in the future related to hydrologic functions that need to be protected, improved, or restored and/or to protect private water supply wells drinking water quality, if required.

MTE collected one groundwater sample from four monitoring locations (MW102-18, MW107-18, MW202-21, and MW203B-21) on April 19, and November 23, 2021, April 18, 2022, and February 6, 2023. The analytical chemistry results are summarized on Table D.1 in **Appendix D**. The Laboratory Certificates of Analysis results are also found in **Appendix D**.

The sodium (Na^+) ion concentrations ranged from as low as 2.8mg/L at MW203B-21 to as high as 128mg/L at MW102-18. Likewise, the chloride (Cl^-) ion concentration ranged from a low of 1.1mg/L at MW203B-21 to as high as 254mg/L at MW102-18. The elevated concentrations of both Na^+ and Cl^- ion concentrations at MW102-18 can be attributed to the dissolution of NaCl from winter road de-icing compounds most likely from dumping or piling snow at end of Charles Young Avenue.

Historically, agricultural practices were the primary land use and continues to be so. Nitrate (NO^{3-}-N) concentrations can be elevated in rural areas due to decades of agricultural fertilizer use and can be useful as a tracer to help delineate groundwater movement beneath the Subject Lands. The NO^{3-}-N concentration ranged from <0.020mg/L to 0.57mg/L at MW102-18, MW107-18, MW202-21. The NO^{3-}-N concentration at MW203B-21 was 11.3mg/L at the April 2021 sampling event and has decreased to below the Ontario Drinking Water Quality Standard (ODWQS) with subsequent monitoring events with a concentration of 9.8mg/L in 2022 and 6.81mg/L in 2023.

Dissolved metals analysis indicates detected levels for barium (Ba^+), manganese (Mn^{2+}), potassium (K^+), silicon (Si^{2+}), and strontium (Sr^{2+}) levels. More specifically, Mn^{2+} concentrations ranged from 0.0001mg/L to 0.1mg/L, K^+ concentrations ranged from 0.6mg/L to 2.7mg/L, Si^{2+} concentrations ranged from 4mg/L to 7.6mg/L, and Sr^{2+} concentrations ranged from 0.13mg/L to 0.4mg/L.

The major ionic species in surface and groundwater (Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-, CO_3^{2-}, HCO_3^- and SO_4^{2-}) from the 2021, 2022 and 2023 sampling events are illustrated on a trilinear diagram (Piper, 1944) as percent composition of each cation of anion as depicted on **Figure 13**. Table 3.4.5.1, below, summarizes the general water types encountered on-Site based on the methodology outlined in Back (1961).

Much of the surface and groundwater across the Site can be classified as Ca-Mg HCO_3^- hard type water. In North America, there are three main compositional categories in which most natural groundwater from glacial deposits can be placed (Type I, Type II and Type III) (Freeze

[28] Source Protection Information Atlas, https://www.lioapplications.lrc.gov.on.ca/, May 3, 2021.

and Cherry, 1979). The water chemistry at the Site can be classified as Type II waters: slightly alkaline, fresh waters (< 1000 mg/L total dissolved solids [TDS]), in which the Ca^{2+} and Mg^{2+} are the dominant cations and HCO_3^- is the dominant anion.

Table 3.4.5.1 – Water Classification

Location	Classification
MW102-18	Ca-Mg HCO_3^-
MW107-18	Ca-Mg HCO_3^-
MW202-21	Ca-Mg HCO_3^-
MW203B-21	Ca-Mg HCO_3^-

A pre-development, during construction and post-development groundwater quality monitoring program is described Section 6.0 below.

4.0 Hydrogeological Conceptual Site Model (HCSM)

A Hydrogeological Conceptual Site Model (HCSM) utilizes the geological and hydrogeological findings to describe the groundwater system as it relates to the various input components such as:

- The areal extent under study;
- Identification of the geological framework and subsurface hydrogeological properties;
- Derivation of subsurface hydrostratigraphic units (e.g. aquifers and aquitards);
- An understanding of regional and/or local groundwater movements including groundwater elevations and patterns;
- Identification of hydrologic features, such as water courses and watershed divides; and
- Basic understanding of water budget components including recharge and discharge conditions.

A simplified HCSM formulation requires two key steps:

1. Defining hydrostratigraphic units; and
2. Defining groundwater and surface water systems.

Within the local setting, the IGMD provides for local groundwater baseflow discharge that ultimately discharges to the Nith River located approximately 700m north of the Subject Lands. The rate of infiltration across the Study Area is expected to vary based on a number of factors such as saturated hydraulic conductivity values, rainfall intensity, relative soil moisture content, and vegetative cover.

5.0 Impact Assessment

The Subject Lands comprise a total area of 37.19ha and are proposed to be developed as a residential development comprised of single detached and townhome family residential blocks, multiple residential blocks, two stormwater management (SWM) facilities, a neighbourhood park, walkways, open space block, emergency access and service corridors, and municipal rights-of-way. Refer to the Draft Plan of Subdivision created by MHBC (dated February 3, 2023) in **Appendix A** for more details. As part of the proposed development design the seasonal high groundwater levels were contoured to identify potential areas of conflict with the groundwater table (**Figure 8**).

5.1 Stormwater Management (SWM) – Design Considerations

Infiltration rates are an important consideration for Stormwater Management (SWM) planning and design. Based on the Draft Plan, the proposed development will contain two SWM facilities (SWMF1 and SWMF2). The EMDP established that due to the fine-grained nature of the subsurface material within the study area, infiltration will not be feasible for most of the study area, however there may be silty sand lenses which may be accessible on some sites for rooftop infiltration[29].

Although the soils in the northern portion of the site are conducive to infiltration (sand and silty sand material), the presence of high groundwater eliminates the widespread potential to provide infiltration in these areas. Infiltration will be utilized to provide stormwater attenuation for Drainage Area 205[30]. Drainage Area 205[31] represents a portion of Street Two that is unable to drain towards SWMF1. This 0.56ha of right-of-way is proposed to be directed towards an OGS unit and infiltration gallery treatment train prior to be released into the IGMD. The infiltration gallery is sized to infiltrate the 25mm event. An infiltration rate of 40mm/hr (representing the sand layers encountered on-site) is assumed at the location of the gallery. The infiltration rate will be confirmed at the location of the gallery during final design [32].

At the request of the Township of Wilmot, two sediment samples collected from MW202-21 and MW203A-21 were submitted for particle size distribution analysis to confirm the suitability of the unsaturated sediments infiltration capacity. In addition, MTE utilized the particle size distribution curve from PML's BH9 (SS3) to also provide preliminary infiltration capacity rates.

Sustainable Technologies Evaluation Program (STEP) updated guidance on Low Impact Development Stormwater Management Planning and Design. As outlined on the STEP website, the water component of STEP is a partnership between the Toronto and Region Conservation Authority (TRCA), CVC (Credit Valley Conservation) and Lake Simcoe Region Conservation Authority (LSRCA). Additional information about STEP is provided on their website at sustainabletechnologies.ca.

STEP has reviewed the LID Stormwater Management Planning and Design Guide first published in 2010 by the CVC and TRCA and provided updated guidance to the 2010 Guide using a wiki website (wiki.sustainabletechnologies.ca). STEP recommends using the online wiki page as the primary resource for LID planning and design. It is also noted that the STEP methodology recommends using the Hazen formula to calculate the infiltration rate based on

[29] MTE, 2023, pp. 29
[30] MTE, 2023, pp. 29
[31] MTE, 2023, pp. 17 Figure 5.5
[32] MTE, 2023, pp. 29

particle size analysis curves. It is noted that Hazen formula does not apply for most of the surficial native material; therefore, a more appropriate formula, such as Kaubisch, was used.

Summaries of the non-factored infiltration rates determined through particle size distribution analyses are provided in **Table 5.1.1,** below.

Table 5.1.1 – Estimated K Values and Infiltration Rates from Particle Size Distribution Analyses

Sample Location	Estimated K Value (cm/sec)	Formula Used	Estimated Infiltration Rate (mm/hr)
BH9 (SS3 1.5-2.0m bgs)	3.5×10^{-9}	Kaubisch	<1
MW202-21 (SS2 0.8-1.4m bgs)	2.9×10^{-8}	Kaubisch	<1
MW203A-21 (SS2 0.6-1.2m bgs)	2.9×10^{-8}	Kaubisch	<1

Note: Some infiltration will occur to a degree; however, based on this data the sediments are not conducive to infiltration.

Based on these estimated K values and infiltration rates and groundwater elevations, infiltration will not be feasible as an end-of-pipe or lot level stormwater management strategy in the developable area of the proposed development.

The Stormwater Management (SWM) strategy and design was developed to mimic existing surface water flow and shallow groundwater flow conditions. MTE does not anticipate any impacts to water quantity or water quality in the groundwater system. Storm drainage will be provided through a combination of minor (piped) and major (overland) drainage systems. The overall storm sewer design, including proposed finished road grades and depths of sewers at key points in the sewer network ranges from approximately 1.5m to 2.0m[33].

5.2 Groundwater Separation

Several multi-residential blocks and portions of single family lots are within the SGRA limits. Seasonal high groundwater contours in this area also vary from 338m amsl to 341m amsl. To accommodate the SGRA and provide adequate groundwater separation from proposed basements, a groundwater management system (GWMS) is proposed[34]. The GWMS consists of solid pipe along Street Two, Street Three and Ingold Avenue. Perforated GWMS pipes will be provided within the residential block limits. The system is directed north through SWMF1 and along Street Two, which ultimately discharges north of Waterloo Street to the IGMD. The GWMS is set at an invert elevation of 339.70m and surrounding underside of footing elevations will be designed to a minimum depth of 340.30m.

In accordance with the Township of Wilmot and Woolwich Township's *Draft Hydrogeological Study Standards* (Chapter 13 of the Engineering Design Manual), the development needs to demonstrate that the underside of footings will be a minimum of 0.6 metres above the seasonally high groundwater table. As mentioned above, in the northern portion of the site a GWMS will be installed to manage the groundwater.

It is proposed that based on the fine-grained nature of the sediments (having a K value at 10^{-6} m/sec or less) at the remaining locations across the Subject Lands, the lands being located

[33] MTE, 2023, pp. 12, Figure 5.1

[34] MTE, 2023, pp. 17. Figure 5.4

outside the mapped SGRA and a linear velocity of 0.5m/year, sump pumps can be used to manage high groundwater levels generally experienced during the spring freshet in areas where a GWMS is not proposed.

5.3 Excavation and Dewatering Considerations

Deep sewer and servicing installations may be required for the proposed development and/or SWM facility development that may require construction dewatering. The purpose of construction dewatering is to control the amount of groundwater seepage entering the excavation to ensure worker safety and the need for construction dewatering should be assessed during the final design stage (in advance of construction). Construction dewatering requirements will be assessed based on an understanding of:

- Construction timing (seasonal high versus low groundwater level periods);
- Groundwater inflow rates to an excavation;
- Shallow overburden aquifer characteristics (e.g. permeability, thickness);
- Radius of influence calculations; and
- Influence of surface water features (e.g. on-site local wetland and/or IGMD).

The sanitary sewer design, including proposed finished road grades and depths of sewers at key points in the sewer network located beneath the proposed streets may require construction dewatering for installation. The depth of these sewers ranges from approximately 2.8m to 6.5m. The deepest point is located at the low point intersection of Street Two/Eight traffic circle prior to entering the Service Corridor block. Sanitary sewers extended through the remaining local roads within the proposed road allowances are at typical depths ranging from 2.8m to 5.0m[35].

Construction dewatering of greater than 50,000L/day and less than 400,000L/day will require an Environmental Activity and Sector Registry (EASR). Dewatering volumes greater than 400,000L/day will require a Category 3 Permit to Take Water (PTTW) from the MECP. For an EASR, the MECP requires the preparation of a Water Taking Report and a Discharge Plan Report, if required.

Regardless of the type of potential permit for construction dewatering, both would require a monitoring and mitigation plan related to sensitive features such as private water users and surface water features. A monitoring and discharge plan for the pumped groundwater would also be required.

Due to the low hydraulic conductivity of the overburden sediment, in the order of 10^{-6}m/sec to 10^{-11}m/sec, extensive construction dewatering will not likely be needed for services constructed within the low permeable material.

5.4 Well Interference Considerations

5.4.1 Private Water User Search

There are several private wells within 500m radius of the Subject Lands. Based on a well record review a total of 22 water well records (WWR) were found. Out of the 22 WWR:

- 17 were classified as monitoring wells, test holes or observation wells;
- 4 were classified as domestic use; and
- 1 was classified as municipal.

[35] MTE, 2022, pp. 13.

Test holes, observation wells or monitoring wells have been excluded from further discussion as they are not considered to be water users. Ten of the 17 monitoring wells were the WWR from the PML investigations (MW101-18 through MW110-18). The remaining WWRs related to monitoring wells were mapped on or near the Wilmot Employment Lands. Five potential water users were identified through the MECP's WWIS database within an approximate 500m radius of the Subject Lands. Their WWR numbers are described in **Table 5.3.1**.

Table 5.3.1 – Potential Water Users

MECP WWR No.	Primary Source
6500364	Domestic
6507963	Domestic
6500363	Municipal
6502524	Domestic
7246229	Domestic

The MECP's WWIS mapped location for WWR No. 6500363 is located along Waterloo Street near the Subject Lands property boundary. No municipal well is located here, nor is this record associated with the New Hamburg Well Field. It is likely this well is mapped in the wrong location, has been misidentified by the well driller, and/or is no longer in use since it was drilled in 1960.

The remaining four private water users are classified as domestic. Based on the completion depths on the WWRs, three (6500364, 6507963, 6502524) of the four wells are completed within the overburden unit between 5.5 and 17.7m bgs. The remaining private water user (WWR No. 7246229) was completed in the bedrock aquifer at a depth of approximately 55.5m bgs.

WWR No. 6500364 is identified as a dug well based on the completed diameter and mapped along the western property boundary between MW201-21 and MW104-18. MTE has not been able to locate this well on site and it likely does not exist anymore or was mapped in an incorrect location. WWR No. 6507963 is located at 1145 Christner Road, New Hamburg and is approximately 460m northwest of the Subject Lands. A private well survey was received by MTE from the well owner (see **Appendix E**). The owners indicated that they have only lived there for five years but did confirm it was a bored well completed to an approximate depth of 9.2m. They have had no previous water quantity issues and their home is equipped with a UV system. Based on the distance between the Subject Lands and 1145 Christner Road, it is unlikely this well would be impacted by the proposed development.

WWR No. 6502524 is mapped at 1122 Waterloo Street, New Hamburg, which is directly north of the Subject Lands. No private well survey was returned for this property; however, based on the WWR, the private well is a dug well and completed to a depth of approximately 5.5m bgs. Based on other returned private well surveys east of this property (1140B and 1170 Waterloo Street), it is understood that there is a municipal water service available at this location.

The last private water user was WWR No. 7246229. This well is located at 1209 Waterloo Street at Pfennings Organic Farm. MTE was in receipt of a returned private well and septic system survey for this property. Based on the WWR and completed survey, the well is completed in the underlying bedrock aquifer at a depth of approximately 55.5m bgs. Based on the open hole interval (39.6 – 55.5m bgs) and completion depth, no impacts to this private water user are anticipated.

5.4.2 Modified Door-to-Door Private Well and Septic System Survey

As discussed in Section 2.5, MTE completed a private well survey in March and November 2021 by sending out 23 letters to the residents in the areas described above. A copy of the resident letter is attached in **Appendix E**. Of the 23 letters sent, MTE received seven responses back as described in **Table E.1**. It is noted that a private well survey was returned for 40 Centennial Crescent; however, MTE never mailed a letter to this location; therefore, it was determined this was incorrectly completed by someone who may be the property owner within the 500m radius but accidentally completed it for their home.

Out of the six relevant surveys returned, three already have a municipal water connection (1170 Waterloo Street, 1140B Waterloo Street, and 55 Hamilton Road). The private well survey returned for 1041 Christner Road indicated that they do experience a water shortage during dry summers historically. It is understood from the Township of Wilmot that there is no municipal water supply along Christner Road.

Based on the returned private well surveys, MTE recommends initiating a private well monitoring program including water quality sampling for potability parameters and installation of a datalogger to record groundwater levels within the well continuously at the following properties:

- 1041 Christner Road;
- 1145 Christner Road;
- 1170 Waterloo Street (water quality only); and
- 1209 Waterloo Street (one well).

It is noted that modifications may be required to access the wells for monitoring purposes, and in some cases, the well may not be accessible at all to equip the well with a datalogger.

Based on property mapping available through the GRCA, there are four remaining properties along Christner Road that did not respond to the private well survey:

- 1010 Christner Road;
- 1022 Christner Road;
- 1034 Christner Road; and
- 1107 Christner Road.

Given two of the properties along Christner Road are supplied by dug and/or bored wells; MTE recommends confirming with the remaining properties along Christner Road by sending a private well survey as a registered letter to confirm if there are other private dug/bored wells in existence and initiate a private well monitoring program upon their approval.

In October 2022, an MTE representative called the property owners of 1041 and 1209 Christner Road to confirm their willingness to participate in a groundwater monitoring program. At this time the representative from MTE also requested a site visit to assess the condition of the private wells and to determine whether a datalogger could be installed within the well. It is noted that the two private wells at 1209 are completed to approximately the same depth; therefore, it is MTE's opinion that only one well needs to be instrumented with a datalogger and continuously monitored. A representative from MTE called the homeowner of 1145 Christner Road on October 19 and 28, 2022. A voice message was left both times and MTE has yet to hear from this homeowner about their willingness to participate in the monitoring program.

Registered letters will be prepared and sent to 1010, 1022, 1034 and 1107 Christner Road in 2023 asking for confirmation whether they would participate in the groundwater monitoring program. A registered letter will also be sent to 1145 Christner Road as the homeowner had agreed to participate in the monitoring program; however, multiple attempts to connect with this homeowner have failed.

In the original MTE Hydrogeological Assessment (2022), MTE did not recommend sending registered letters to homes along Waterloo Street that had not responded to the first two circulations of the private well survey. However, it was decided that registered letters sent via Canada Post would be sent to the homes on Waterloo Street to confirm whether they would want to participate in a monitoring program, if a private well exists on the property.

5.4.3 Municipal Wells

The municipal wells discussed in Section 3.4.4 will not be adversely impacted by the proposed development because of the following:

- Their distance from the Subject Lands (over 2km away);
- Their deep well construction and deep casing depths (57m bgs); and
- The separation of regional aquifers by a relatively thick sequence of Lower Maryhill Till (Regional Aquitard 2) and Catfish Creek Till (Regional Aquitard 3) with a cumulative thickness of between 19m and 34m.

Aquifer vulnerability is low in relation to Source Water Protection (SWP), which is discussed in Section 3.4.4.

5.5 Surface Water and Wetland Considerations

Based on the proposed SWM strategies, MTE does not anticipate any impacts to the IGMD and/or the on-site local wetland feature.

There is a potential that temporary construction dewatering may impact the on-site wetland and/or the IGMD in the short term. A short-term construction dewatering assessment should be completed at final design and an appropriate monitoring and mitigation plan should be implemented to prevent impacts to these surface water features.

6.0 Groundwater Monitoring Program

6.1 Pre-Development Groundwater Monitoring Program

This stage of the monitoring is intended to establish background groundwater quality and quantity conditions and baseline data. The pre-construction monitoring program (which is currently ongoing) will include:

- Groundwater level monitoring including continuous collection of groundwater levels within the existing on-site monitoring wells (has been ongoing since March 2021) and mini piezometer.
- Annual groundwater quality analysis for general chemistry parameters including major cations and anions, nutrients, metals, fecal coliforms and E.coli in Monitoring Wells MW101, MW102, MW107, MW110, MW202-21 and MW203B-21.
- Include Monitoring Well MW101 and MW110 into the pre-development groundwater chemistry sampling program.

6.2 During Development Groundwater Monitoring Program

This stage of the monitoring is intended to continue with the pre-development monitoring program to monitor groundwater quality and quantity conditions compared to the pre-development stage. The during construction monitoring program will include:

- Groundwater level monitoring including continuous collection of groundwater levels within the existing on-site monitoring wells and mini piezometer; and
- Annual groundwater quality analysis for general chemistry parameters including major cations and anions, nutrients, metals, fecal coliforms and E.coli in Monitoring Wells MW101 and MW110.

6.3 Post-Development Groundwater Monitoring Program

This stage of the monitoring is intended to continue with the pre- and during development monitoring program to monitor groundwater quality and quantity conditions compared to pre- and during development stages. The during construction monitoring program will include:

- Groundwater level monitoring including continuous collection of groundwater levels within the existing on-site monitoring wells and mini piezometer; and
- Annual groundwater quality analysis for general chemistry parameters including major cations and anions, nutrients, metals, fecal coliforms and E.coli in Monitoring Wells MW101 and MW110.

This period of the monitoring will begin following 90% buildout of the subdivision buildout (buildings constructed, lots are sodded/landscaped, and open spaces are stabilized). It is noted that some monitoring wells may need to be decommissioned prior to construction. Monitoring wells will be decommissioned by a licensed well contractor in accordance with O.Reg. 903. Monitoring wells may need to be reinstated in a similar location during-development or post-development to continue with the monitoring program. A detailed monitoring program is in **Appendix G** in Table G.1.

7.0 Summary & Conclusions

Based on the hydrogeological investigation and background literature review, MTE offers the following summary and conclusions:

Geology:

- Overburden deposits are comprised of aquitard material identified as Upper Maryhill Till and equivalents (Regional Aquitard 2) and aquifer type material of the Upper Waterloo Moraine aquifer (Regional Aquifer1);
- Table 1 highlights (in grey) units interpreted to exist beneath the Subject Lands; and
- Stratigraphic conditions beneath a large areal extent of the Subject Lands consist predominately of silt to clayey silt sediment with some silty fine sand deposits in the north region.

Hydrogeology:

- Direction of groundwater flow is generally to the north and to the south from the topographic high identified in the central region of the Subject Lands. This coincides with the groundwater divide associated with the subwatershed boundary;

- Groundwater levels were encountered at a depth range of 0.1m bgs to 6.0m bgs (~337m amsl to 345m amsl) – water table conditions;
- Groundwater velocity in the regional shallow overburden aquifer deposit (Regional Aquifer 1) was estimated to be 0.5m/yr; and
- The Subject Lands is not located within a Wellhead Protection Area (WHPA).

Water Quality:

- SGRA vulnerability mapping shows the Subject Lands is situated in a low vulnerability environment that will provide adequate protection to the groundwater resource from contamination.
- The Subject Lands are not located in an Issue Contributing Area (ICA).
- Groundwater quality is affected by nitrate impacts in the central region of the Subject Lands due to historical agricultural practices, which is considered detrimental to groundwater quality. Residential developments are not a generator of nitrate waste and will be a net benefit to groundwater quality in this regard.
- The north region of the Subject Lands is impacted by high chloride and sodium concentrations due to winter road de-icing practices (snow clearing piles).

8.0 Recommendations

- Continuation of the pre-construction groundwater monitoring program and implementation of a during and post-construction groundwater monitoring program as described in Section 6.0:
- Any monitoring wells requiring decommissioning to allow for construction activities to take place shall be decommissioned in accordance with Ontario Regulation 903 (as amended).
- Initiate a private well monitoring program at the properties described in Section 5.3.2.
- Send a registered letter to the properties described in Section 5.3.2.
- Complete a dewatering assessment during detailed design to determine whether an EASR or PTTW will be required during site servicing.

9.0 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 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 to support a proposed residential development. It was completed in accordance with the approved Scope of Work referred to herein. As such, this report may not deal with all issues potentially applicable to the Subject Lands and may omit issues that are or may be of interest to the reader. MTE makes no representation that the present report has dealt with all important environmental features, except as provided in the Scope of Work. All findings and conclusions presented in this report are based on Subject Lands conditions, as they existed during the time period of the investigation.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by any third party as a result of decisions made or actions taken, based upon this report. Others with interest in the Subject Lands 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 might affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

2023-03-08

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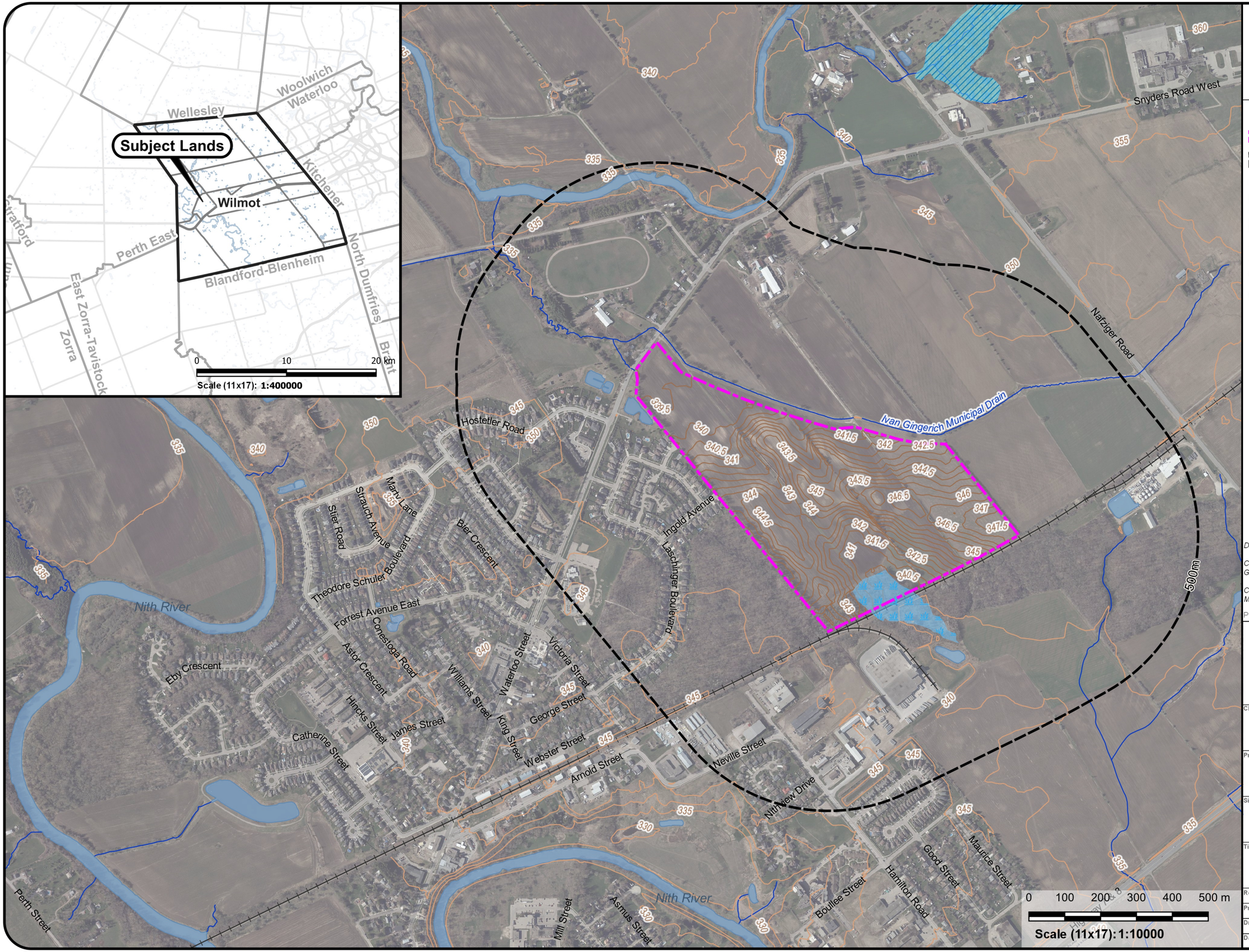
Figures



NORTH

PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- Railroad
- Provincally Significant Wetland
- Non-Provincially Significant Wetland (Evaluated)
- Waterbody
- Water Courses
- 0.5m Contours (MTE, 2021)

Data Sources:

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Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

Title: Key Map

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	1
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

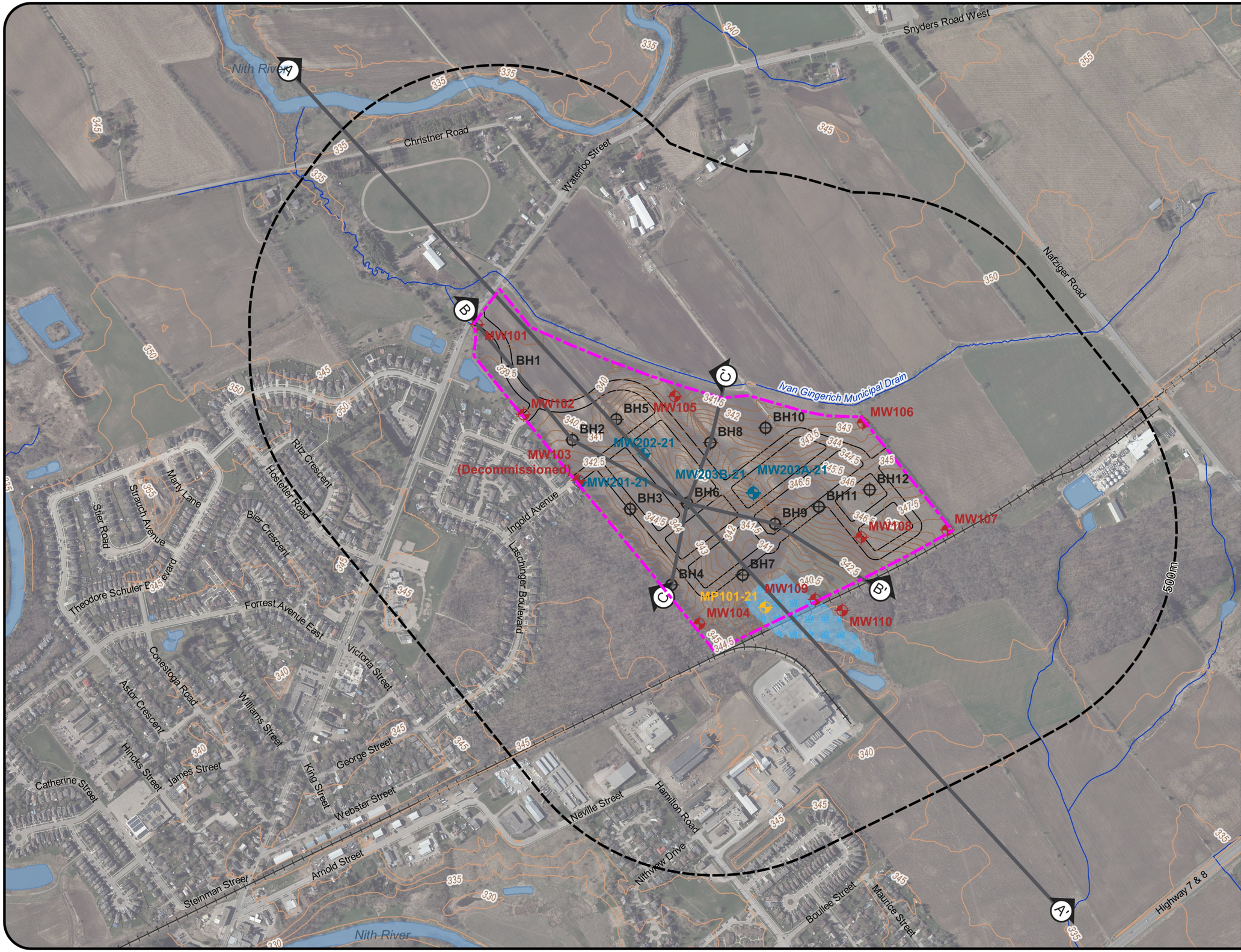
GWR2.1

March 02, 2023 - 12:08 - Plotted By: SRederer

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.2

March 02, 2023 - 12:10 - Plotted By: SRederer



NORTH

PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- Geological Cross Section Location
- 0.5m Contours (MTE, 2021)
- Railroad
- Waterbody
- Water Courses
- Provincally Significant Wetland
- Future Development

Monitoring Locations

- Monitoring Well (MTE, 2021)
- Monitoring Well (PML, 2018)
- Mini Piezometer (MTE, 2022)
- Borehole (PML, 2018)

Data Sources:

0 70 140 210 280 350 m

Scale (11x17): 1:8000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

Title: Existing Conditions

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	2
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.3

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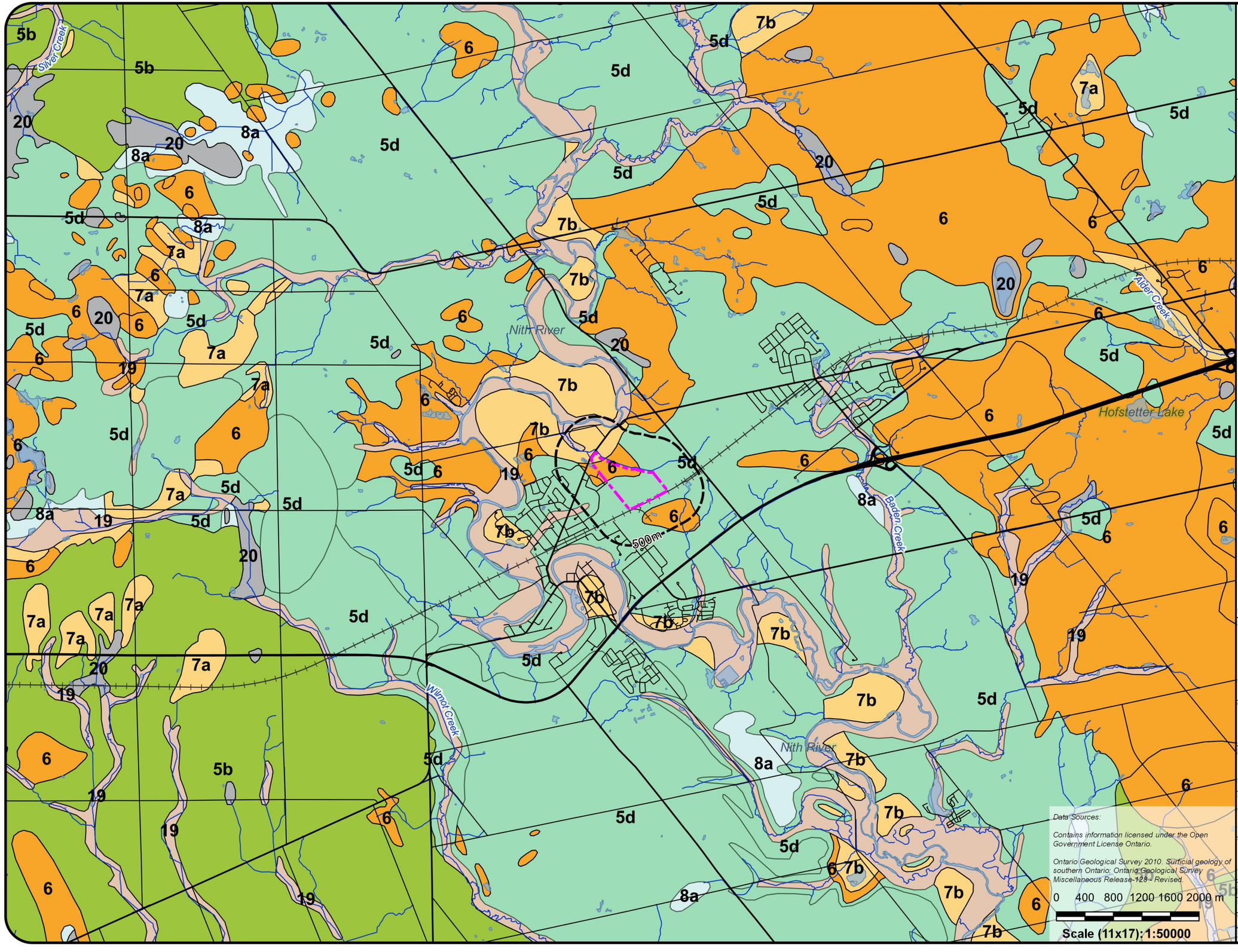

N
NORTH

N
PROJECT NORTH

Legend

- 500m Study Area
- Roads
- Railroad
- Waterbody
- Water Courses

Quaternary Geology

Quaternary

- 20. Organic Deposits: peat, muck, marl
- 19. Modern alluvial deposits: clay, silt, sand, gravel, may contain organic remains
- 8. Fine-textured glaciolacustrine deposits: silt and clay, minor sand and gravel
- 8a. Massive to well laminated
- 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)

Project CRS: NAD83 / UTM zone 17N

Data Sources:

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0 400 800 1200 1600 2000 m

Scale (11x17): 1:50000

MTE
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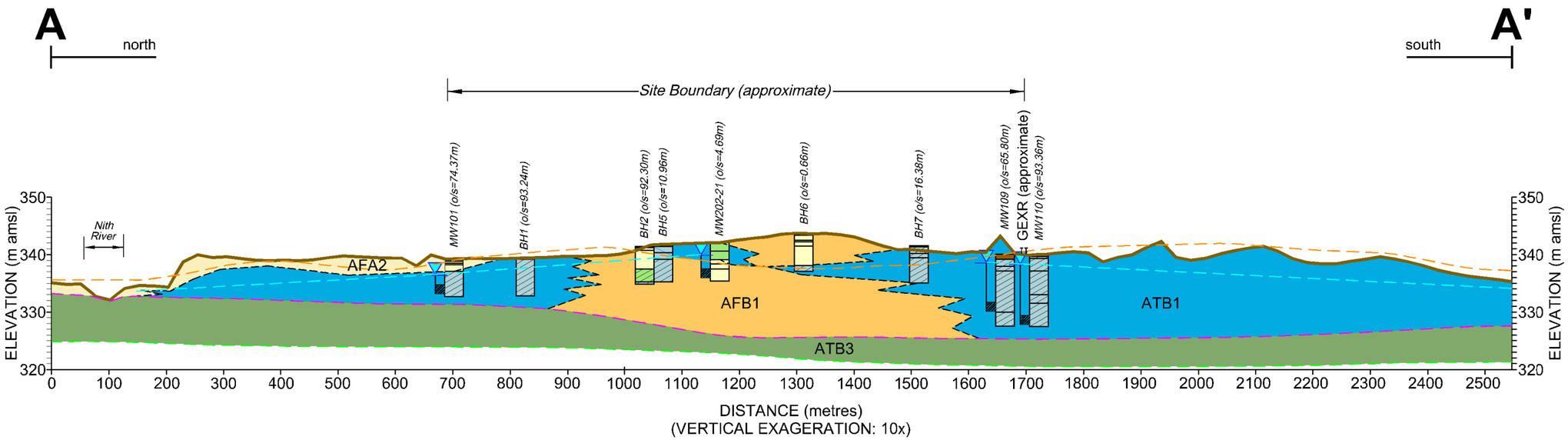
Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

Title: Quaternary Geology

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	3
Date	March 2023		



The geological sequence presented herein is based on professional interpretation from the overburden sediments recorded during drilling, actual geological conditions can vary between locations.

Legend

Ground Surface (Swoop 2015)

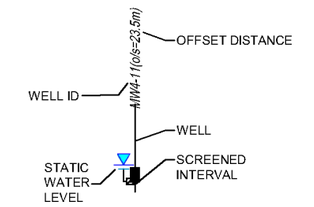
Borehole Lithology

- Topsoil
- Sand / Silty Sand
- Clay
- Clayey Silt
- Silt

Interpreted Geology

- Grand River Outwash Deposits (AFA2)
- Upper Maryhill Till (ATB1)
- Upper Waterloo Moraine (AFB1)
- Middle Maryhill Till (ATB2)
- Lower Maryhill Till (ATB3)

- Aquifer 1 Groundwater Elevation (mAMSL)
- Interpreted Water Table
- Upper Waterloo Moraine (OGS, 2007)
- Lower Maryhill Till (OGS, 2007)
- Upper/Main Catfish Creek Till (OGS, 2007)



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Scale(11x17): 1:8000

MTE
Engineers, Scientists, Surveyors
Ph. (905) 639-2552

CLIENT: Wilmot Woods Development Inc.

PROJECT: Wilmot Woods Subdivision

SITE: Waterloo Street, New Hamburg, Ontario

TITLE: Geological Cross-Section A-A'

Reviewed By	EMB		
Prepared By	RBM	Project No.	35056-104
Drawn By	EMM	Figure No.	4
Date	March 2023		

Project: 35056-104 CAD: P:\P\35056\104\35056-104-EXS4.DWG

Figure 4 - Cross-Section A-A'

January 18, 2022 — 10:55 p.m. — Plotted By: SRederer

Project: 35056-104 CAD: P:\P\35056\104\35056-104-EXS4.DWG

Figure 5 - Cross-Section B-B'

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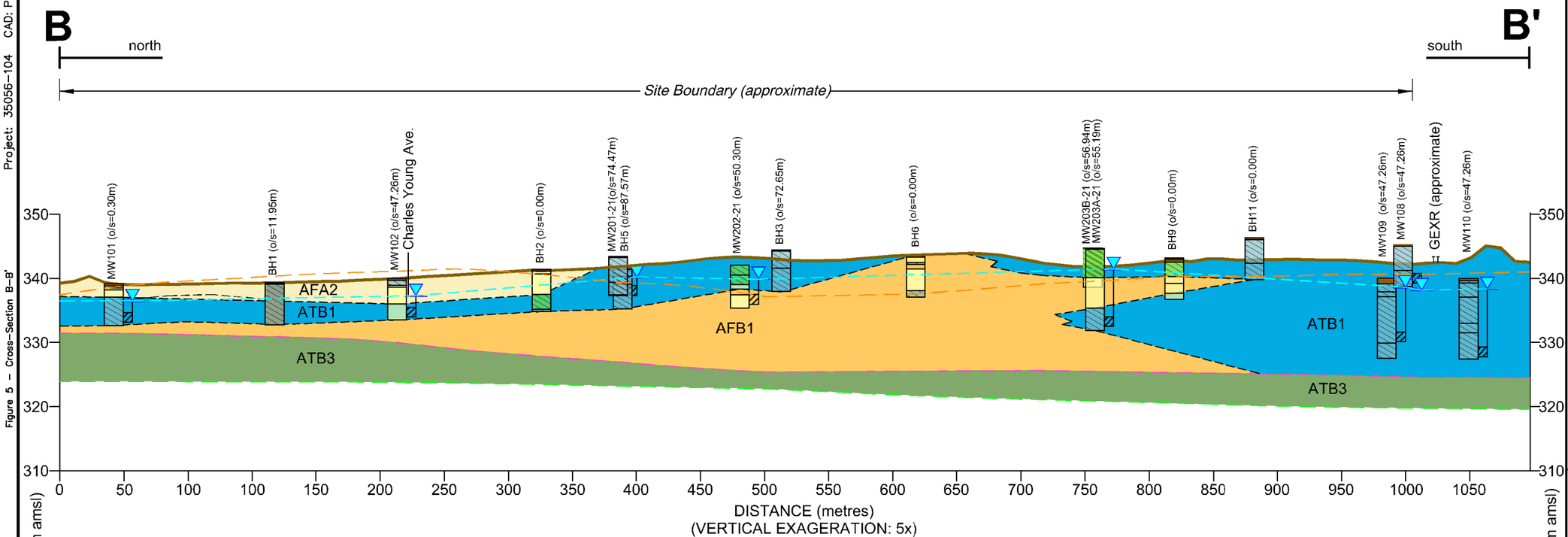


The geological sequence presented herein is based on professional interpretation from the overburden sediments recorded during drilling, actual geological conditions can vary between locations.

Legend

Ground Surface (Swoop 2015)

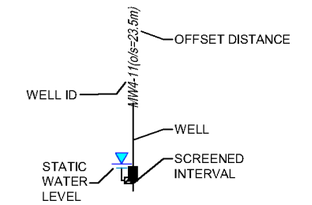
Borehole Lithology

- Topsoil
- Sand / Silty Sand
- Clay
- Clayey Silt
- Silt

Interpreted Geology

- Grand River Outwash Deposits (AFA2)
- Upper Maryhill Till (ATB1)
- Upper Waterloo Moraine (AFB1)
- Middle Maryhill Till (ATB2)
- Lower Maryhill Till (ATB3)

- Aquifer 1 Groundwater Elevation (mAMSL)
- Interpreted Water Table
- Upper Waterloo Moraine (OGS, 2007)
- Lower Maryhill Till (OGS, 2007)
- Upper/Main Catfish Creek Till (OGS, 2007)



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Scale(11x17): 1:3500

MTE
Engineers, Scientists, Surveyors
Ph. (905) 639-2552

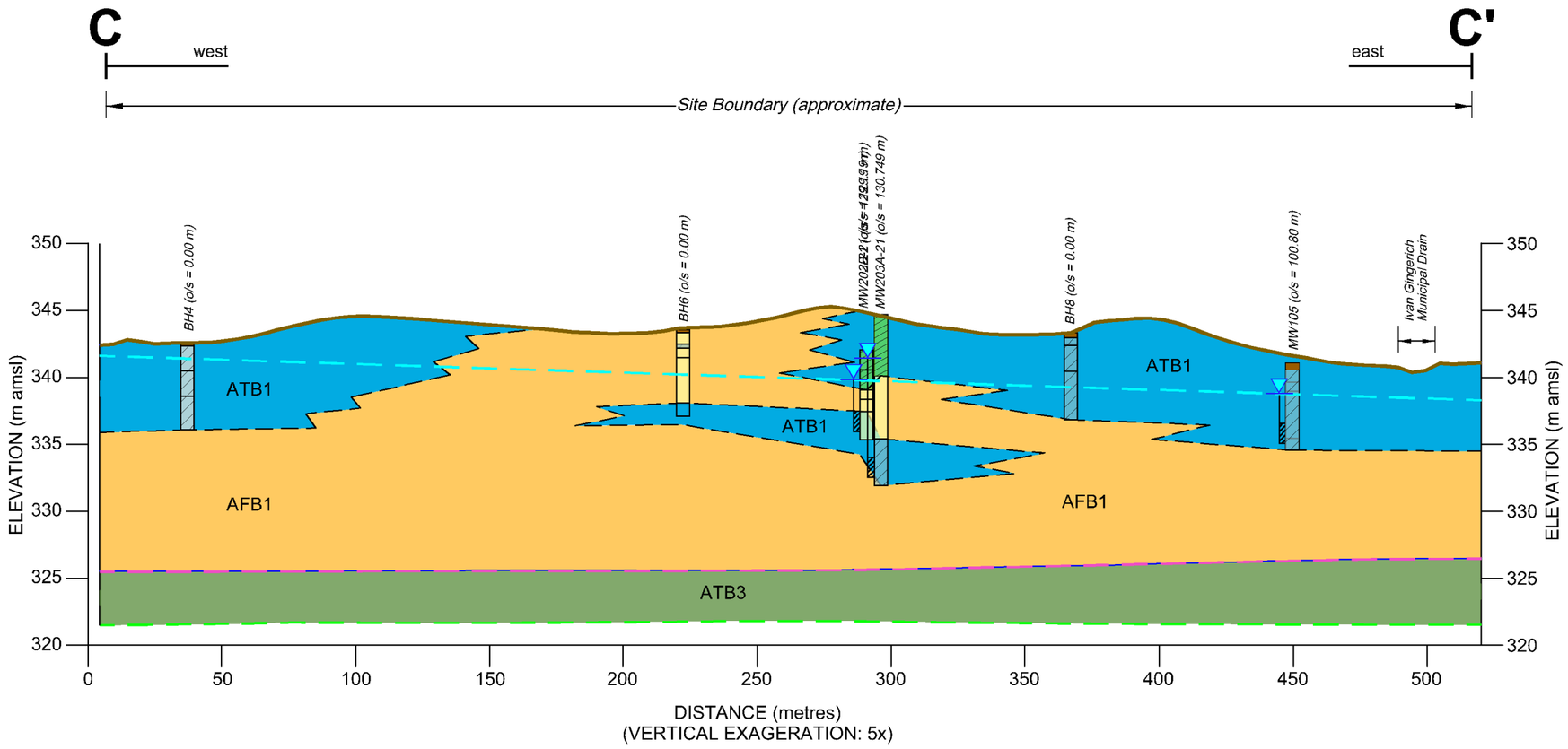
CLIENT: Wilmot Woods Development Inc.

PROJECT: Wilmot Woods Subdivision

SITE: Waterloo Street, New Hamburg, Ontario

TITLE: Geological Cross-Section B-B'

Reviewed By	EMB		
Prepared By	RBM	Project No.	35056-104
Drawn By	EMM	Figure No.	5
Date	March 2023		



Legend

Ground Surface (Swoop 2015)

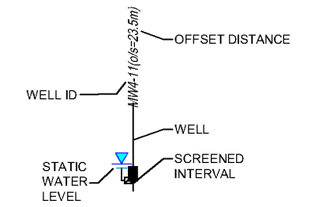
Borehole Lithology

- Topsoil
- Sand / Silty Sand
- Clay
- Clayey Silt
- Silt

Interpreted Geology

- Grand River Outwash Deposits (AFA2)
- Upper Maryhill Till (ATB1)
- Upper Waterloo Moraine (AFB1)
- Middle Maryhill Till (ATB2)
- Lower Maryhill Till (ATB3)

- Aquifer 1 Groundwater Elevation (mAMSL)
- Interpreted Water Table
- Upper Waterloo Moraine (OGS, 2007)
- Lower Maryhill Till (OGS, 2007)
- Upper/Main Catfish Creek Till (OGS, 2007)



Scale(11x17): 1:2000

The geological sequence presented herein is based on professional interpretation from the overburden sediments recorded during drilling, actual geological conditions can vary between locations.

MTE
Engineers, Scientists, Surveyors
Ph. (905) 639-2552

CLIENT: Wilmot Woods Development Inc.

PROJECT: Wilmot Woods Subdivision

SITE: Waterloo Street, New Hamburg, Ontario

TITLE: Geological Cross-Section C-C'

Reviewed By	EMB		
Prepared By	RBM	Project No.	35056-104
Drawn By	EMM	Figure No.	6
Date	March 2023		

Project: 35056-104 CAD: P:\P\35056\104\35056-104-EXS4.DWG
Figure 6 - Cross-Section C-C'
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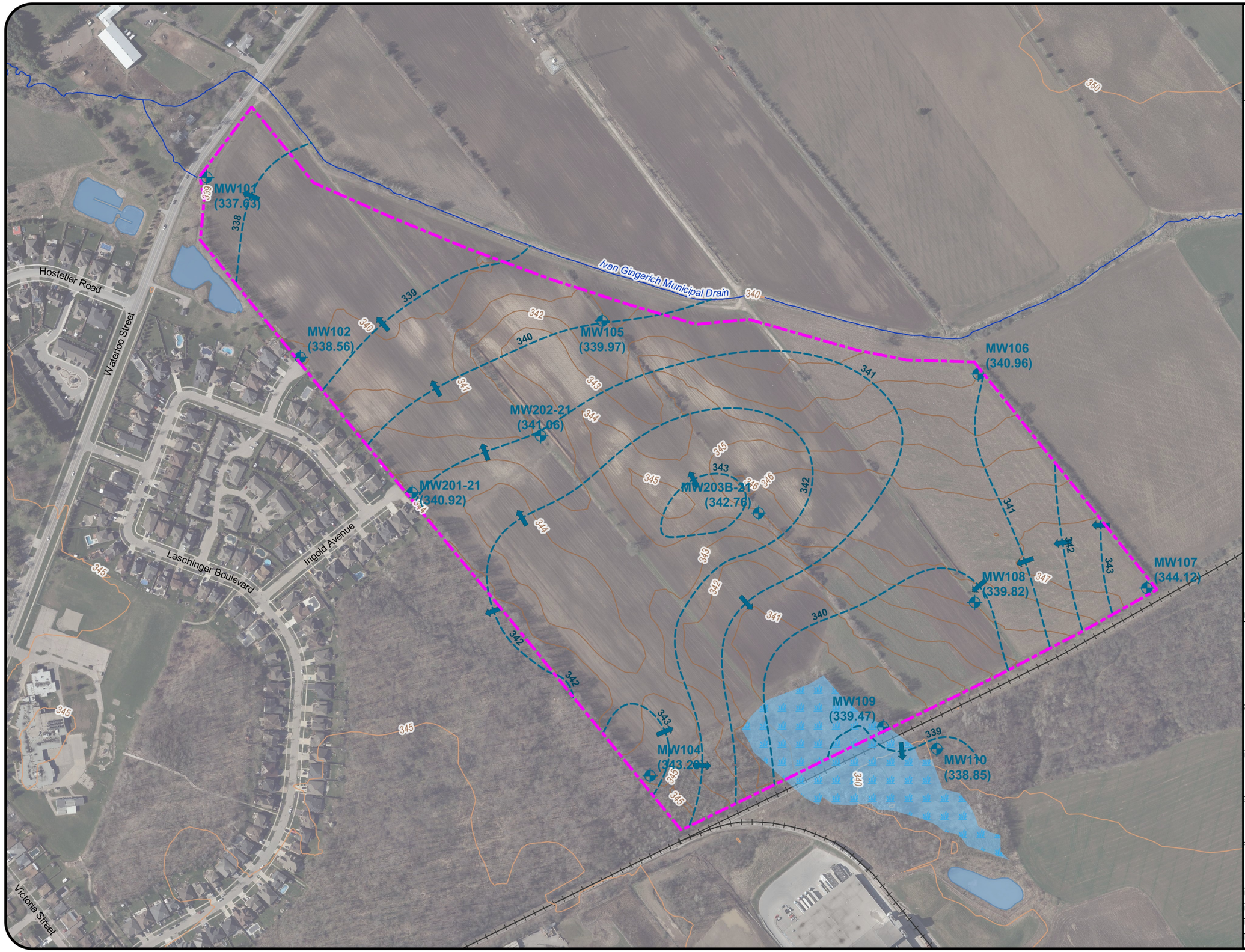

N
NORTH

N
PROJECT NORTH

Legend

- Subject Lands
- 1m Contours (MTE, 2021)
- Railroad
- Waterbody
- Water Courses
- Groundwater Contours (1m Interval)
- Groundwater Flow Direction (Inferred)
- Monitoring Well (Groundwater Elevation (mAMSL))

Data Sources:

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0 30 60 90 120 150 m

Scale (11x17): 1:4000

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client
Wilmot Woods Development Inc.

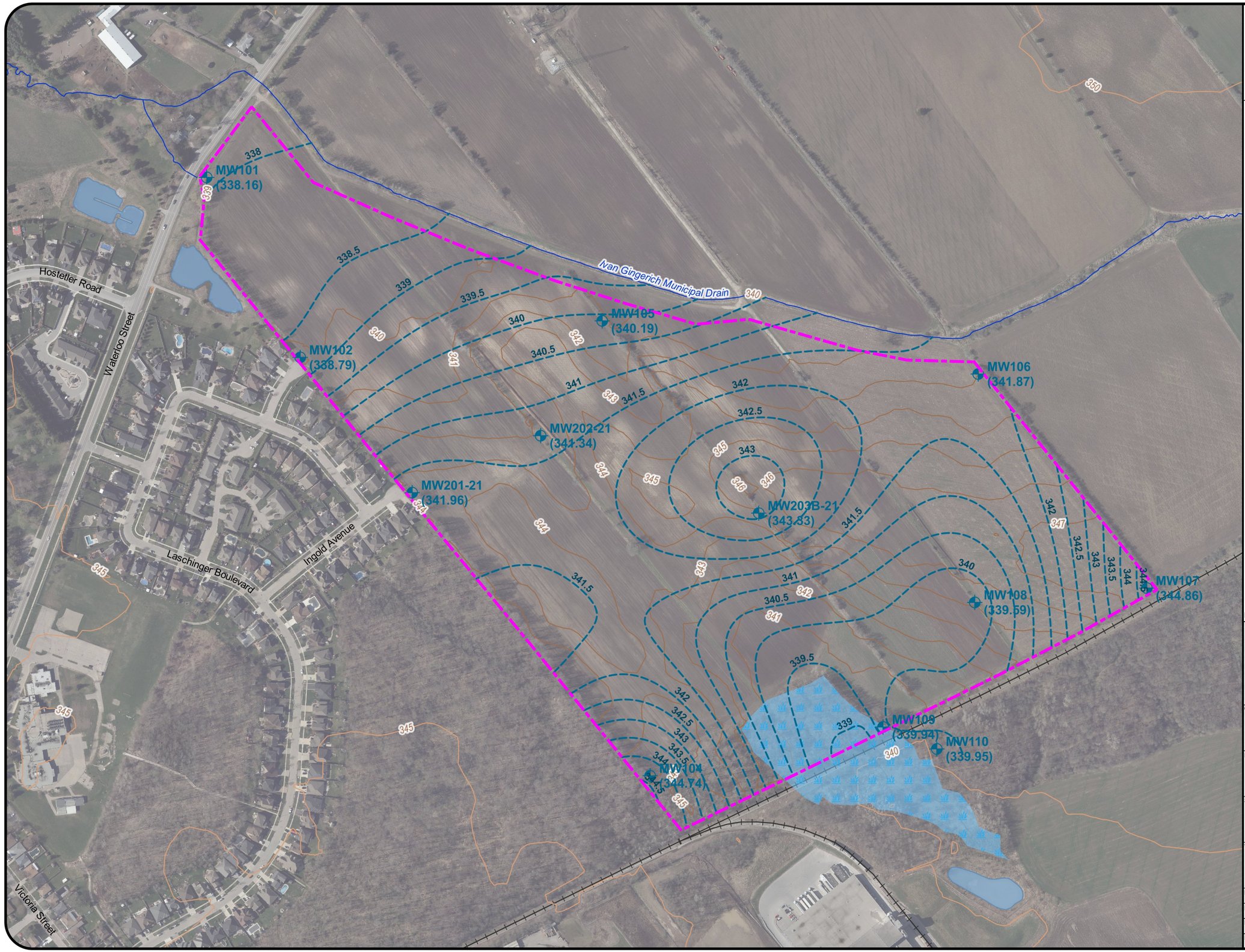
Project
Wilmot Woods Subdivision

Site
Waterloo Street, New Hamburg, Ontario

Title
Interpreted Groundwater Flow Map

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	7
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz
GWR2.7
March 02, 2023 - 12:10 - Plotted By: SRederer



N
NORTH

N
PROJECT NORTH

Legend

- Subject Lands
- 1m Contours (MTE, 2021)
- Railroad
- Waterbody
- Water Courses
- Groundwater Contours (0.5m Interval)

Monitoring Locations

- Monitoring Well (Groundwater Elevation (mAMSL))

Data Sources:

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0 30 60 90 120 150 m

Scale (11x17): 1:4000

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

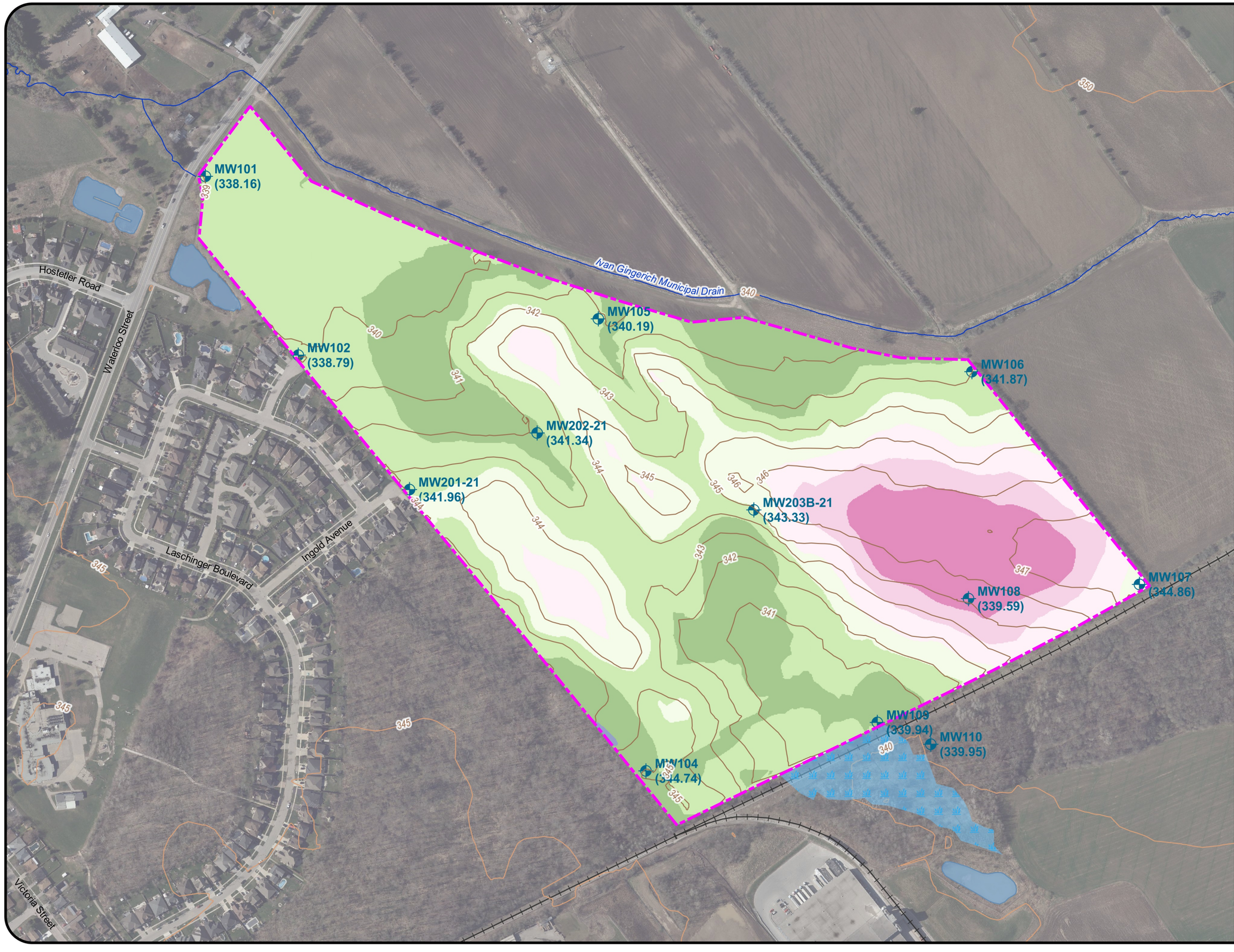
Client	Wilmot Woods Development Inc.
Project	Wilmot Woods Subdivision
Site	Waterloo Street, New Hamburg, Ontario
Title	Composite High Groundwater Level
Reviewed By	EMB
Prepared By	RBM
Drawn By	SAR
Date	March 2023
Project No	35056-104
Figure No	8

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz
GWR2.8
March 08, 2023 - 09:53 - Plotted By: SRederer

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.9

March 08, 2023 - 10:39 - Plotted By: SRederer



N
NORTH

N
PROJECT NORTH

Legend

- Subject Lands
- 5m Contours
- Railroad
- Waterbody
- Water Courses
- Monitoring Well (Groundwater Elevation (mAMSL))

Groundwater Depth

- <0 mBGS
- 0-1 mBGS
- 1-2 mBGS
- 2-3 mBGS
- 3-4 mBGS
- 4-5 mBGS
- >5 mBGS

Data Sources:

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0 30 60 90 120 150 m

Scale (11x17): 1:4000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

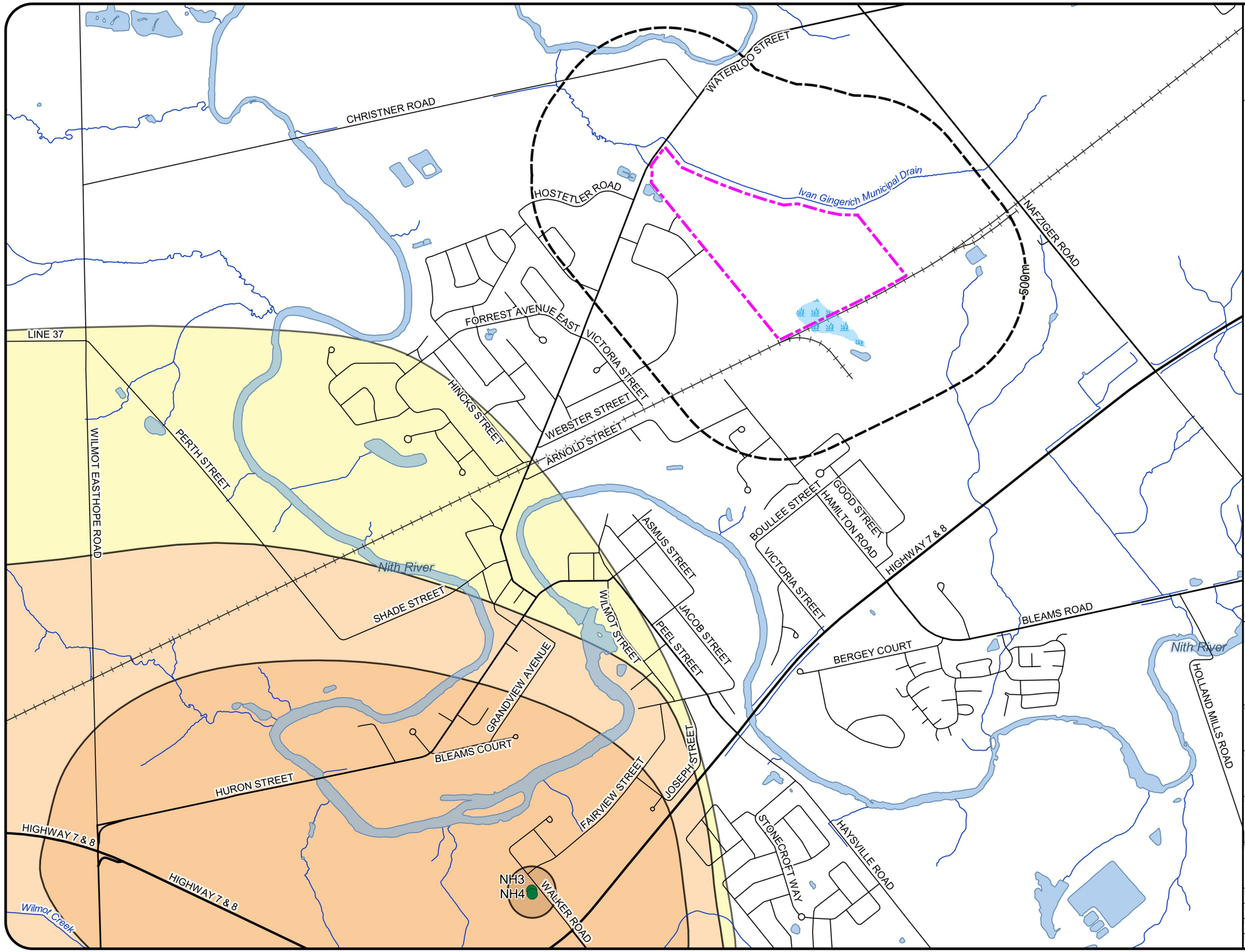
Title: Depth to Groundwater Level (m bgs)

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	9
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.10

March 02, 2023 - 12:08 - Plotted By: SRederer



N NORTH

N PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- Railroad
- Provincally Significant Wetland
- Waterbody
- Water Courses
- Municipal Well (GRCA)

WHPA-Wellhead Protection Area (GRCA)

- A
- B
- C
- D

Data Sources:

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0 100 200 300 400 500 m

Scale (11x17): 1:15000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

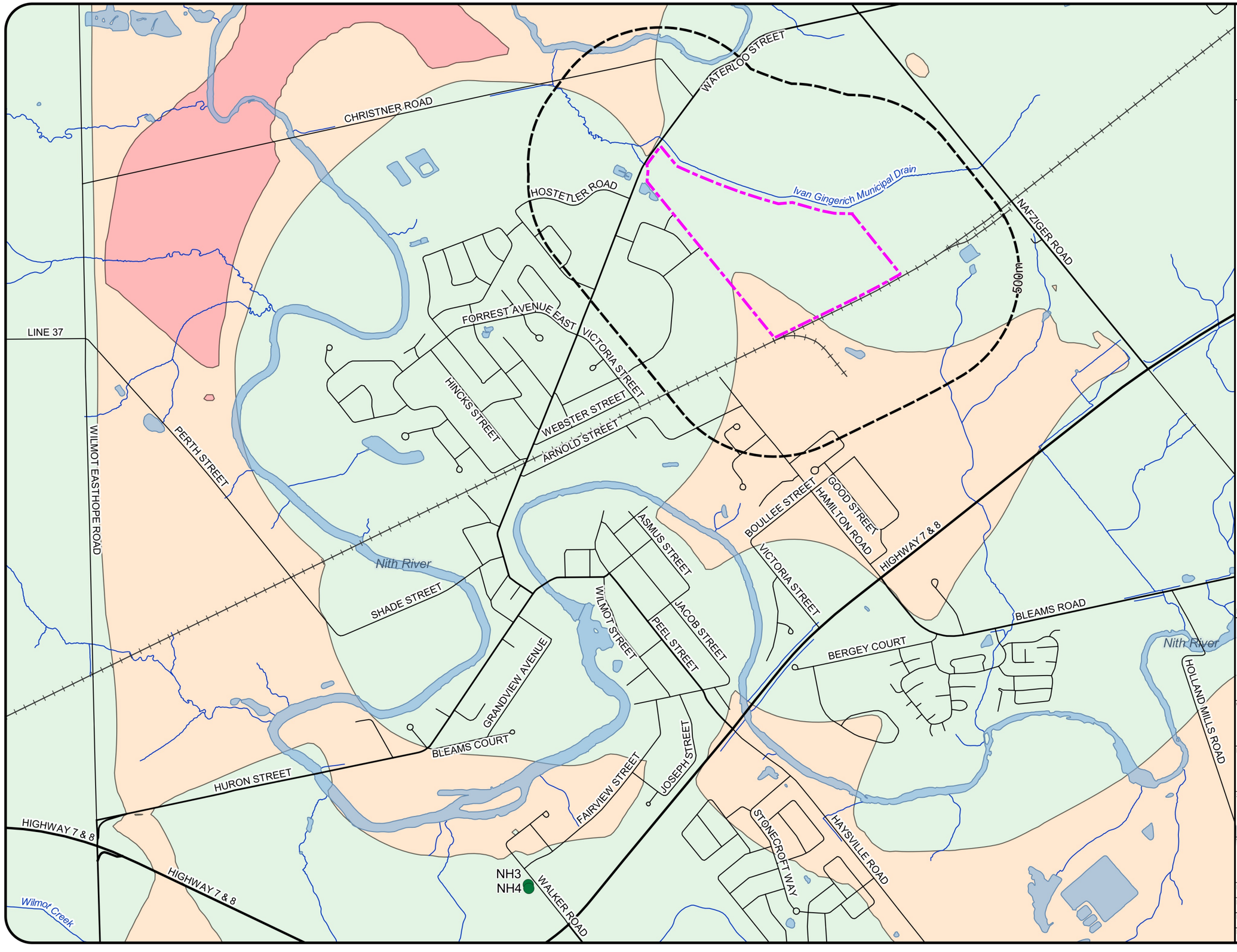
Title: Wellhead Protection Area (WHPA)

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	10
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.11

March 02, 2023 - 12:08 - Plotted By: SRederer



NORTH

PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- Railroad
- Provincally Significant Wetland
- Waterbody
- Water Courses
- Municipal Well (GRCA)

Intrinsic Vulnerability (GRCA)

- Low
- Medium
- High

Data Sources:

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0 100 200 300 400 500 m

Scale (11x17): 1:15000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

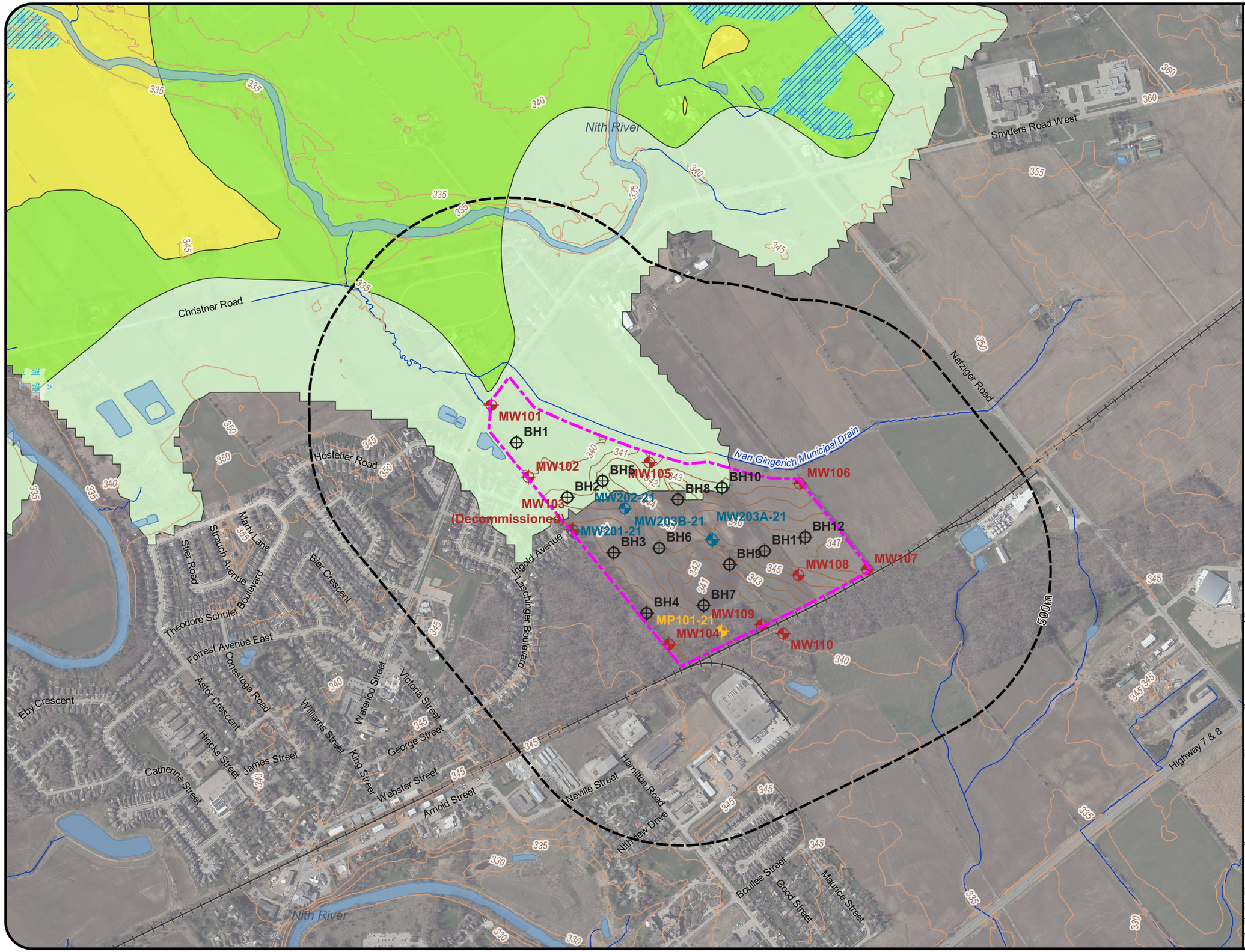
Title: Intrinsic Vulnerability Mapping

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	11
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.12

March 02, 2023 - 12:08 - Plotted By: SRederer



N NORTH

N PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- 5m Contours
- Railroad
- Non-Provincially Significant Wetland (Evaluated)
- Waterbody
- Water Courses

Monitoring Locations

- Monitoring Well (MTE, 2021)
- Monitoring Well (PML, 2018)
- Mini Piezometer (MTE, 2022)
- Borehole (PML, 2018)

Significant Groundwater Recharge Area (GRCA)

- 2
- 4
- 6

Data Sources:

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0 90 180 270 360 450 m

Scale (11x17): 1:10000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

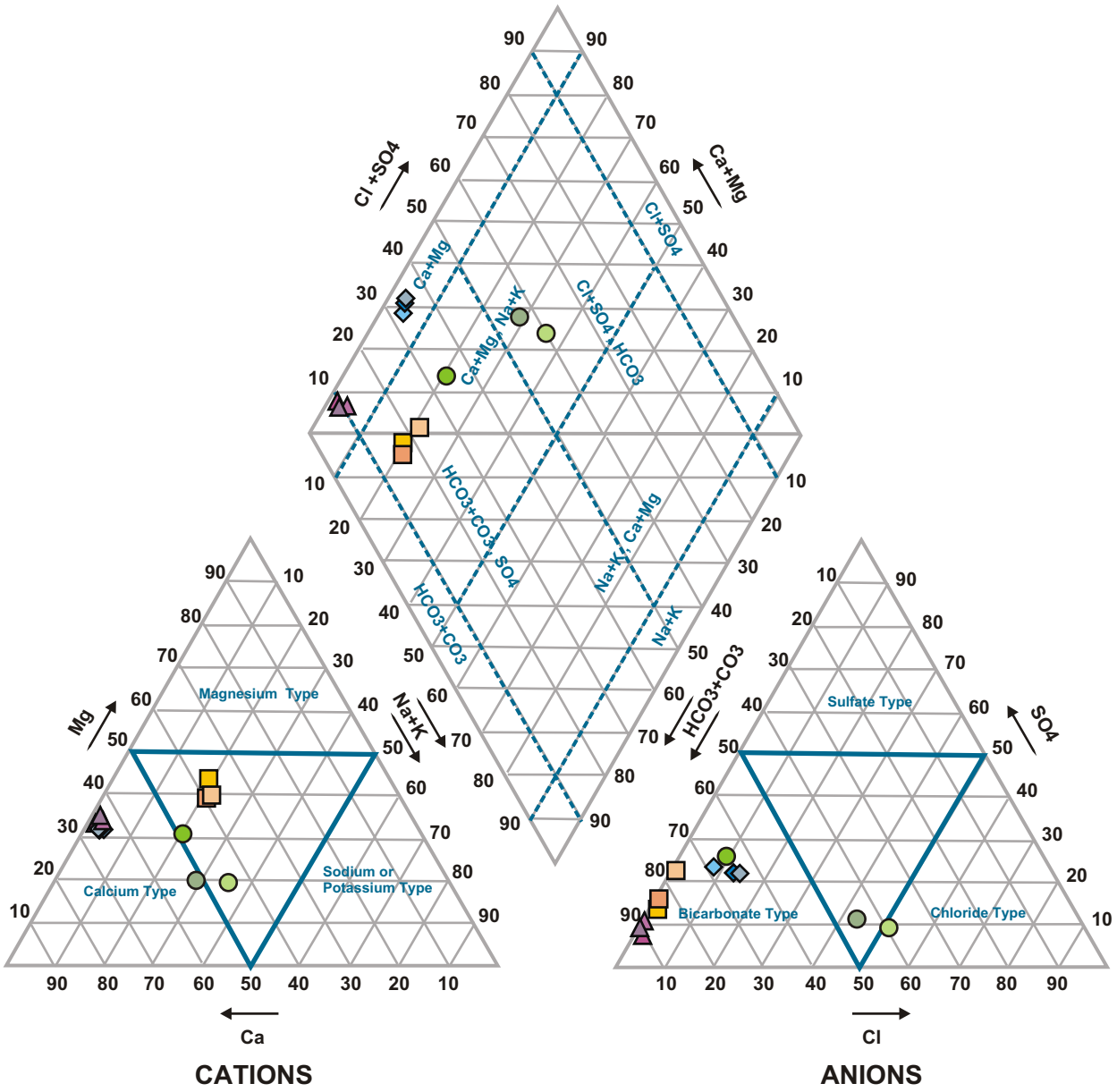
Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

Title: Significant Groundwater Recharge Area (SGRA)

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	12
Date	March 2023		

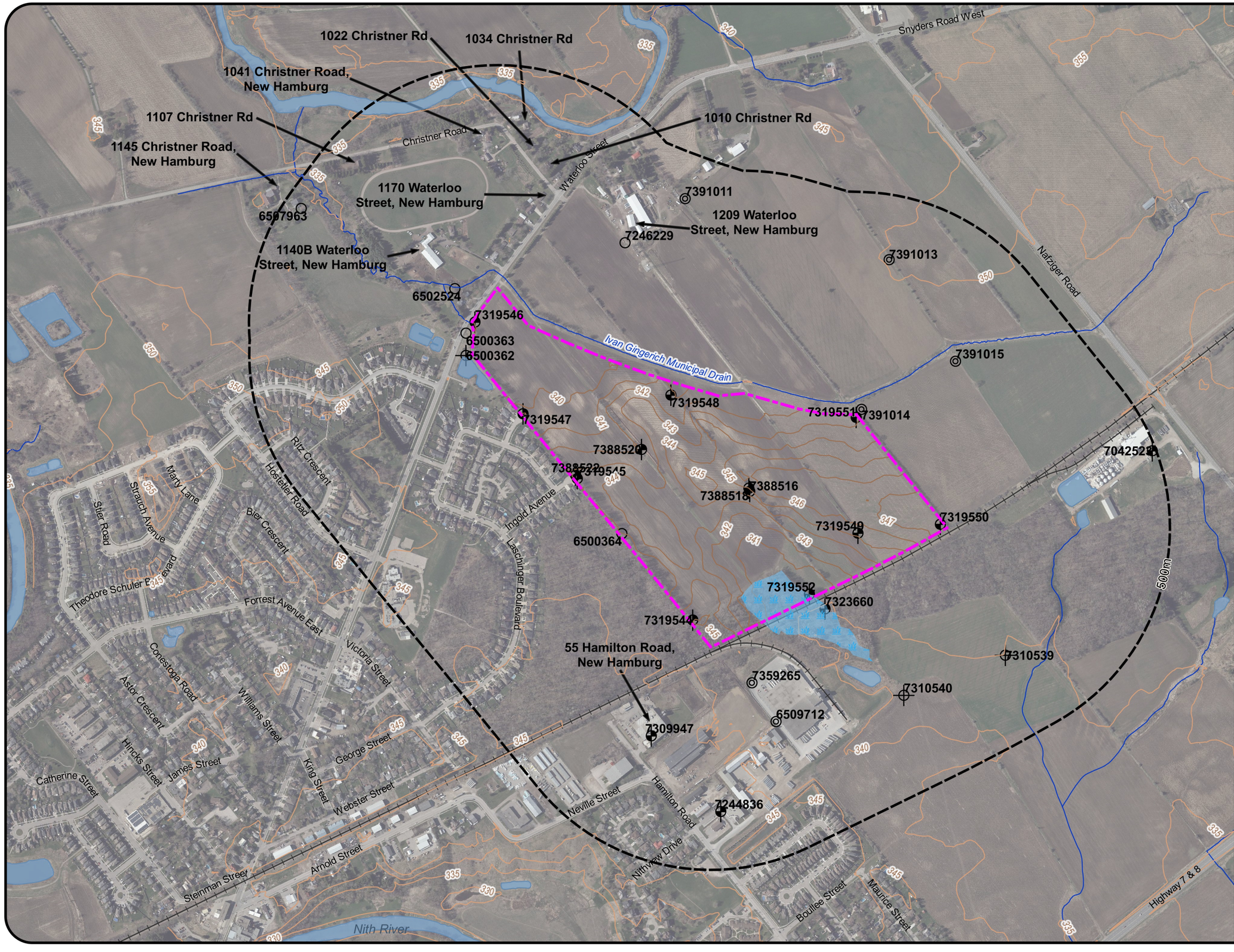


LEGEND

MW102-18 (2021)	MW107-18 (2021)	MW202-21 (2021)	MW203B-21 (2021)
MW102-18 (2022)	MW107-18 (2022)	MW202-21 (2022)	MW203B-21 (2022)
MW102-18 (2023)	MW107-18 (2023)	MW202-21 (2023)	MW203B-21 (2023)

PIPER PLOT 2021, 2022, 2023

Project Name			
Wilmot Woods Hydrogeological Assessment			
Site		**Client**	
Wilmot Woods, New Hamburg, ON		Wilmot Woods Developments Inc.	
Scale	**MTE Project No:**	**Date**	**Figure No.:**
NTS	35056-104	March 2023	13



NORTH

PROJECT NORTH

Legend

- Subject Lands
- 500m Study Area
- 1m Contours (MTE, 2021)
- Railroad
- Waterbody
- Water Courses
- Provincally Significant Wetland

MOE Wells

- Water Supply

Data Sources:

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MOECP WWIS2 September 2020

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0 70 140 210 280 350 m

Scale (11x17): 1:8000

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Wilmot Woods Development Inc.

Project: Wilmot Woods Subdivision

Site: Waterloo Street, New Hamburg, Ontario

Title: Private Water User and Private Well Survey Locations

Reviewed By	EMB		
Prepared By	RBM	Project No	35056-104
Drawn By	SAR	Figure No	14
Date	March 2023		

Project No: 35056-104 P:\P35056\104\35056-104_gwr2.qgz

GWR2.14

March 02, 2023 - 12:09 - Plotted By: SRederer

Appendix A

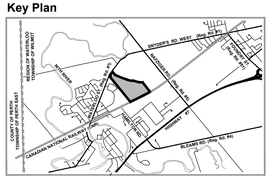
Draft Plan dated February 3, 2023

DRAFT PLAN OF SUBDIVISION

Legal Description

PART OF LOT 20, CONCESSION SOUTH OF SNYDER'S ROAD
TOWNSHIP OF WILMOT
REGIONAL MUNICIPALITY OF WATERLOO

Key Plan



Subject Lands

SCALE: NTS

Source: SLRN, Region of Waterloo

Additional Information Required Under Section 51(17) of the Planning Act
R.S.O. 1990, c.P.13 as Amended

A. AS SHOWN	B. AS SHOWN	C. AS SHOWN
D. RESIDENTIAL, MULTIPLE RESIDENTIAL, STORMWATER MANAGEMENT, PARK, OPEN SPACE		
E. AS SHOWN	F. AS SHOWN	G. AS SHOWN
H. MUNICIPAL WATER SUPPLY	I. SANDY LOAM/CLAY LOAM	J. AS SHOWN
K. ALL SERVICES AS REQUIRED	L. AS SHOWN	

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
2. BOUNDARY INFORMATION AND TOPOGRAPHICAL BASE INFORMATION PROVIDED BY MTE, MAY 31, 2021
3. ADJACENT PARCEL FABRIC IS APPROXIMATE.
4. LOTS/BLOCKS ON THE PLAN ARE RESIDENTIAL UNLESS OTHERWISE LISTED

■ ■ ■ DENOTES STAGE LIMITS

19/25 MINIMUM/MAXIMUM LOT YIELD PER BLOCK

Rev. No.	Date	Issued / Revision	By
2.	Feb.3, 2023	For Resubmission to Township/Region;	DGS
1.	Sept. 30, 2021	For pre-consultation meeting submission;	DGS

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

DATE: January 12, 2022 — Adam Belsky, Adam Belsky, Wilmot Woods Developments Inc.

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: JAN. 14, 2022 — Trevor D.A. McNeil, OLS (MTE OLS LTD.)

Area Schedule 30T-_____

	Stage 1		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
Residential*	1-18	135/196	4.81
Multiple Residential	19-21	186/246	2.83
Park	22		1.00
Open Space	23-26		5.30
Stormwater Management	27,28		2.99
Service Corridor	29		0.22
Walkway	30		0.02
0.3m Reserve	31-36		0.01
Road Widening	37		0.03
Roads			4.27
Total	37	321/442	21.48

*Blks. 2,3,4,5,12,16 [street towns (5.5-7m)]
Blks. 6-11,17 [street towns (6m) and small single detached lots (9m)]
Blk. 1,13,14 [small single detached lots (9-12m)]
Blk. 15,18 [large single detached lots (9-13.76m)]
Blks. 19,20,21 [from Concept Plans (Stacked Towns)]

	Stage 2		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-5	66/96	2.73
Trail	6		0.05
0.3m Reserve	7		0.001
Roads			1.00
Total	7	66/96	3.78

*Blk. 1 [street towns (6m) and small single detached lots (9m)]
Blks. 2,3,4,5 [small single detached lots (9m-12m)]

	Stage 3		
Description	Lots/Blocks	Units (min/max)*	Area (ha)
*Residential	1-7	56/81	2.48
Open Space	8		2.86
Walkway	9		0.02
Trail			
0.3m Reserve			
Roads			0.84
Total	9	56/81	6.20

*Part of Blk. 6 [street towns (6m) and small single detached lots (9m)]
Blks. 1,2,3,4,5 [small single detached lots (9m-12m)]
Blk. 6,7 [large single detached lots (9-13.76m)]

Stage 4		
Lots/Blocks	Units (min/max)*	Area (ha)
1-11	80/134	3.49
12-14		0.42
15		0.001
		1.82
15	80/134	5.73

*Part of Blk. 1, Blks. 3,4,5,6,7,8 [street towns (6m) and small single detached lots (9m)]
Blks. 2,9,10,11 [small single detached lots (9m-12m)]
Blk. 1 [large single detached lots (9-13.76m)]

Total			
Description	Lots/Blocks	Units (min/max)	Area (ha)
Residential	41	337/507	13.51
Multiple Residential	3	186/246	2.83
Park	1		1.00
Open Space	5		8.16
Stormwater Management	2		2.99
Trail	4		0.47
Walkway	2		0.04
Service Corridor	1		0.22
0.3m Reserve	8		0.01
Road Widening	1		0.03
Roads			7.93
Total	68	523/753	37.19

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp

Date	February 3, 2023
File No.	2123A
Plan Scale	1:2,000 (24x36)
Drawn By	D.G.S.
Checked By	P.B.

Project Wilmot Woods

Applicant

Wilmot Woods Developments Inc.
310 Fairway Rd. S
P.O. Box 45016
Kitchener, ON. N2C 2R6
P: 519.570.2137

File Name DRAFT PLAN

Dwg No. 1 of 1

Scale Bar 0 10 25 50 100m

K:\2123A-NH Properties-New Hamburg\DP\Draft Plan February3 2023.dwg

Appendix B

Borehole Logs

ID No.: MW201-21

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

Client: Wilmot Woods Development Inc.

Site Location: Waterloo Street, New Hamburg

Date Completed: 4/1/2021

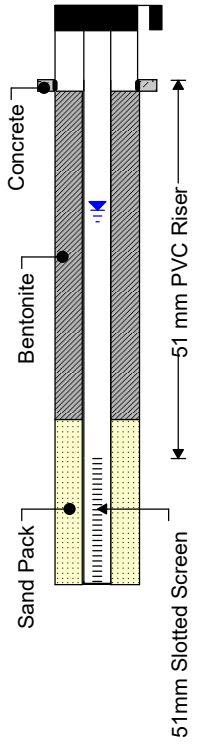
Drilling Contractor: GEDI

Drill Rig: CME 75 Track Mounted

Drill Method: HSA

Protective Cover: Yes

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)	Well Completion Details
0 / 0		Ground Surface	343.5 / 0.0						
		TOPSOIL Dark brown sandy silt TOPSOIL some clay, occasional rootlets, moist							
		CLAYEY SILT Stiff brown clayey SILT trace sand, DTPL, numerous silt layers							
6 / 2		becoming WTPL	341.4 / 2.1						
12 / 4		becoming grey GSA at 6.1mBGS = Silt some clay, trace sand	339.5 / 4.0						
20 / 6		Drilling Terminated	337.4 / 6.1						
		Lithology inferred from Peto MacCallum MW103-18.							



Field Technician: MDE

Drafted by: MDE

Reviewed by: EMB

Sheet: 1 of 1

Groundwater Elevation: April 8, 2021 - 342.91 mAMSL
Monitoring Well Coordinates (NAD83 17N):
Northing: 4804244.76
Easting: 523913.75

ID No.: MW202-21

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

Client: Wilmot Woods Development Inc.

Site Location: Waterloo Street, New Hamburg

Date Completed: 4/1/2021

Drilling Contractor: GEDI

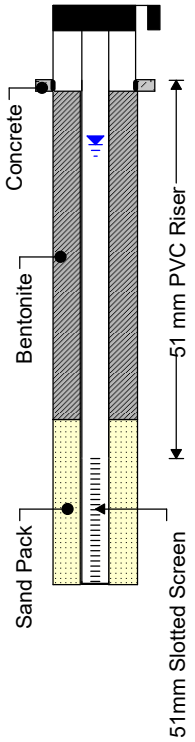
Drill Rig: CME 75 Track Mounted

Drill Method: HSA

Protective Cover: Yes

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
0 / 0		Ground Surface	342.1					
0–4 / 0–1.5		**SILT** Brown to mottled grey - red/brown SILT with sand, some clay moist to wet	0.0	1	SS		6	16
				2	SS		15	15
			340.6					
4–10 / 1.5–3.0		**SILT** Grey SILT some to trace clay wet to staturated	1.5	3	SS		9	21
				4	SS		12	27
			339.0					
10–12 / 3.0–3.7		**SANDY SILT** Grey fine sandy SILT, saturated	3.0	5	SS		4	18
			338.4					
12–16 / 3.7–4.6		**SILTY SAND** Grey to grey/brown silty fine SAND saturated	3.7	6	SS		19	19
			337.5					
16–22 / 4.6–6.7		**SAND** Grey SAND trace silt and clay, saturated	4.6	7	SS		14	21
				8	SS		6	20
				9	SS		22	20
22 / 6.7		Drilling Terminated	335.4					

Well Completion Details



Field Technician: MDE

Drafted by: MDE

Reviewed by: EMB

Groundwater Elevation: April 8, 2021 - 341.31 mAMSL.
Monitoring Well Coordinates (NAD83 17N):
Northing: 4804308.29
Easting: 524057.03

ID No.: MW203A-21

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

Client: Wilmot Woods Development Inc.

Site Location: Waterloo Street, New Hamburg

Date Completed: 3/31/2021

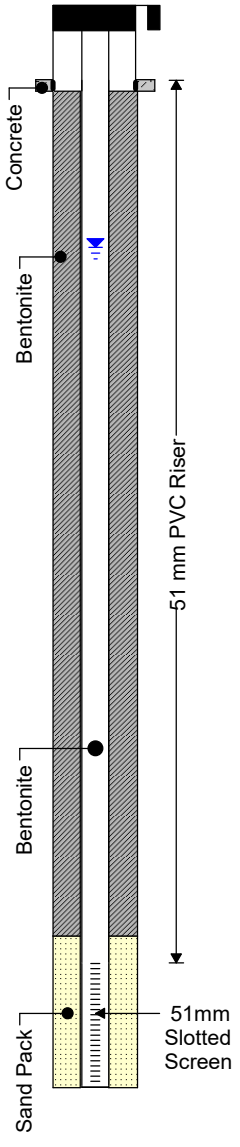
Drilling Contractor: GEDI

Drill Rig: CME 75 Track Mounted

Drill Method: HSA

Protective Cover: Yes

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
0 ft / 0 m		Ground Surface	344.7					
		TOPSOIL Black to dark brown TOPSOIL	0.0	1	SS		8	20
		SILT Brown SILT trace to some clay, very moist to wet		2	SS		6	15
				3	SS		7	26
				4	SS		13	22
				5	SS		12	23
			340.2					
		SILT Grey SILT trace clay and sand, very moist to wet. Increasing clay content with depth	4.6	6	SS		13	20
				7	SS		10	14
				8	SS		10	16
			335.4					
		CLAYEY SILT Grey Clayey SILT trace gravel and sand very moist. Wet at 12.2 mBGS	9.3	9	SS		11	16
				10	SS		12	17
			331.9	11	SS		14	21
			12.8					



Field Technician: MDE

Drafted by: MDE

Reviewed by: EMB

Groundwater Elevation: April 8, 2021 - 342.71 mAMSL

Monitoring Well Coordintates (NAD83 17N):
Northing: 4804219.84
Easting: 524301.52

ID No.: MW203B-21

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

Client: Wilmot Woods Development Inc.

Site Location: Waterloo Street, New Hamburg

Date Completed: 3/31/2021

Drilling Contractor: GEDI

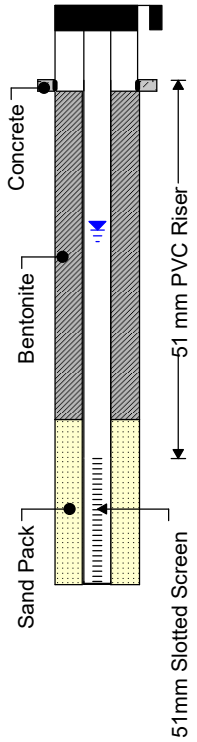
Drill Rig: CME 75 Track Mounted

Drill Method: HSA

Protective Cover: Yes

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
0 / 0		Ground Surface	344.8					
0 / 0		**TOPSOIL** Black to dark brown TOPSOIL	0.0					
2 /		**SILT** Brown SILT trace to some clay, very moist to wet						
6 / 2								
8 /								
10 /								
12 / 4								
14 /			340.2					
16 /		**SILT** Grey SILT trace clay and sand, very moist to wet. Increasing clay content with depth	4.6					
18 /								
20 / 6			338.7					
		Drilling Terminated	6.1					
22 /		Lithology inferred from MW203A-21						
24 /								
26 / 8								
28 /								
30 /								
32 / 10								
34 /								
36 /								
38 /								
40 / 12								
42 /								

Well Completion Details



Field Technician: MDE

Drafted by: MDE

Reviewed by: EMB

Sheet: 1 of 1

Groundwater Elevation: April 8, 2021 - 342.96 mAMSL
Monitoring Well Coordintates (NAD83 17N):
Northing: 4804211.93
Easting: 524300.27

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 1

17T 523755E 4804492N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE September 24, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN M. Rapsey

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 339.37					
0.0	339.37						339
0.22	339.15	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1	SS	6	
		CLAYEY SILT: Soft brown clayey silt, some sand, moist					
1.0				2	SS	3	338
1.1		becoming WTPL					
1.4	338.0	becoming firm		3	SS	7	
2.0							337
2.1	337.3	becoming stiff, numerous silt layers		4	SS	14	
3.0				5	SS	12	336
4.0							335
5.0				6	SS	11	
							334
6.0				7	SS	12	333
6.6	332.8	BOREHOLE TERMINATED AT 6.55 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

17T 523879E 4804339N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** September 24, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** M. Rapsey

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 341.42					
0.18	341.24	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, damp		1	SS	4	341
0.70	340.72	SAND: Loose brown sand, some silt, damp					
1.4	340.0	SANDY SILT: Loose brown sandy silt, moist becoming compact, saturated		2	SS	6	340
				3	SS	18	
				4	SS	17	339
				5	SS	23	338
3.9	337.5	SILT: Compact grey silt, trace sand, occasional clayey silt seams, saturated					337
				6	SS	17	
							336
6.2	335.2	CLAYEY SILT: Very stiff grey clayey silt, trace sand, WTPL		7	SS	17	335
6.6	334.8	BOREHOLE TERMINATED AT 6.55 m					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Free water encountered after SS3

Upon completion of augering Wet cave at 2.0 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

17T 524026E 4804185N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** July 31, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 344.50			
0.0	344.30	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A	SS	5
			1B		
1.0		CLAYEY SILT: Very stiff brown clayey silt, some sand, WTPL, numerous silt layers	2	SS	19
2.0			3	SS	19
			4	SS	18
2.9	341.6	becoming stiff, grey			
3.0			5	SS	14
4.0					
5.0			6	SS	12
6.0			7	SS	13
6.5	338.0	BOREHOLE TERMINATED AT 6.5 m			

STRAT PLOT

ELEVATION SCALE: 344, 343, 342, 341, 340, 339

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

17T 524118E 4804016N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** July 30, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 342.61					
0.24 / 342.37	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	7	342
			1B			
	CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL		2	SS	6	
			3	SS	6	341
2.1 / 340.5	becoming stiff, some sand, WTPL, numerous silt layers		4	SS	15	340
			5	SS	15	
4.0 / 338.6	becoming grey		6	SS	11	339
5.6 / 337.0	becoming very stiff		7	SS	16	338
6.5 / 336.1	BOREHOLE TERMINATED AT 6.5 m					337

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

17T 523995E 4804385N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE July 31, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 341.78					
0.0	341.78						
0.31	341.47	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	13	
				1B			
		CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL		2	SS	11	341
1.0							
1.4	340.4	numerous silt layers		3	SS	13	340
2.0							
2.6	339.2	becoming grey, WTPL		4	SS	14	339
3.0				5	SS	9	
4.0							338
				6	SS	11	337
5.0							
6.0							336
6.5	335.3	BOREHOLE TERMINATED AT 6.5 m		7	SS	13	
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

17T 524153E 4804198N

PROJECT Wilmot Woods Development | **PML REF.** 18KF031

LOCATION New Hamburg, Ontario | **BORING DATE** July 31, 2018 | **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers | **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 343.61					
0.25	343.36	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist		1A	SS	7	343
				1B			
		SILTY SAND: Compact brown silty sand, trace gravel, damp		2A	SS	17	
1.1				2B			
1.4	342.2	SILT: Compact brown silt, trace clay, trace sand, wet					342
		SAND: Compact brown sand, some silt, wet		3	SS	20	
2.1	341.5	becoming saturated		4	SS	19	341
				5	SS	22	
							340
				6	SS	28	339
5.5							
	338.1	CLAYEY SILT: Very stiff grey clayey silt, WTPL, numersous silt layers					338
				7	SS	23	
6.5	337.1	BOREHOLE TERMINATED AT 6.5 m					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Cave at 2.1 m
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 7

17T 524277E 4804038N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** July 30, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 341.57					
0.0							
0.22	341.35	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	10	341
				1B			
		CLAYEY SILT: Stiff to very stiff brown clayey silt, some sand, trace gravel, DTPL		2	SS	16	
1.0							
1.4	340.2	numerous silt layers		3	SS	14	340
2.0							
2.1	339.5	becoming grey, WTPL		4	SS	19	339
3.0				5	SS	16	
4.0							338
				6	SS	9	337
5.0							
							336
6.0				7	SS	20	
6.5	335.1	BOREHOLE TERMINATED AT 6.5 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 8

17T 524205E 4804333N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 1, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 343.37					
0.0	343.37	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	5	343
0.39	342.98	SANDY SILT: Compact brown sandy silt, moist; with topsoil inclusions		1B			
0.95	342.42	CLAYEY SILT: Stiff brown clayey silt, some sand, WTPL, numerous silt layers		2A 2B	SS	11	342
1.0				3	SS	14	
2.0				4	SS	15	341
2.9	340.5	becoming grey		5	SS	12	340
3.0							
4.0							339
				6	SS	15	
5.0							338
6.0				7	SS	9	337
6.5	336.9	BOREHOLE TERMINATED AT 6.5 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 9

17T 524349E 4804152N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 1, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH / ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 343.24			
0.27 / 342.97	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A	SS	5
0.68 / 342.56	SILTY SAND: Compact brown silty sand, damp	1B		
	SILT: Compact brown silt, trace sand, trace clay, moist to wet	2	SS	16
		3	SS	17
		4	SS	14
2.9 / 340.3	SILTY SAND: Compact brown silty sand, wet	5	SS	22
4.0 / 339.2	becoming saturated	6	SS	16
5.5 / 337.7	SANDY SILT: Compact grey sandy silt, trace clay, saturated	7	SS	26
6.5 / 336.7	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu; ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × ; STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Free water at 2.3 m
Cave at 2.4 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 10

17T 524328E 4804366N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 342.20					
0.27 / 341.93	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	8	342
			1B			
	CLAYEY SILT: Firm brown clayey silt, DTPL, numerous silt layers		2	SS	5	341
1.4 / 340.8	becoming stiff		3	SS	10	
			4	SS	12	340
2.9 / 339.3	becoming grey, WTPL		5	SS	8	339
			6	SS	14	338
			7	SS	10	337
6.5 / 335.7	BOREHOLE TERMINATED AT 6.5 m					336

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 11

17T 524447E 4804190N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 346.37					
0.0	346.37	TOPSOIL: Dark brown clayey silt, trace sand, occasional rootlets, DTPL		1A	SS	9	346
0.30	346.07	CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL		1B			
1.0				2	SS	14	345
2.0				3	SS	9	
				4	SS	11	344
3.0				5	SS	12	343
4.0	342.4	becoming grey, WTPL					
				6	SS	11	342
5.0							341
6.0				7	SS	15	340
6.5	339.9	BOREHOLE TERMINATED AT 6.5 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 12

17T 524560E 4804228N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** August 2, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Solid Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 346.22					
0.0							346
0.25	345.97	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL		1A	SS	10	
				1B			
		CLAYEY SILT: Stiff to very stiff brown clayey silt, some sand, DTPL to APL, numerous silt layers		2	SS	14	
1.0							345
				3	SS	17	
2.0							344
				4	SS	14	
2.9	343.3	becoming grey, WTPL					
3.0				5	SS	10	343
4.0							342
				6	SS	12	
5.0							341
6.0				7	SS	8	340
6.5	339.7	BOREHOLE TERMINATED AT 6.5 m					
7.0							
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

Upon completion of augering
Open
Dry

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 101

17T 523684.7E 4804597N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 1, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 339.04			
0.38	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A	SS	7
0.68	SANDY SILT: Loose brown sandy silt, moist, occasional rootlets	1B		
0.98	SILT: Loose brown silt, some sand, trace clay, moist	2A	SS	8
338.06	SILTY SAND: Compact brown silty sand, wet	2B		
		3	SS	11
2.1				
336.9	CLAYEY SILT: Stiff to very stiff grey clayey silt, trace sand, WTPL, numerous silt layers	4	SS	17
		5	SS	12
		6	SS	16
		7	SS	16
6.5				
332.5	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	2.4	336.6
2018-08-03	1.8	337.2
2018-11-07	0.9	338.1
2018-11-26	0.9	338.1

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 102

17T 523788.7E 4804396N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 1, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN K. Pettitt

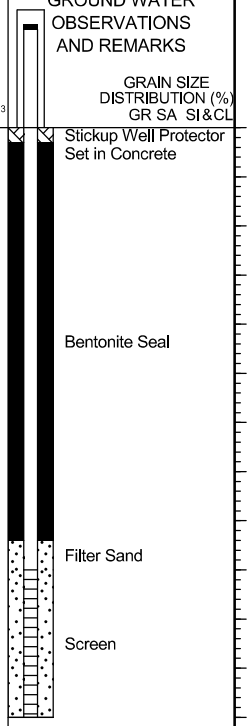
DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	340.00	SURFACE ELEVATION 340.00			
0.30	339.70	TOPSOIL: Dark brown sandy silt, some clay, occasional rootlets, moist	1A, 1B	SS	8
1.1	338.9	CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL, numerous silt layers	2A, 2B	SS	6
1.4	338.6	SAND: Loose brown sand, trace silt, wet to saturated becoming compact	3	SS	14
			4	SS	17
			5	SS	15
4.0	336.0	SANDY SILT: Compact grey sandy silt, trace clay, saturated	6	SS	20
6.5	333.5	BOREHOLE TERMINATED AT 6.5 m	7	SS	21

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL



Water Level Readings:

Date	Depth	Elev.
2018-08-01	1.7	338.3
2018-08-03	1.7	338.3
2018-11-07	1.4	338.6
2018-11-26	1.2	338.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 103

17T 523910.3E 4804249N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 1, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 343.23			
0.21	343.02	TOPSOIL: Dark brown sandy silt topsoil, some clay, occasional rootlets, moist	1A	SS	8
			1B		
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers	2	SS	10
			3	SS	13
2.1	341.1	becoming WTPL	4	SS	14
			5	SS	18
4.0	339.2	becoming grey	6	SS	17
			7	SS	21
6.5	336.7	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	4.0	339.2
2018-08-03	2.8	340.4
2018-11-07	2.3	340.9
2018-11-26	1.9	341.3

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 104

17T 524180E 4803929N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE July 30, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 344.92			
0.18	344.74	FILL: Dark brown clayey silt, some sand, occasional rootlets, APL, occasional wood fragments	1A	SS	8
			1B		
0.68	344.24	FILL: Firm brown silty clay , some sand, WTPL, occasional wood fragments	2	SS	11
		CLAYEY SILT: Stiff to very stiff brown clayey silt, trace sand, DTPL, numerous silt layers	3	SS	15
2.1	342.8	becoming grey, WTPL	4	SS	30
			5	SS	17
			6	SS	12
6.5	338.4	BOREHOLE TERMINATED AT 6.5 m	7	SS	17

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-07-31	DRY	--
2018-08-03	3.3	341.6
2018-11-07	1.4	343.5
2018-11-26	0.8	344.1

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 105

17T 524125.6E 4804437N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 1, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION 341.05				
0.0	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist		1A	SS	9
0.46 / 340.59	CLAYEY SILT: Firm brown clayey silt, trace sand, DTPL, numerous silt layers		1B		
			2	SS	7
1.4 / 339.6	becoming stiff		3	SS	10
2.1 / 338.9	becoming WTPL		4	SS	9
			5	SS	9
			6	SS	13
5.6 / 335.4	becoming very stiff		7	SS	17
6.5 / 334.5	BOREHOLE TERMINATED AT 6.5 m				

ELEVATION SCALE: 340, 339, 338, 337, 336, 335

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-01	DRY	--
2018-08-03	1.4	339.6
2018-11-07	1.0	340.0
2018-11-26	0.8	340.2

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 106

17T 524544.9E 4804378N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 342.98			
0.0	342.78	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL	1A		
			1B	SS	11
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers			
1.0			2	SS	15
			3	SS	16
2.0	2.1 / 340.9	becoming firm, grey, WTPL			
			4	SS	7
3.0			5	SS	8
4.0	4.0 / 339.0	becoming stiff to very stiff			
			6	SS	13
5.0					
6.0			7	SS	25
	6.5 / 336.5	BOREHOLE TERMINATED AT 6.5 m			
7.0					
8.0					
9.0					
10.0					
11.0					
12.0					
13.0					
14.0					
15.0					

ELEVATION SCALE: 342, 341, 340, 339, 338, 337

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	4.3	338.7
2018-08-03	2.7	340.3
2018-11-07	1.5	341.5
2018-11-24	1.2	341.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 107

17T 524733E 4804139N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 346.96				
0.0	346.96			1A		
0.20	346.76	TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, DTPL		1B	SS	12
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers		2	SS	11
1.0				3	SS	12
2.0				4	SS	12
2.9	344.1	becoming firm to stiff, grey, WTPL		5	SS	7
3.0				6	SS	9
4.0				7	SS	10
5.0						
6.0						
6.5	340.5	BOREHOLE TERMINATED AT 6.5 m				
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

ELEVATION SCALE: 346, 345, 344, 343, 342, 341

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	DRY	--
2018-08-03	DRY	--
2018-11-07	2.5	344.5
2018-11-26	2.3	344.7

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 108

17T 524541.1E 4804122N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 345.32			
0.22 / 345.10	TOPSOIL: Dark brown sandy silt, trace clay, occasional rootlets, moist	1A / 1B	SS	9
	CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL, numerous silt layers	2	SS	17
		3	SS	12
		4	SS	14
		5	SS	12
4.0 / 341.3	becoming WTPL	6	SS	15
		7	SS	13
6.5 / 338.8	BOREHOLE TERMINATED AT 6.5 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L — WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete

Bentonite Seal

Filter Sand

Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-02	DRY	--
2018-08-03	DRY	--
2018-11-07	5.9	339.4
2018-11-26	5.4	339.9

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 109

17T 524441.1E 4803985N

PROJECT Wilmot Woods Development
PML REF. 18KF031
LOCATION New Hamburg, Ontario
BORING DATE August 2, 2018
ENGINEER H. Shinwary
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.93			
0.0		TOPSOIL: Dark brown clayey silt, some sand, occasional rootlets, APL to WTPL	1	SS	5
0.85	339.08	CLAYEY SILT: Soft to firm brown clayey silt, trace sand, DTPL, numerous silt layers, occasional cobbles	2A 2B	SS	3
1.0			3	SS	7
2.0			4	SS	11
2.1	337.8	becoming stiff			
2.9	337.0	becoming WTPL	5	SS	15
3.0			6	SS	13
4.0			7	SS	9
5.0			8	SS	14
6.0			9	SS	10
7.0			10	SS	10
8.0			11	SS	12
9.0					
10.0			12	SS	16
10.1	329.8	becoming very stiff			
11.0					
12.0			13	SS	15
12.5	327.4	BOREHOLE TERMINATED AT 12.5 m			
13.0					
14.0					
15.0					

ELEVATION SCALE: 339, 338, 337, 336, 335, 334, 333, 332, 331, 330, 329, 328

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-08-03	3.7	336.2
2018-11-07	0.1	339.8
2018-11-26	0.1	339.8

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 110

17T 524499.6E 4803961N

PROJECT Wilmot Woods Development — **PML REF.** 18KF031

LOCATION New Hamburg, Ontario — **BORING DATE** October 15, 2018 — **ENGINEER** H. Shinwary

BORING METHOD Continuous Flight Hollow Stem Augers — **TECHNICIAN** K. Pettitt

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 339.98			
0.0	339.98	TOPSOIL: Dark brown silt, trace sand, occasional rootlets, moist to wet	1	SS	3
0.36	339.62	CLAYEY SILT: Stiff brown clayey silt, some sand, DTPL, numerous silt layers			
0.70	339.28	becoming firm to stiff, occasional cobbles, WTPL	2	SS	10
1.0					
			3	SS	12
2.0					
			4	SS	16
2.9	337.1	becoming firm to stiff grey, trace sand, WTPL			
3.0			5	SS	8
4.0			6	SS	7
			7	SS	9
5.0					
			8	SS	9
6.0					
			9	SS	9
7.0	333.0	becoming very stiff, occasional silt layers			
			10	SS	18
8.0					
8.5	331.5	becoming stiff, numerous silt layers			
9.0					
			11	SS	12
10.0					
			12	SS	10
11.0					
			13	SS	13
12.6	327.4	BOREHOLE TERMINATED AT 12.6 m			
13.0					
14.0					
15.0					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 339, 338, 337, 336, 335, 334, 333, 332, 331, 330, 329, 328

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%)
GR SA SI&CL

Stickup Well Protector Set in Concrete
50 mm pipe
Bentonite Seal
Filter Sand
Screen

Water Level Readings:

Date	Depth	Elev.
2018-10-15	DRY	---
2018-11-07	0.5	339.5
2018-11-26	0.2	339.8

NOTES

ID No.: MP01-22

Project Name: Wilmot Woods Subdivision

MTE File No.: 35056-104

Client: Capital Homes

Site Location: Wilmot Con South of Snyders Rd Pt Lot 20

Date Completed: 1/11/2022

Construction Materials: Stainless steel

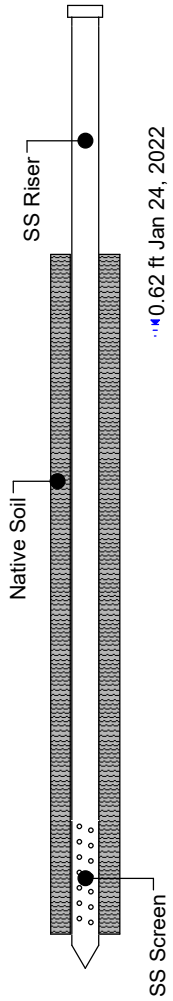
Installation Method: Post pounder

Subsurface Profile

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)
			Ground Surface	341.0
0	0		**TOPSOIL** dark brown, moist silt, trace clay and rootlets	0.0 340.8
			SILT light brown, moist silt	0.2 340.5
			CLAYEY SILT light brown, wet to saturated clayey silt	0.5 340.4
2			**CLAY** brown, saturated clay	0.6 339.8
4			**Sampler Extent**	1.2 339.1
6	2		Excavation Terminated	1.8

Soil Sample Lab Analysis

Piezometer



Field Technician: TXG

Drafted by: TXG

Reviewed by: RBM

NAD83 17T 524329E 4803965N

Sheet: 1 of 1

Appendix C

Slug Test Analyses Sheets and Particle Size Distribution Analyses

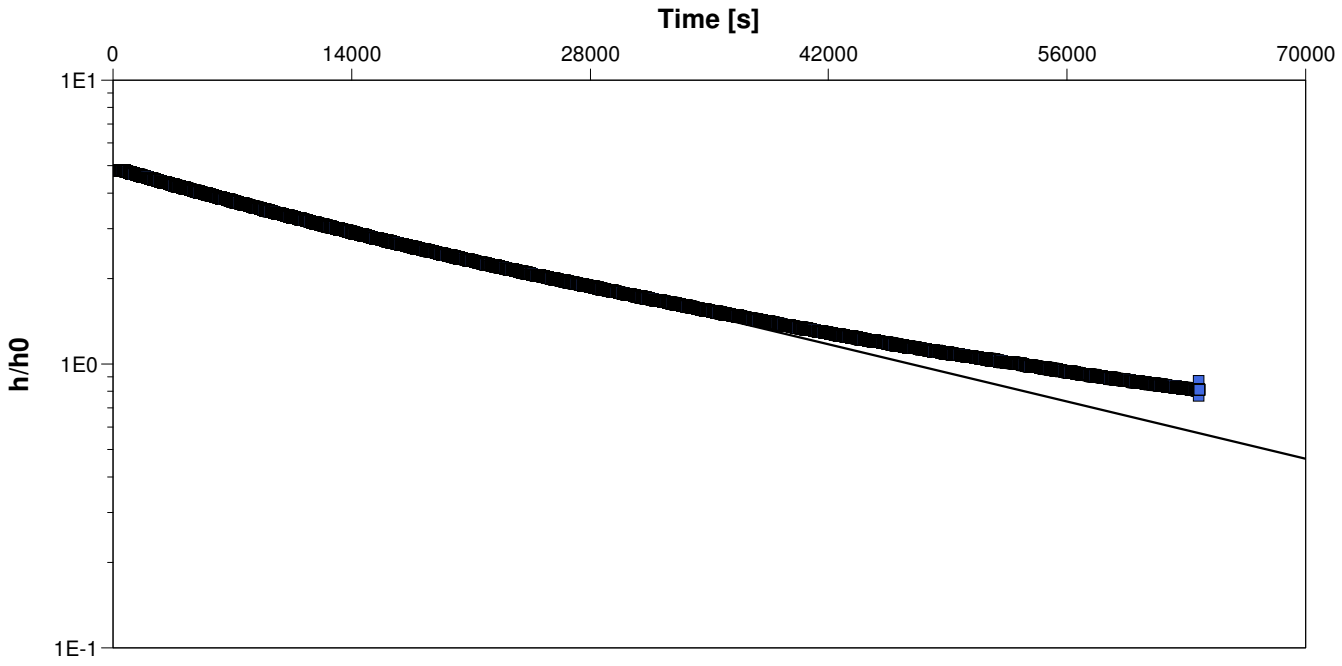
Table C.1: Hydraulic Conductivity (m/sec) Summary

In-Situ Hydraulic Conductivity						
Monitoring Well	**Ground Surface Elevation**	**Screened Interval (mBGS/ mAMSL)**	**Sediment Description**	**Hydraulic Conductivity (m/sec)**	**Method**	**Calculation**
MW101-18	339.2	4.6 - 6.1 333.1 - 334.7	Clayey silt, trace sand	2.23×10^{-8}	Rising Head (Recovery Test)	Bouwer & Rice
MW102-18	340.2	4.6 - 6.1 334.1 - 335.6	Sandy silt, trace clay	1.68×10^{-5}	Rising Head	Bouwer & Rice
MW104-18	345.0	4.6 - 6.1 338.9 - 340.4	Clayey silt, trace sand	1.40×10^{-7}	Rising Head (Recovery Test)	Bouwer & Rice
MW105-18	341.1	4.6 - 6.1 335.0 - 336.5	Clayey silt, trace sand	3.36×10^{-7}	Rising Head (Recovery Test)	Bouwer & Rice
MW106-18	343.0	4.6 - 6.1 335.0 - 336.5	Clayey silt, trace sand	5.93×10^{-6}	Rising Head (Recovery Test)	Bouwer & Rice
MW107-18	347.0	4.6 - 6.1 336.9 - 338.4	Clayey silt, trace sand	6.77×10^{-8}	Rising Head (Recovery Test)	Bouwer & Rice
MW109-18	340.1	4.6 - 6.1 329.3 - 330.9	Clayey silt, trace sand	3.63×10^{-7}	Rising Head (Recovery Test)	Bouwer & Rice
MW110-18	340.0	4.6 - 6.1 327.8 - 329.4	Clayey silt, trace sand	2.17×10^{-8}	Rising Head (Recovery Test)	Bouwer & Rice
MW201-21	343.5	4.6 - 6.1 337.4 - 338.9	Silt, trace clay and sand	3.19×10^{-8}	Rising Head (Recovery Test)	Bouwer & Rice
MW202-21	342.1	4.6 - 6.1 336.0 - 337.5	Sand, trace silt and clay	7.10×10^{-5}	Rising Head	Bouwer & Rice
MW203A-21	344.7	10.7 - 12.2 332.5 - 334.1	Clayey silt, trace gravel and sand	1.61×10^{-7}	Rising Head (Recovery Test)	Bouwer & Rice
MW203B-21	344.8	4.6 - 6.1 338.7 - 340.2	Silt, trace clay and sand	9.18×10^{-6}	Rising Head (Recovery Test)	Bouwer & Rice

Particle Size Distribution						
Monitoring Well / Borehole Name	**Ground Surface Elevation**	**Sample Identification and Depth (mBGS)**	**Screened Interval (mBGS/ mAMSL)**	**Sediment Description**	**Hydraulic Conductivity Range (m/sec)**	**Formula**
MW101-18	339.2	SS7 6.1 - 6.5	4.6 - 6.1 333.1 - 334.7	Clayey silt	$3.3x\ 10^{-11}$	Kaubisch
MW102-18	340.2	SS2 4.6 - 5.0	4.6 - 6.1 334.1 - 335.6	Sandy silt	4.6×10^{-9}	Kaubisch
MW104-18	345.0	SS6 4.6 - 5.0	4.6 - 6.1 338.9 - 340.4	Clayey silt	3.0×10^{-11}	Kaubisch
MW105-18	341.1	SS6 4.6 - 5.0	4.6 - 6.1 335.0 - 336.5	Clayey silt	3.0×10^{-11}	Kaubisch
MW107-18	347.0	SS6 4.6 - 5.0	4.6 - 6.1 336.9 - 338.4	Clayey silt	2.8×10^{-11}	Kaubisch
MW109-18	340.1	SS11 9.1 - 9.6	4.6 - 6.1 329.3 - 330.9	Clayey silt	3.1×10^{-11}	Kaubisch
MW201-21	343.5	6.1	4.6 - 6.1 337.4 - 338.9	Sand, trace silt and clay	3.8×10^{-11}	Kaubisch
MW202-21	342.1	SS7 4.6 - 5.2	4.6 - 6.1 336.0 - 337.5	Sand, trace gravel and sand	5.5×10^{-5}	Beyer
MW203A-21	344.7	SS10 10.7 - 11.3	10.7 - 12.2 332.5 - 334.1	Clayey silt, trace gravel and sand	3.1×10^{-11}	Kaubisch
MW203B-21	344.8	SS6 4.6 - 5.2	4.6 - 6.1 338.7 - 340.2	Silt, trace clay and sand	4.9×10^{-11}	Kaubisch

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg	Slug Test: MW101	Test Well: MW101
Test Conducted by: TXG		Test Date: 12/9/2021
Analysis Performed by: EMB	MW101	Analysis Date: 12/9/2021
Aquifer Thickness: 4.97 m		

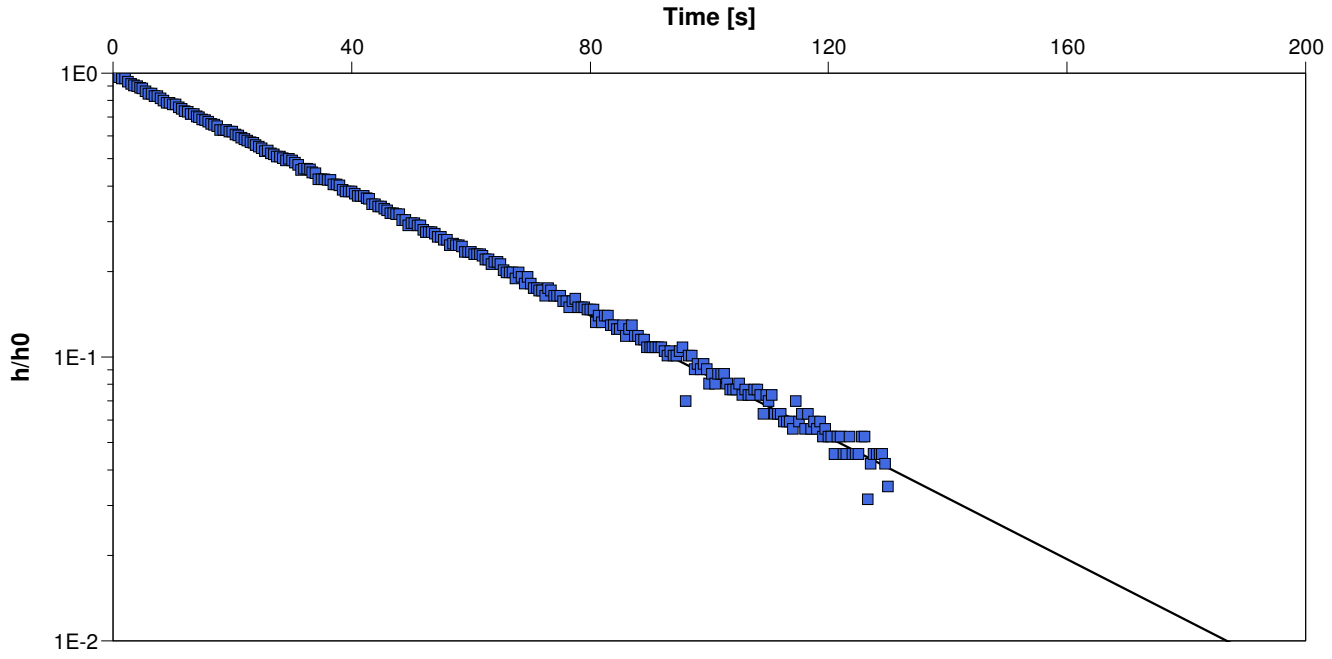


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW101	2.23×10^{-8}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg	Slug Test: MW102	Test Well: MW102
Test Conducted by: TXG		Test Date: 5/31/2021
Analysis Performed by: EMB	MW102	Analysis Date: 5/31/2021
Aquifer Thickness: 5.41 m		

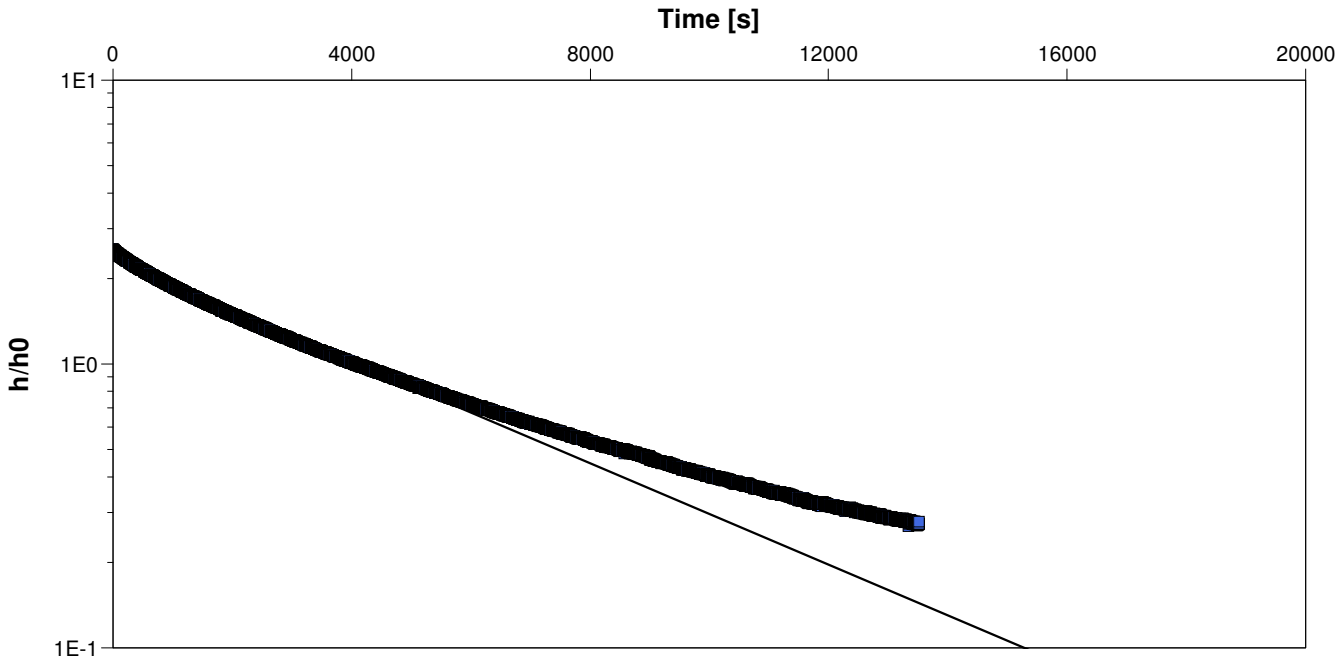


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW102	1.68×10^{-5}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW104	Test Well: MW104
Test Conducted by: TXG		Test Date: 12/9/2021
Analysis Performed by: EMB	MW104	Analysis Date: 12/9/2021
Aquifer Thickness: 5.44 m		

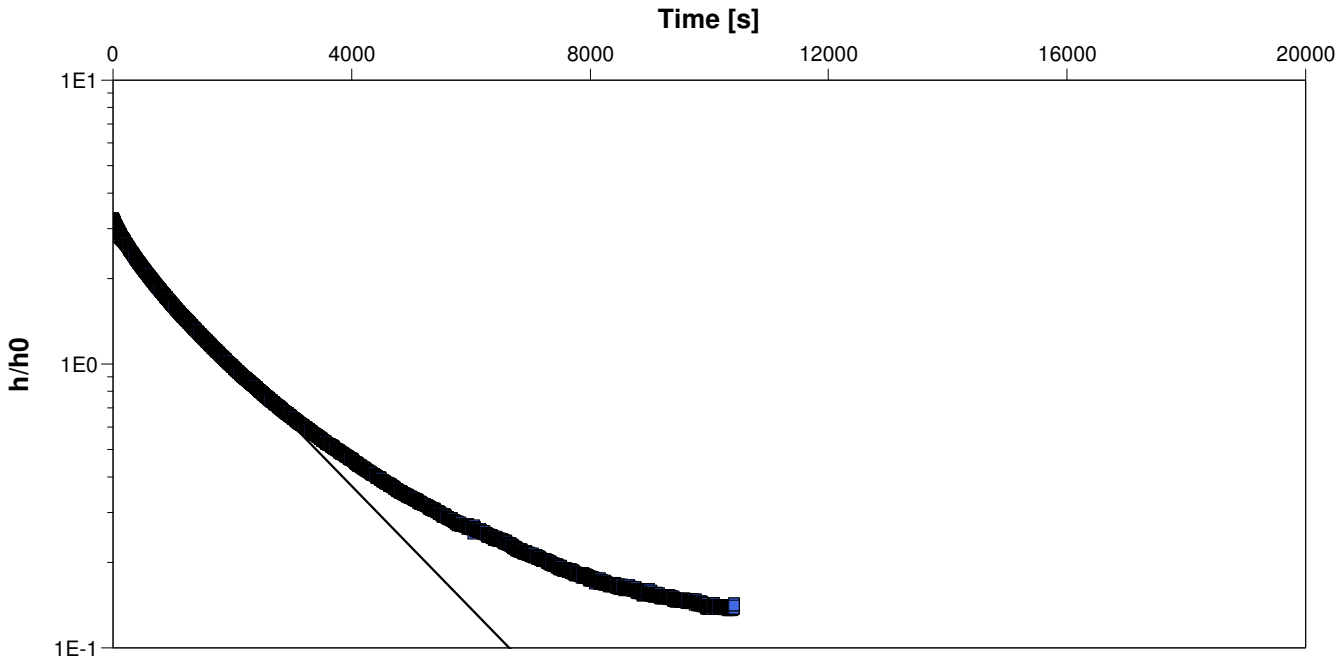


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW104	1.40×10^{-7}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW105	Test Well: MW105
Test Conducted by: TXG		Test Date: 12/9/2021
Analysis Performed by: EMB	MW105	Analysis Date: 12/9/2021
Aquifer Thickness: 5.11 m		

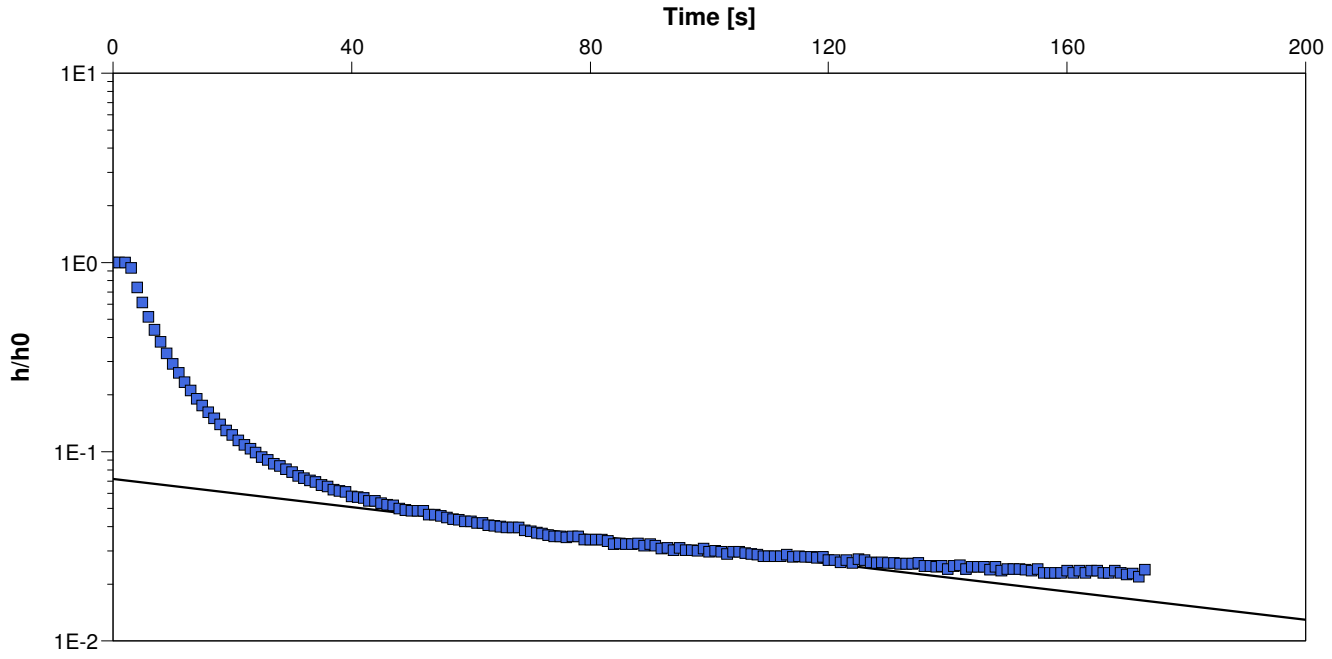


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW105	3.36×10^{-7}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW106	Test Well: MW106
Test Conducted by: TXG		Test Date: 6/11/2021
Analysis Performed by: EMB	MW106	Analysis Date: 11/2/2021
Aquifer Thickness: 4.92 m		

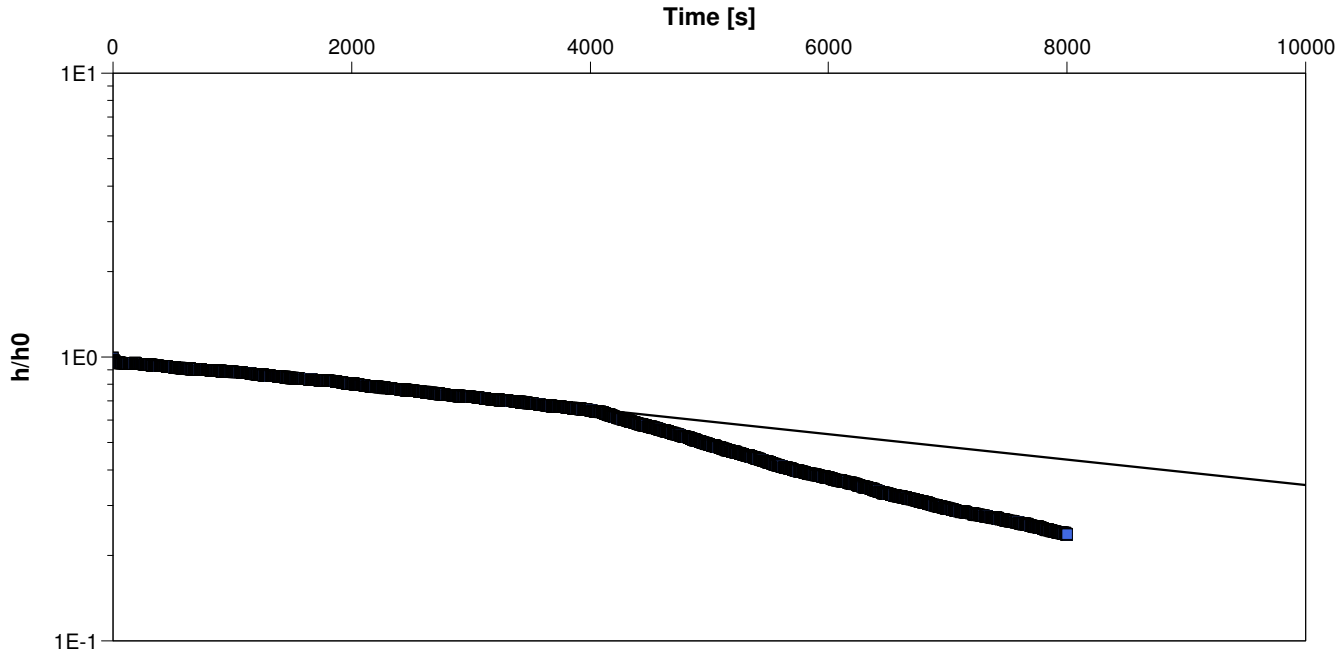


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW106	5.93×10^{-6}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg	Slug Test: MW107	Test Well: MW107
Test Conducted by: TXG		Test Date: 6/11/2021
Analysis Performed by: EMB	MW107	Analysis Date: 6/11/2021
Aquifer Thickness: 3.61 m		

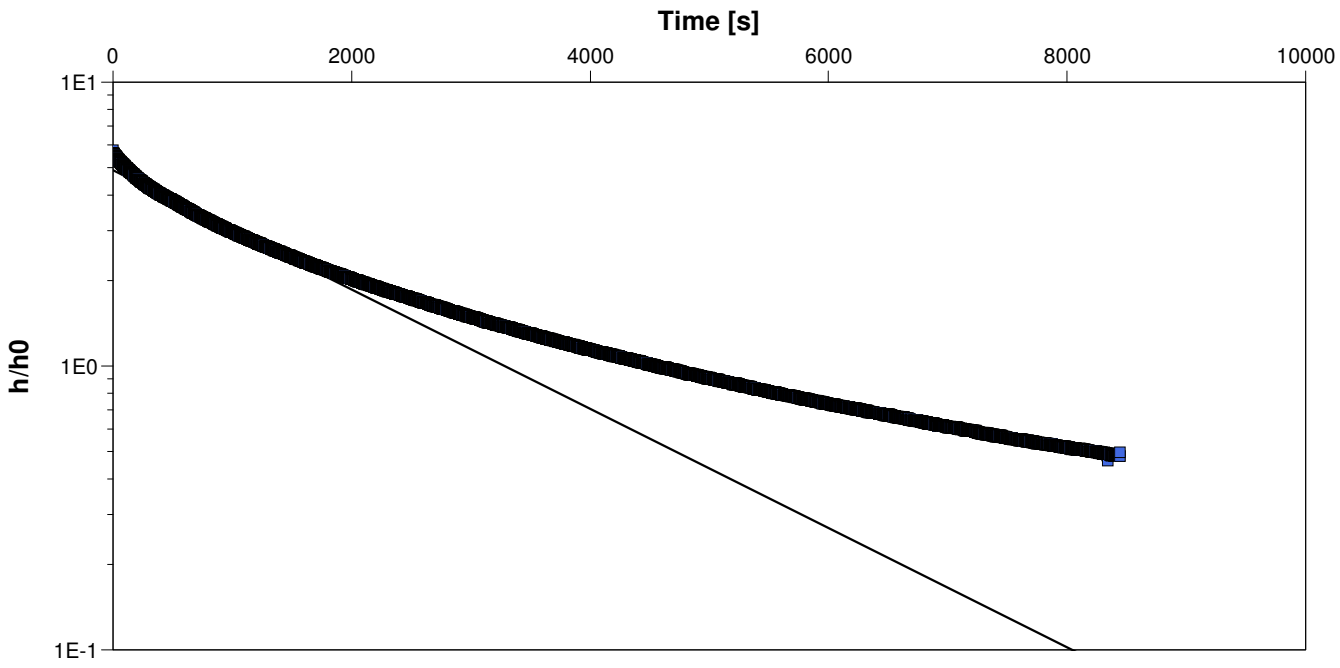


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW107	6.77×10^{-8}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW109	Test Well: MW109
Test Conducted by: EMB		Test Date: 12/9/2021
Analysis Performed by: EMB	MW109	Analysis Date: 12/9/2021
Aquifer Thickness: 9.79 m		

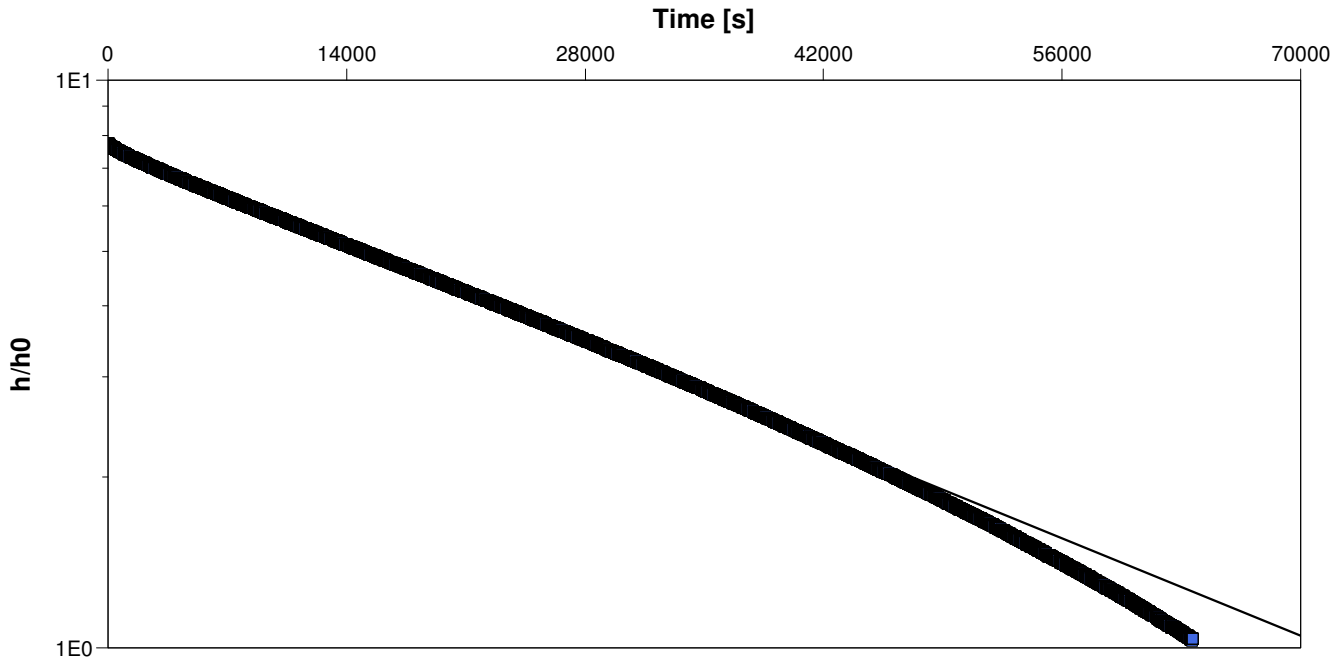


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW109	3.63×10^{-7}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW110	Test Well: MW110
Test Conducted by:		Test Date: 12/9/2021
Analysis Performed by: EMB	MW110	Analysis Date: 12/9/2021
Aquifer Thickness: 11.97 m		

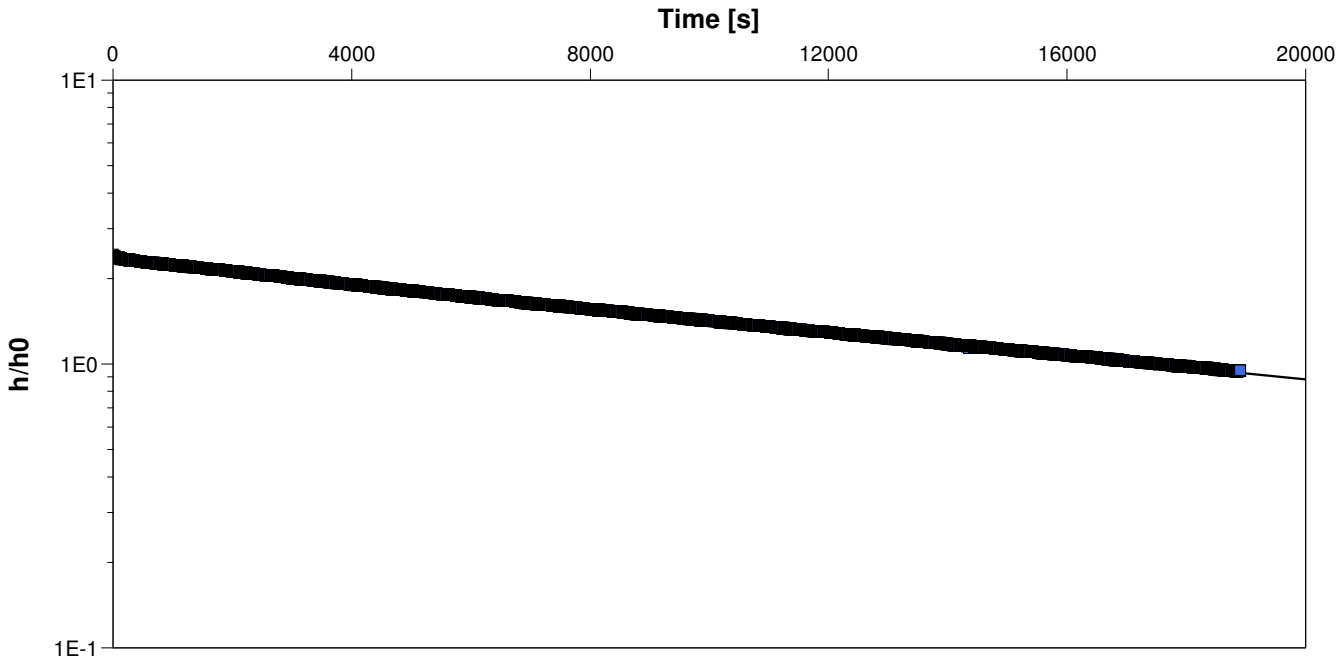


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW110	2.17×10^{-8}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Hydrogeological Assessment

Location: New Hamburg, ON	Slug Test: MW201-21	Test Well: MW201-21
Test Conducted by: TXG		Test Date: 12/9/2021
Analysis Performed by: EMB	MW201-21	Analysis Date: 12/9/2021
Aquifer Thickness: 4.54 m		

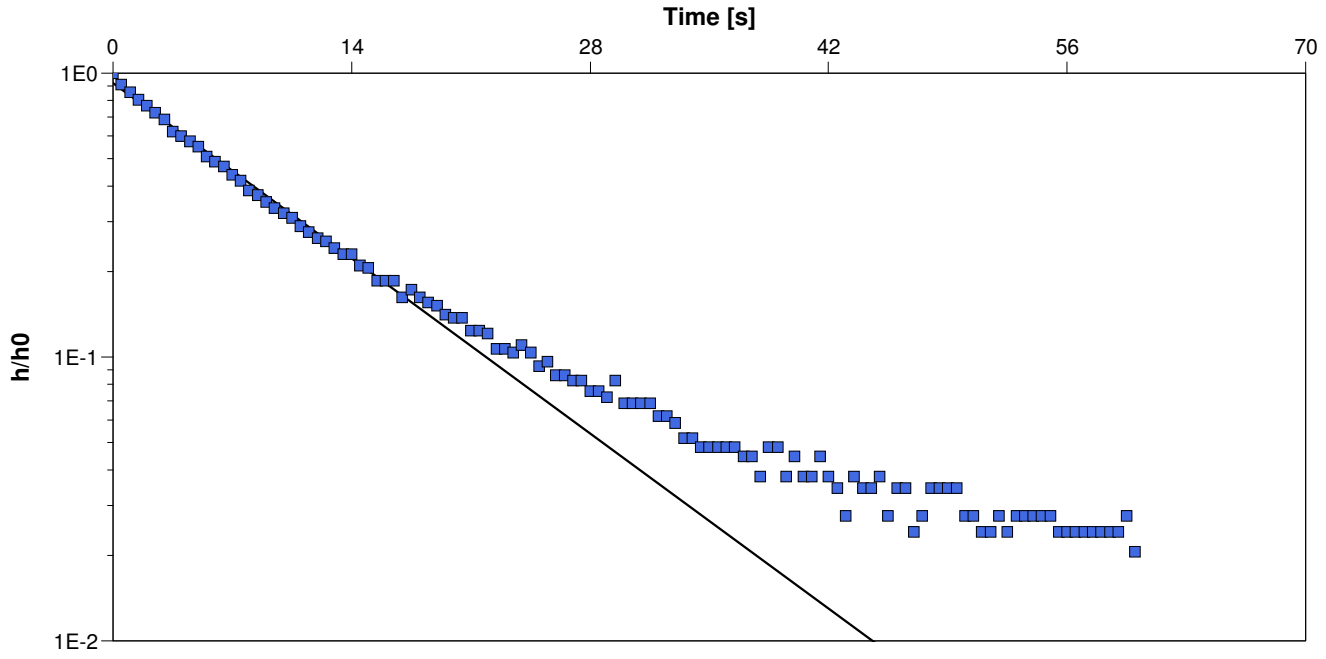


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW201-21	3.19×10^{-8}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg	Slug Test: MW202-21	Test Well: MW202-21
Test Conducted by: TXG		Test Date: 5/31/2021
Analysis Performed by: EMB	MW202-21	Analysis Date: 5/31/2021
Aquifer Thickness: 5.25 m		

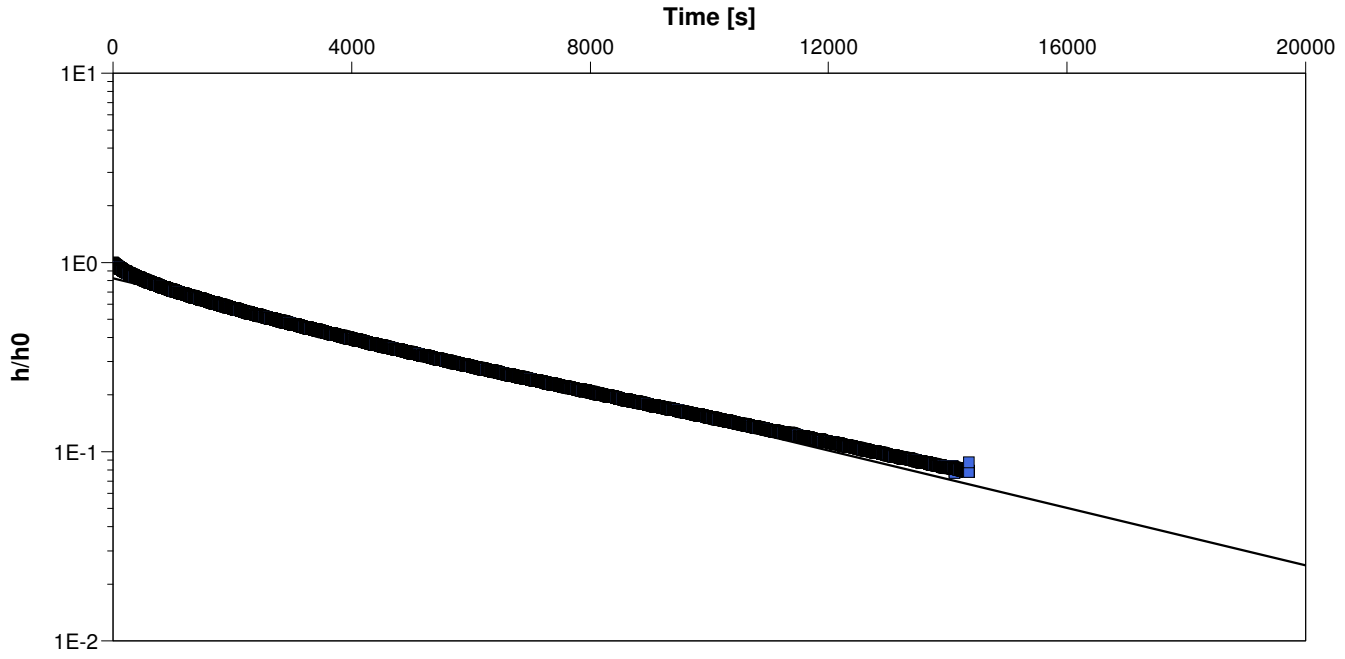


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW202-21	7.10×10^{-5}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg	Slug Test: MW203A-21	Test Well: MW203A-21
Test Conducted by: TXG		Test Date: 6/1/2021
Analysis Performed by: EMB	MW203A-21	Analysis Date: 6/1/2021
Aquifer Thickness: 10.08 m		

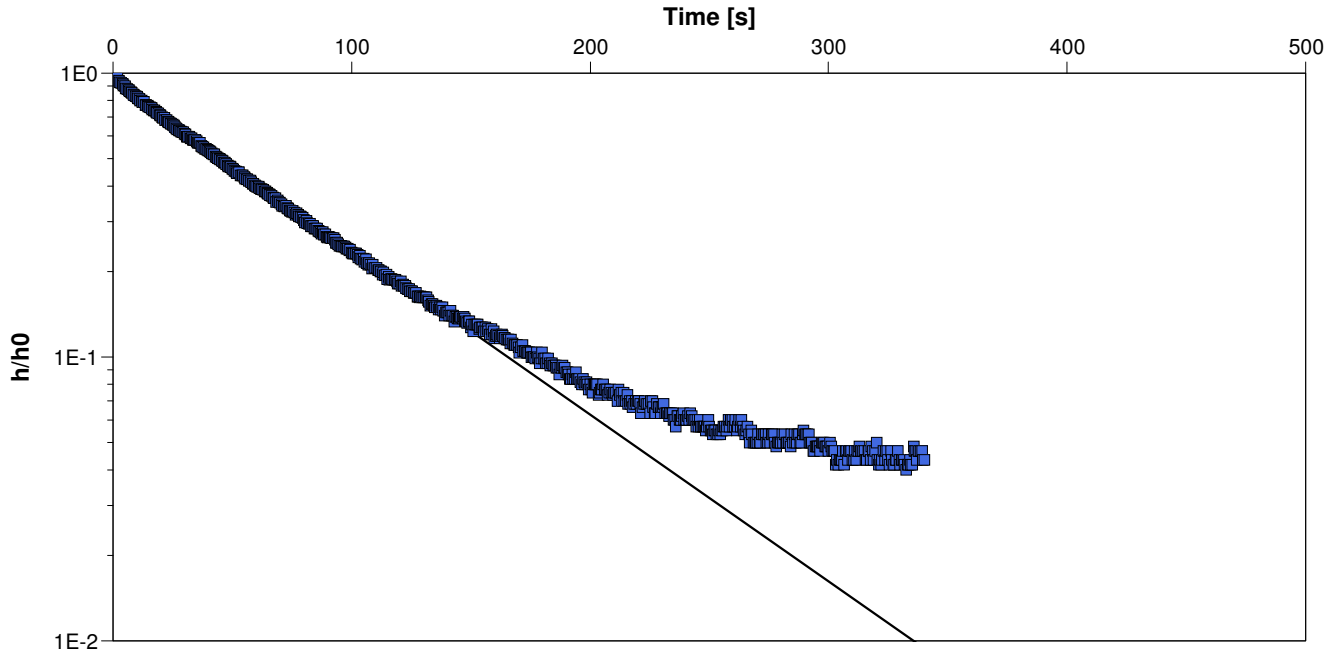


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW203A-21	1.61×10^{-7}	

MTE	**Slug Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 35056-104
	Client: Wilmot Woods Development Inc.

Location: New Hamburg, ON	Slug Test: MW203B-21	Test Well: MW203B-21
Test Conducted by: TXG		Test Date: 5/31/2021
Analysis Performed by: EMB	MW203B-21	Analysis Date: 5/31/2021
Aquifer Thickness: 4.40 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW203B-21	9.18×10^{-6}	

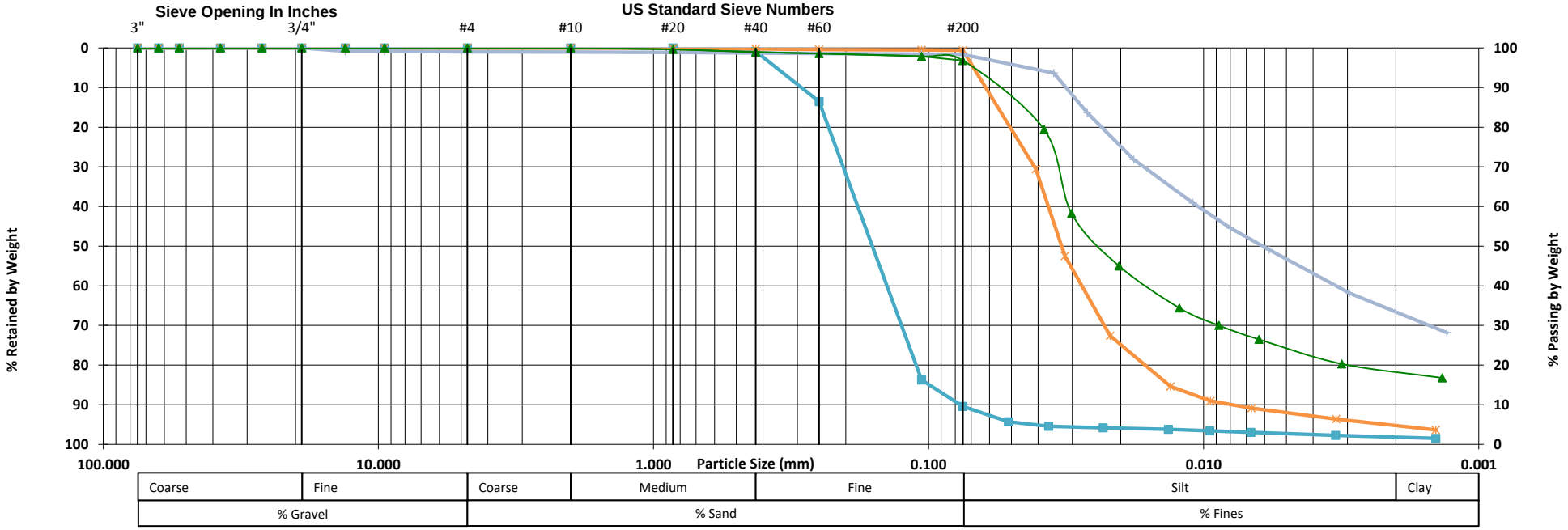
Particle Size Distribution Analysis Test Results

Project Name: Wilmot Woods Subdivision
Client: Wilmot Woods Development Inc.
Project Location: Waterloo Street, New Hamburg, ON

Date Received: Apr. 5, 2021
Date Tested: Apr. 13-16, 2021

MTE File No.: 35056-104
Table No.: 101

Unified Soil Classification



Symbol	Borehole ID	Sample #	*Sample Depth*	Description
	MW202-21	N/A	6.1 mbgs	SILT, some Clay, trace Sand
	MW203A-21	N/A	4.6-5.2 mbgs	SAND, trace Silt and Clay
	MW203A-21	N/A	4.6-5.2 mbgs	SILT, trace Clay and Sand
	MW201-21	N/A	10.7-11.3 mbgs	Clayey SILT, trace Gravel and Sand

CERTIFIED BY CCIL Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

NOTES:

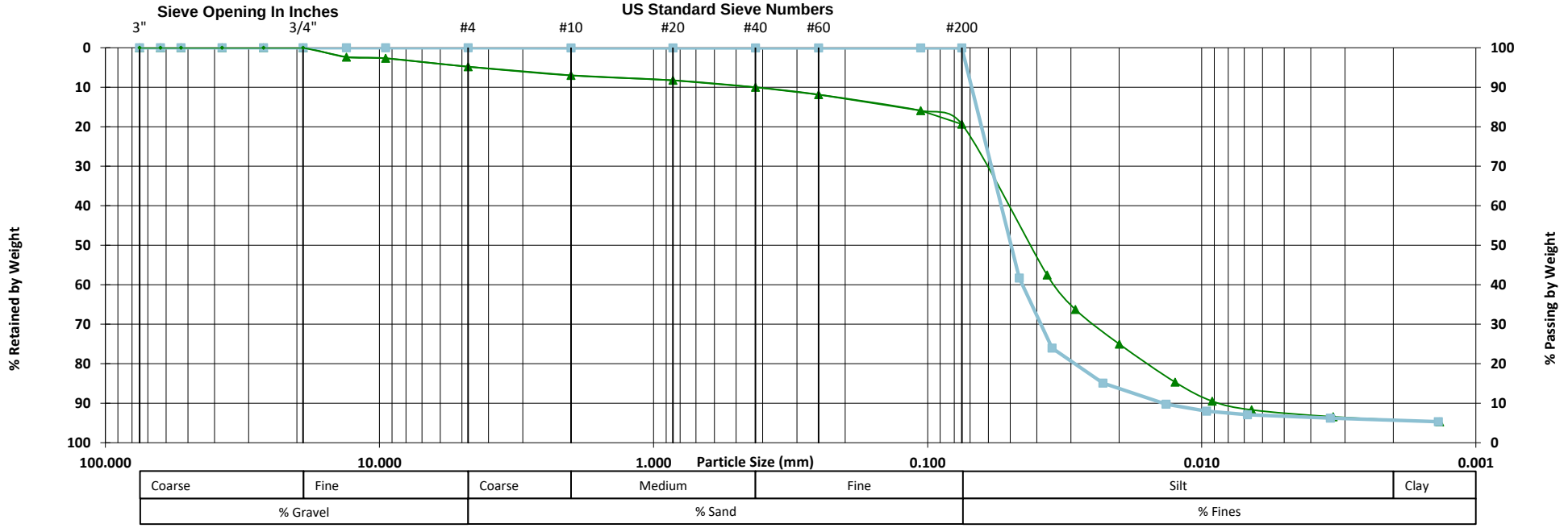
Particle Size Distribution Analysis Test Results

Project Name: Wilmot Woods Subdivision
Client: Wilmot Woods Development Inc.
Project Location: Waterloo Street, New Hamburg, ON

Date Received: Jan. 12, 2022
Date Tested: Jan. 18-21, 2022

MTE File No.: 35056-104
Table No.: 102

Unified Soil Classification



Symbol	Borehole ID	Sample #	*Sample Depth*	Description
▲	MW202-21	SS-2	0.8-1.4 mbgs	SILT, some Sand, trace Clay and Gravel
■	MW203A-21	SS-2	0.6-1.2 mbgs	SILT, trace Clay

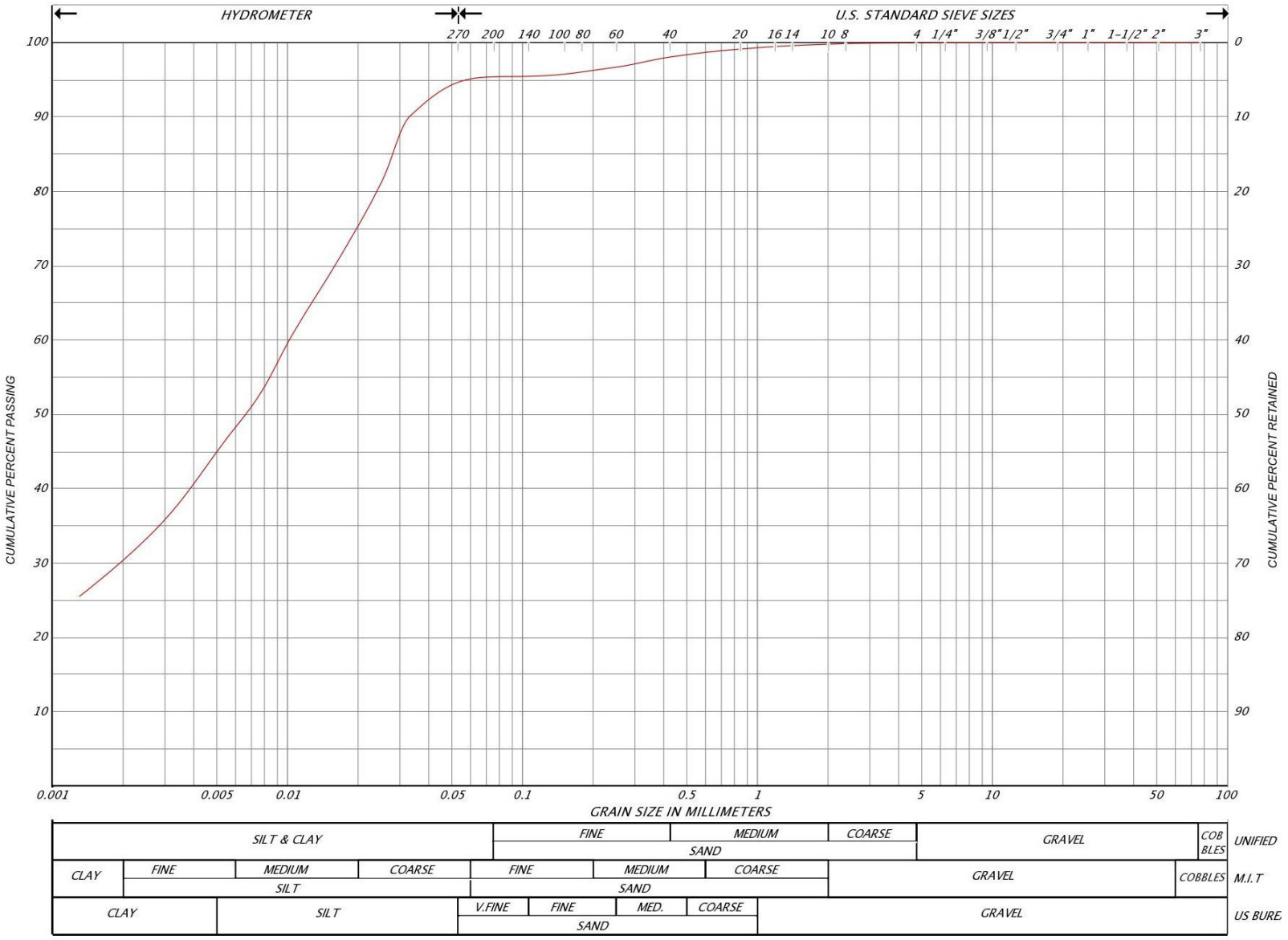
CERTIFIED BY CCIL Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

NOTES:

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 1



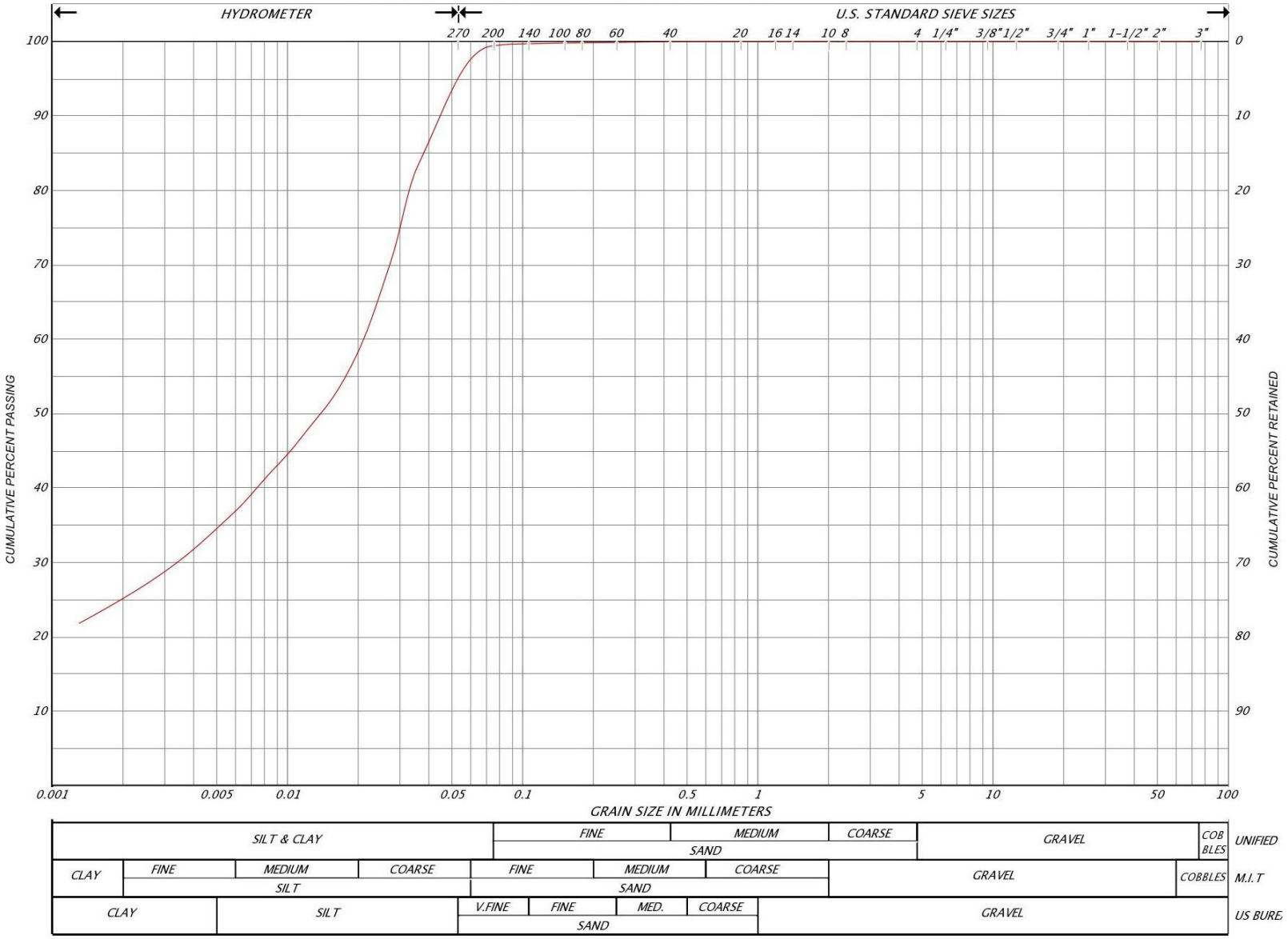
REMARKS Borehole MW101, Sample SS7, Depth 6.1 to 6.5 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 2



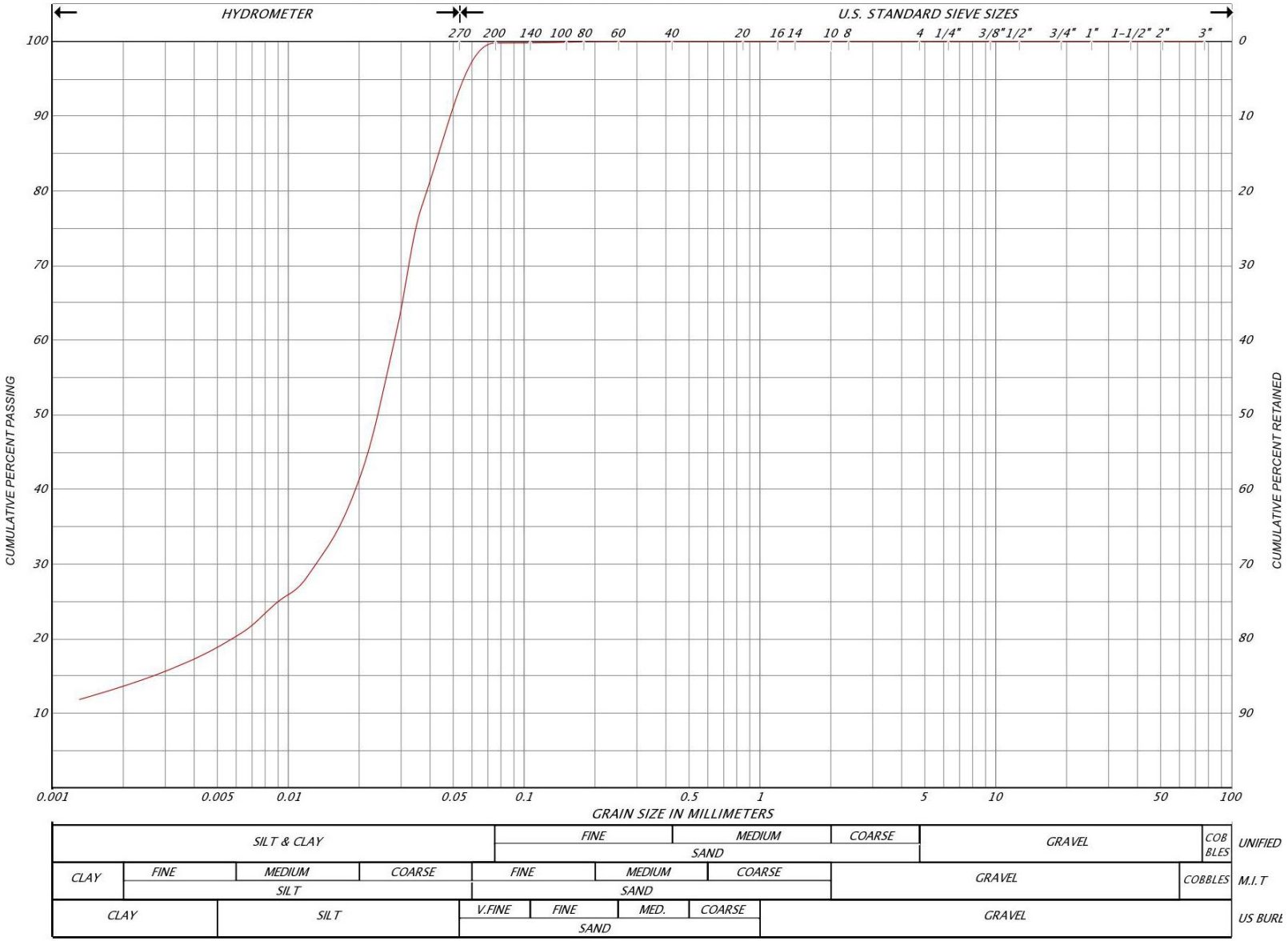
REMARKS Borehole MW104, Sample SS6, Depth 4.6 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 3



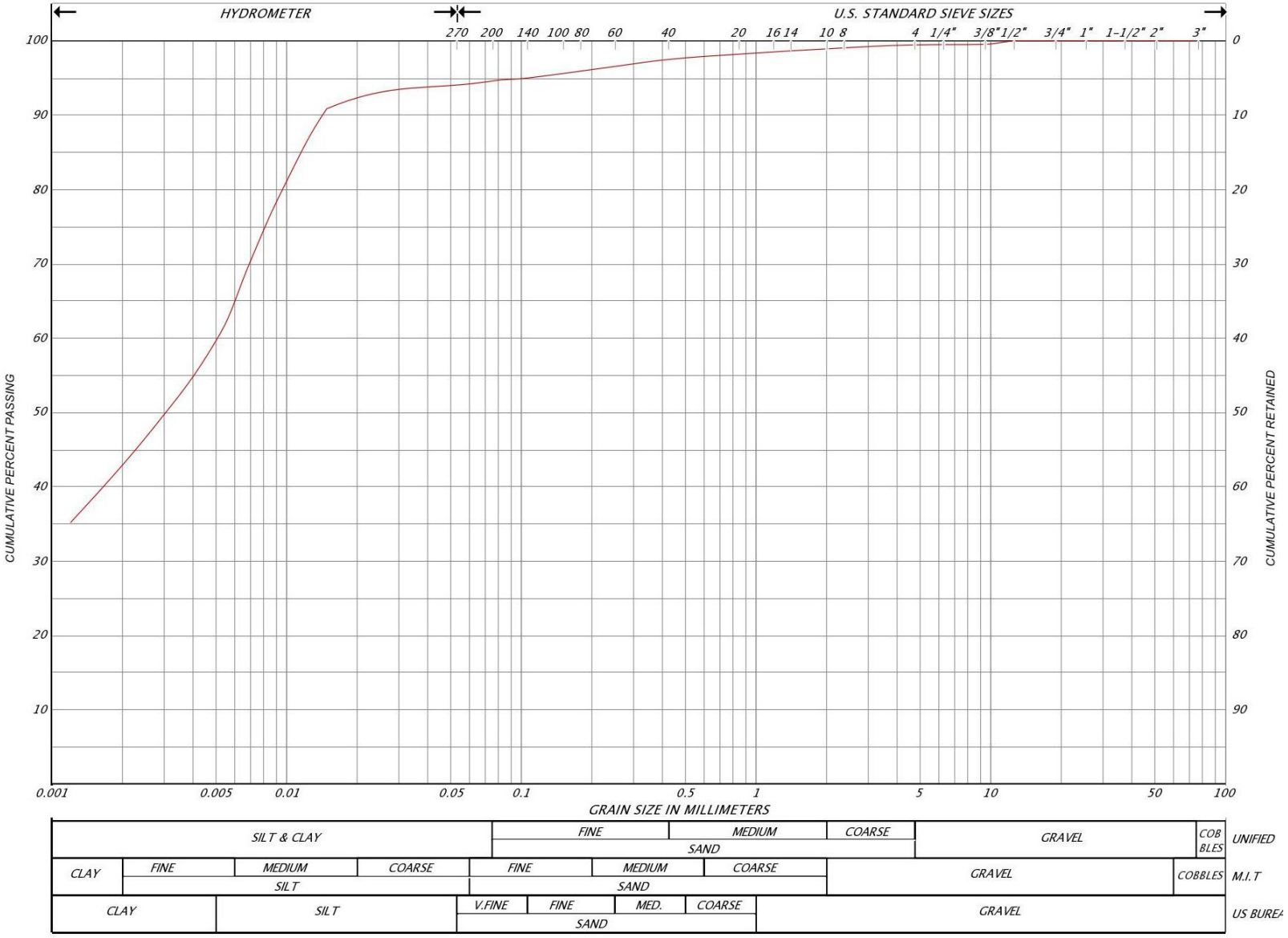
REMARKS Borehole MW105, Sample SS6, Depth 4.5 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 4



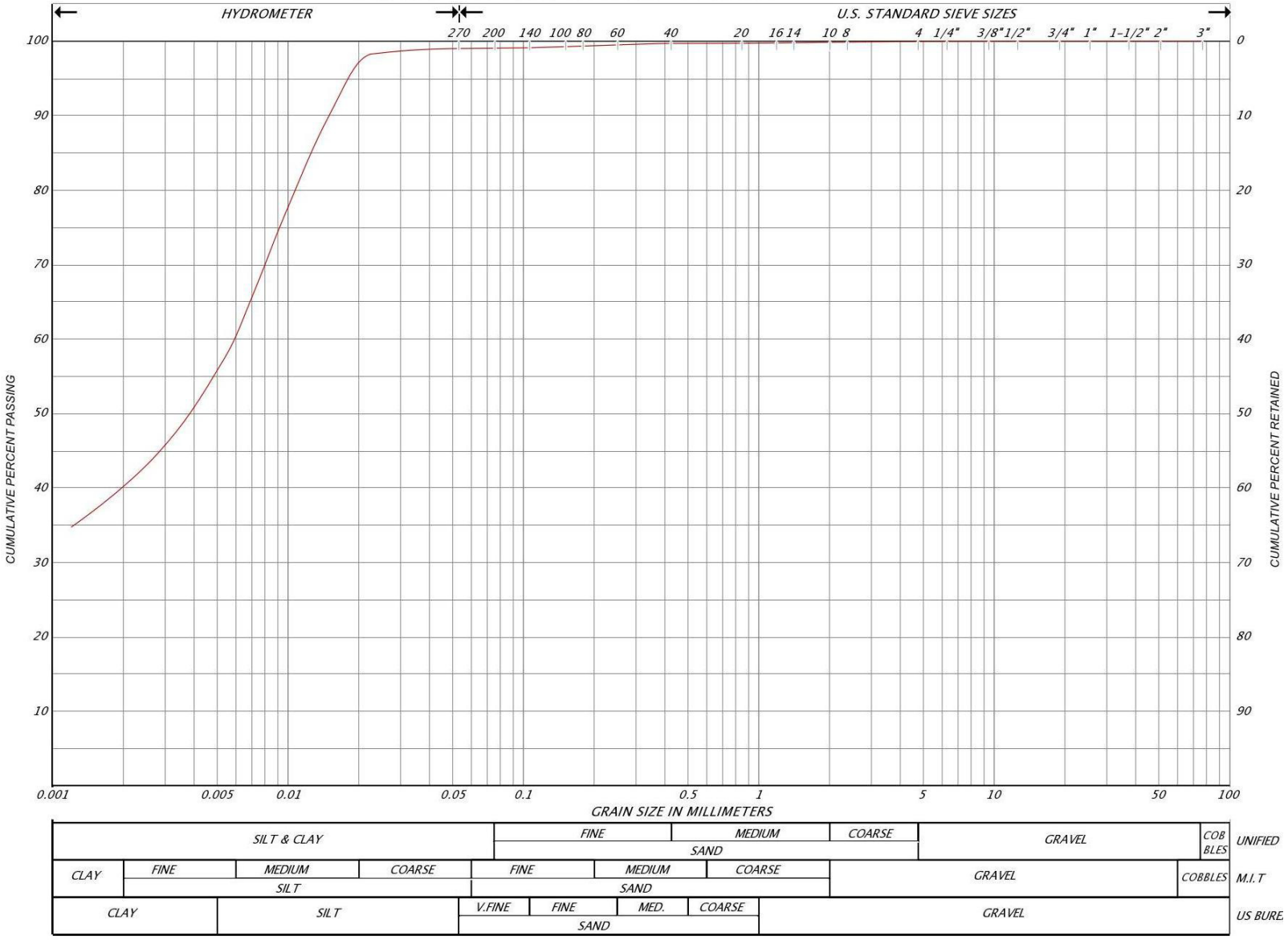
REMARKS Borehole MW107, Sample SS3, Depth 1.5 to 2.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 5



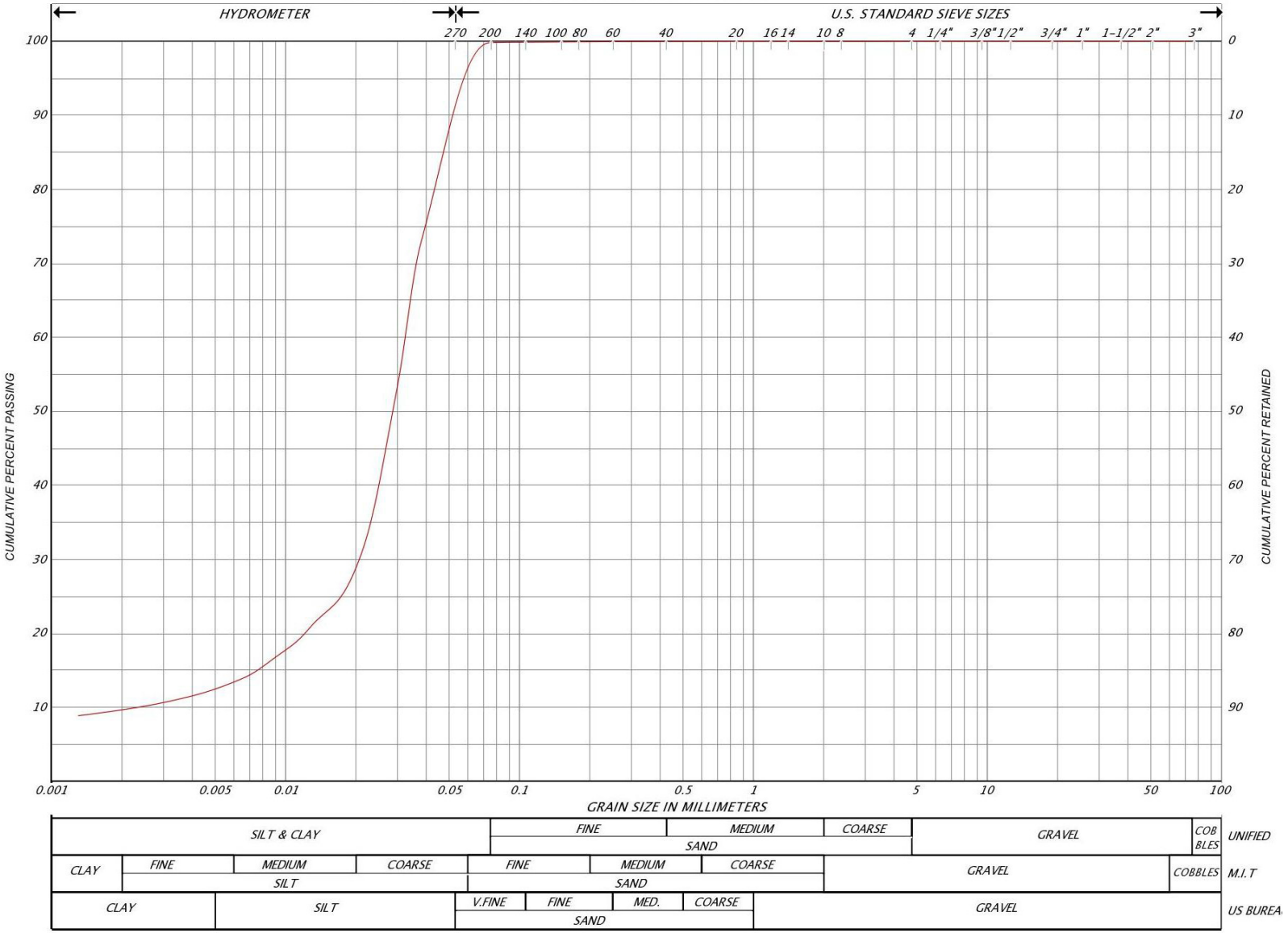
REMARKS Borehole MW107, Sample SS6, Depth 4.6 to 5.0 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 6



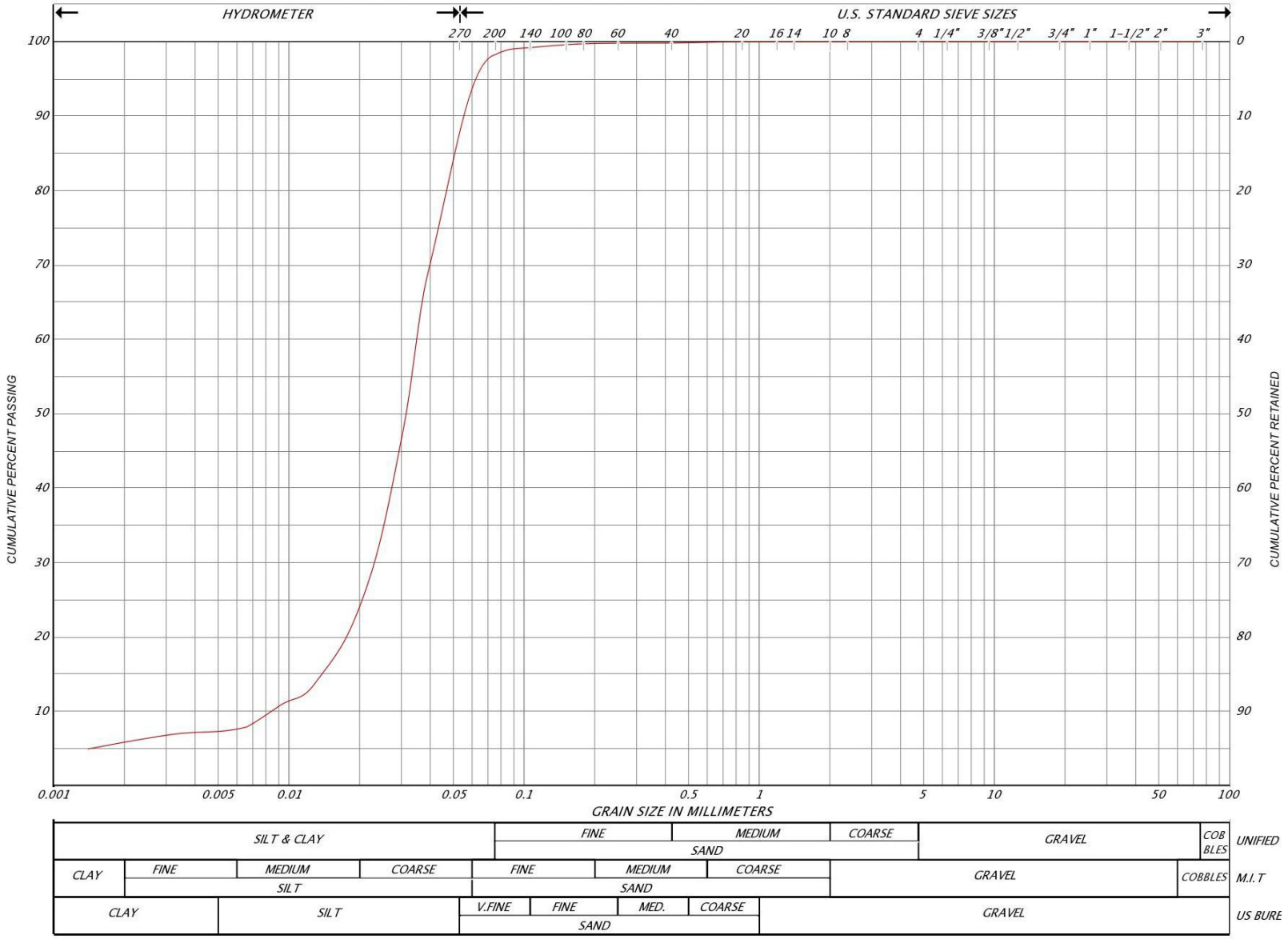
REMARKS Borehole MW109, Sample SS11, Depth 9.1 to 9.6 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 7



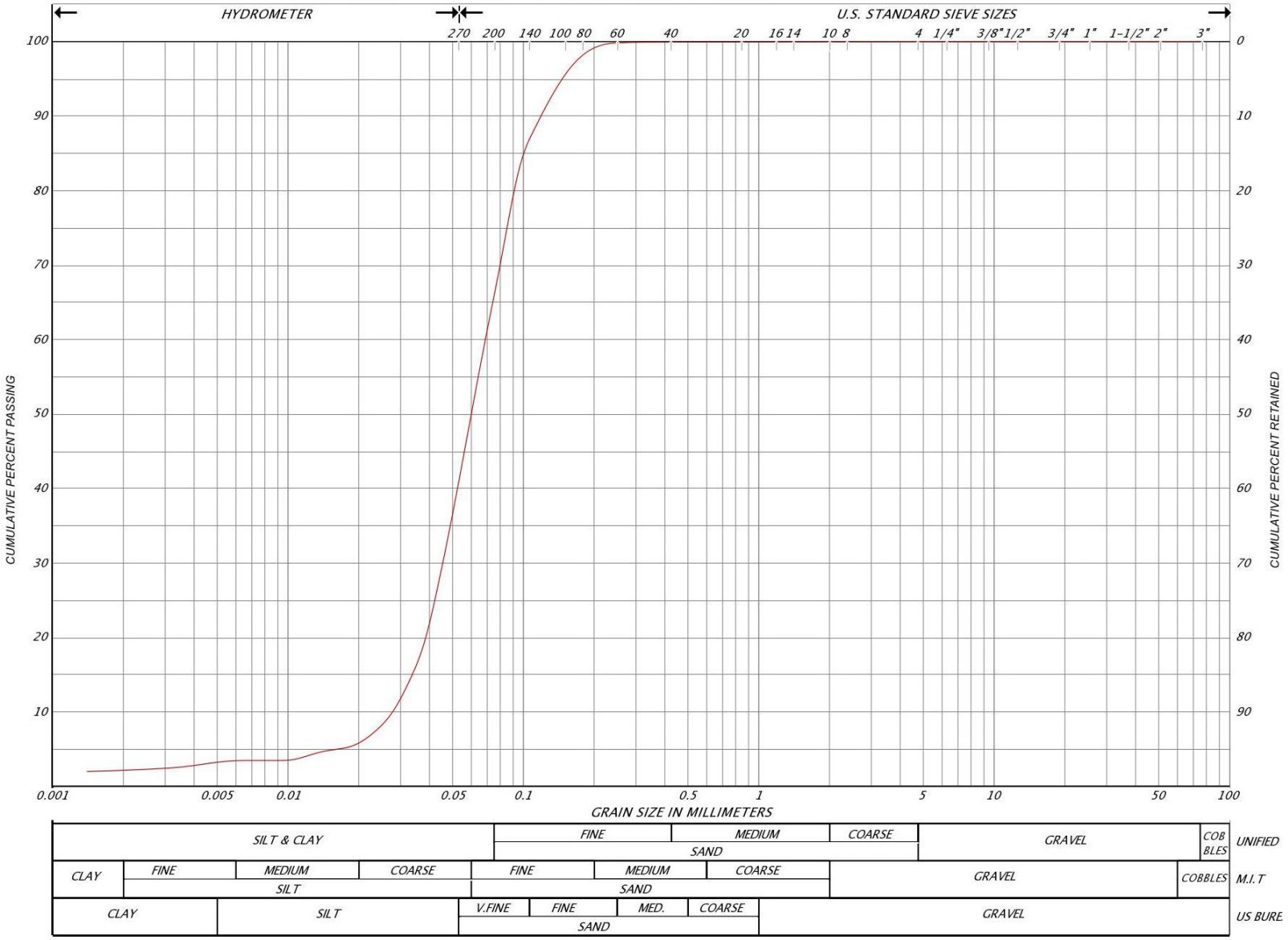
REMARKS Borehole BH9, Sample SS3, Depth 1.5 to 2.0 m

SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 8



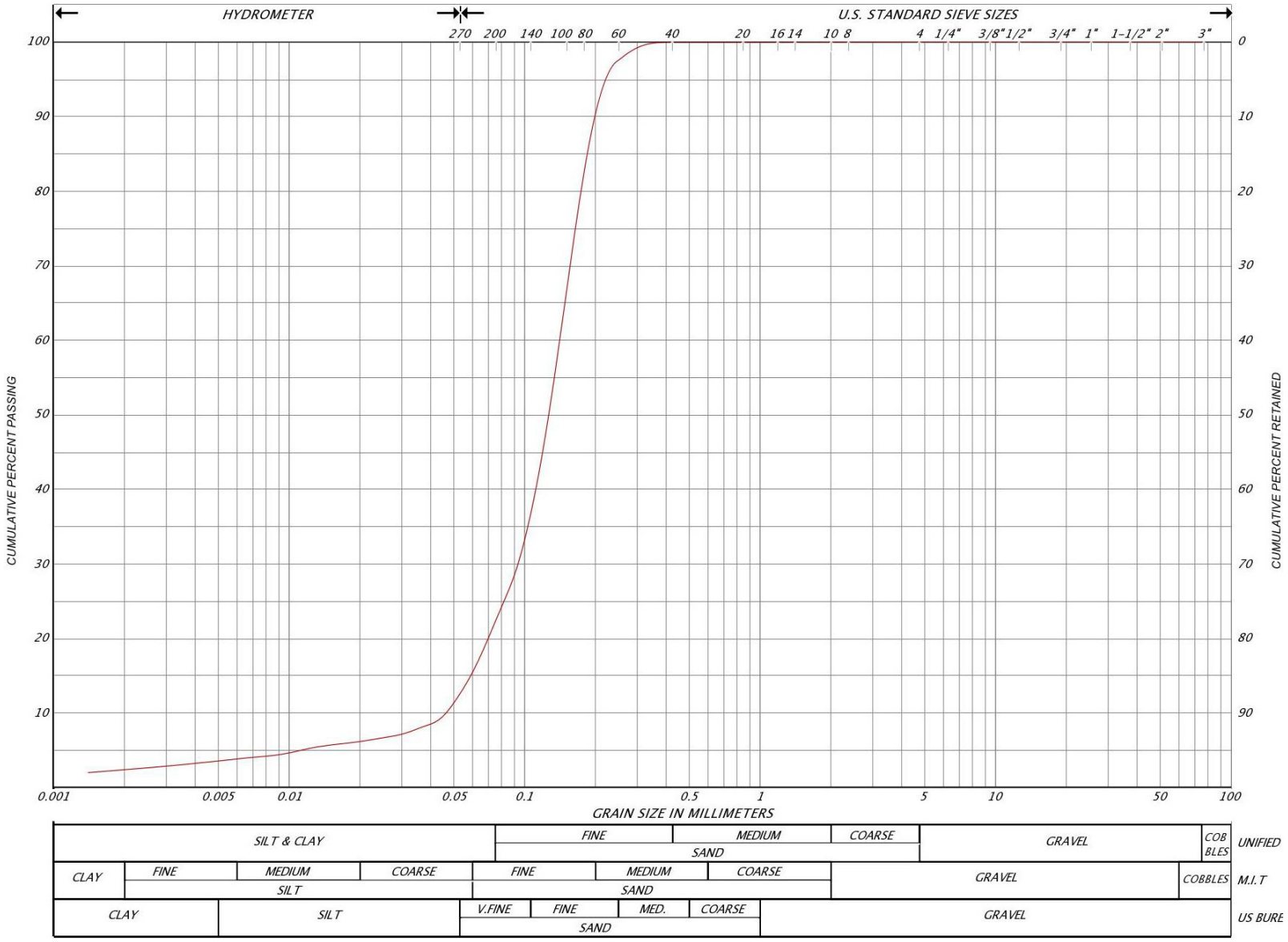
REMARKS Borehole MW102, Sample SS6, Depth 4.6 to 5.0 m

SANDY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 9



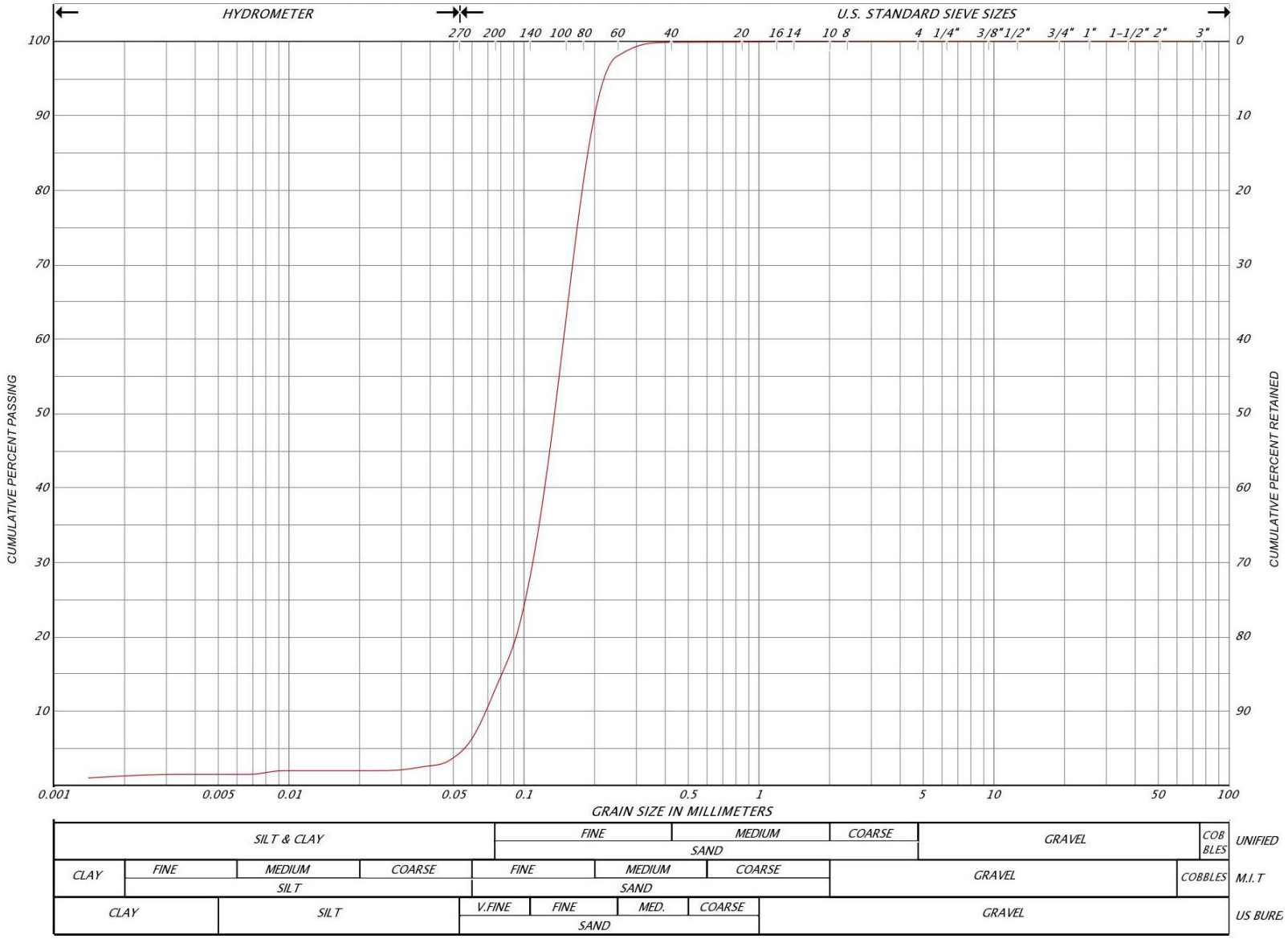
REMARKS Borehole BH9, Sample SS5, Depth 3.1 to 3.5 m

SILTY SAND

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 10



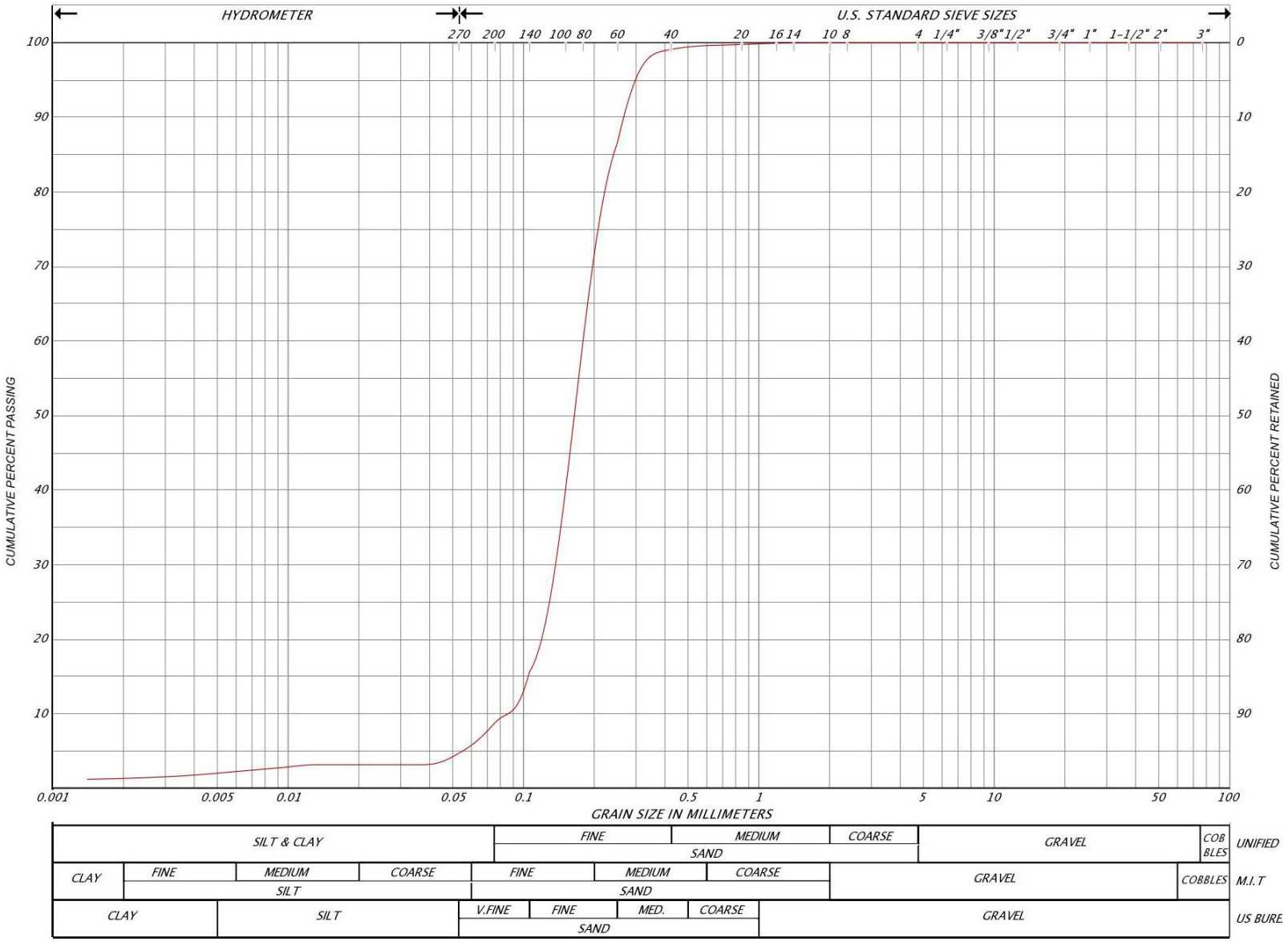
REMARKS Borehole BH6, Sample SS5, Depth 3.1 to 3.5 m

SAND

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 11



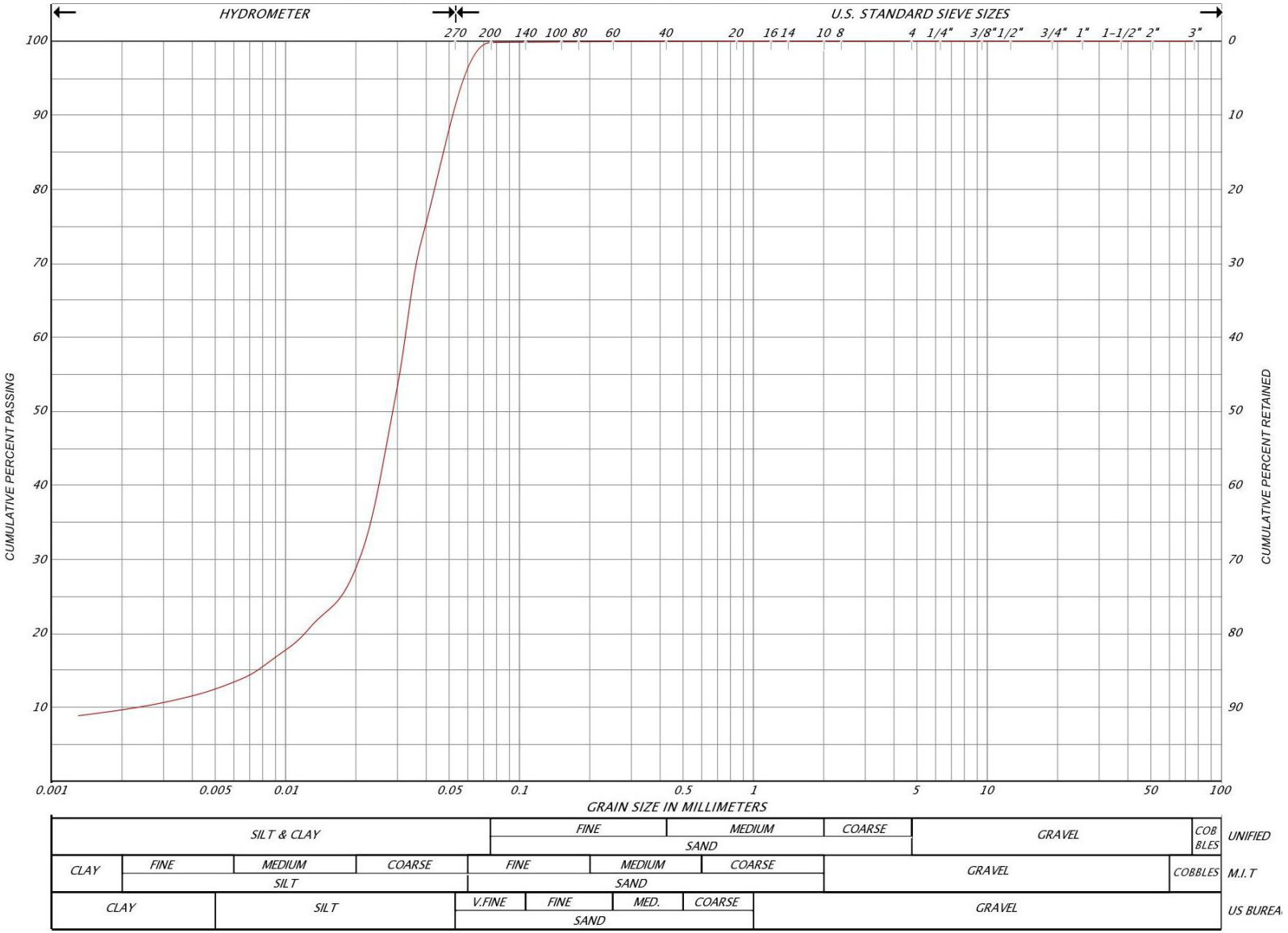
REMARKS Borehole MW102, Sample SS4, Depth 2.3 to 2.7 m

SAND

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 18KF031
FIGURE NO. 6



REMARKS Borehole MW109, Sample SS11, Depth 9.1 to 9.6 m

CLAYEY SILT

Appendix D

Laboratory Certificates of Analysis & Groundwater Quality Summary

Table D.1: Groundwater Chemistry Analytical Results

		Client Sample ID	MW102(Peto)	MW102(Peto)	MW102(Peto)	MW107(Peto)	MW107(Peto)	MW107(Peto)	MW202-21	MW202-21	MW202-21	MW203B-21	MW203B-21	MW203B-21
		Date Sampled	19-Apr-2021	18-Apr-2022	6-Feb-2023	23-Nov-2021	18-Apr-2022	6-Feb-2023	19-Apr-2021	18-Apr-2022	6-Feb-2023	19-Apr-2021	18-Apr-2022	6-Feb-2023
		Time Sampled	12:55	15:55	15:15	9:00	11:30	14:00	14:30	14:20	12:10	15:45	12:50	14:00
		ALS Sample ID	L2578066-1	L2699539-1	WT2302860-001	L2665556-1	L2699539-4	WT2302860-004	L2578066-2	L2699539-2	WT2302860-002	L2578066-3	L2699539-3	WT2302860-003
Parameter	Detection Limit	Units	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Physical Tests														
Colour, Apparent	2.0	CU	10.6	52.2	41.5	26.2	5.2	250.0	<2.0	2.4	3.4	4.0	<2.0	152
Conductivity	3.0	umhos/cm	1350	507	1560	832	842	899	618	732	759	540	621	578
Hardness (as $CaCO_3$)	0.5	mg/L	534	205	526	390	376	431	342	370	413	347	322	327
pH	0.10	pH units	7.73	7.92	7.93	7.69	8.0	7.8	8.08	8.04	8.19	7.86	8.02	7.92
Total Dissolved Solids	20	mg/L	778(*)	314	904(*)	486(*)	454	552(*)	375(*)	420	456(*)	353(*)	344	354(*)
Turbidity	0.10	NTU	136	142	7	81.3	14.3	81.6	2.29	0.3	0.31	28.8	2.8	56.4
Anions and Nutrients														
Alkalinity, Total (as $CaCO_3$)	10	mg/L	326	193	344	466	426	417	252	279	286	255	272	266
Ammonia, Total (as N)	0.010	mg/L	0.117	0.023	0.098	0.020	0.017	<0.0050	0.013	0.026	0.006	0.017	0.021	<0.0050
Chloride (Cl)	0.50	mg/L	213	17	254(*)	4.04	4.08	3.86	17.5	30.8	35.6	1.28	1.11	1.06
Fluoride (F)	0.020	mg/L	0.050	0.258	<0.100(*)	0.318	0.283	0.282	0.054	0.049	0.048	0.051	0.046	0.055
Nitrate (as N)	0.020	mg/L	0.046	<0.020	<0.100(*)	<0.020	0.023	0.053	0.035	0.427	0.572	11.3	9.80	6.81
Nitrite (as N)	0.010	mg/L	<0.010	<0.010	<0.050(*)	<0.010	<0.010	<0.010	<0.010	0.018	0.02	0.036	<0.010	<0.010
Orthophosphate-Dissolved (as P)	0.0030	mg/L	<0.0030	0.0036	<0.0010	0.0058	0.0062	0.0064	0.0079	<0.0030	0.0011	<0.0030	<0.0030	0.0013
Total Phosphorus	0.0030	mg/L	0.173	0.108	0.0056	0.0496	0.039	0.0067	0.0101	0.004	<0.0030	0.0271	0.0062	<0.0030
Sulfate (SO_4)	0.30	mg/L	73.0	56.2	66.2(*)	55.8	56.1	92.5	67.1	72.1	71.2	18.7	25.6	20.6
Bacteriological Tests														
E. Coli	n/a	CFU/100mL		0.0			0.0			0.0			0.0	
Total Coliforms	n/a	CFU/100mL		0.0			0.0			0.0			27.0	
Dissolved Metals														
Aluminum (Al)	0.0050	mg/L	<0.0050	0.0126	0.0122	<0.0050	<0.0050	0.0016	<0.0050	<0.0050	0.0045	<0.0050	<0.0050	0.0023
Antimony (Sb)	0.00010	mg/L	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	0.00010	mg/L	0.00209	0.00029	0.00335	0.00078	0.00054	0.00061	0.00102	0.00040	0.00034	0.00014	0.00016	0.00016
Barium (Ba)	0.00010	mg/L	0.342	0.0463	0.4020	0.190	0.164	0.131	0.172	0.171	0.170	0.0174	0.0216	0.0194
Beryllium (Be)	0.00010	mg/L	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020
Bismuth (Bi)	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)	0.010	mg/L	0.030	0.079	0.049	0.021	0.019	0.024	<0.010	<0.010	0.011	0.012	0.012	0.013
Cadmium (Cd)	0.0000050	mg/L	0.0000085	0.00001	0.0000111	<0.0000050	<0.0000050	0.0000055	0.0000081	0.0000064	0.0000102	0.000019	0.0000166	0.0000159
Calcium (Ca)	0.050	mg/L	155	50.6	147.0	73.2	74.5	86.3	93.2	99.9	111.0	93.6	85.6	85.7
Chromium (Cr)	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	0.00065	0.00059
Cobalt (Co)	0.00010	mg/L	0.00028	<0.00010	0.00020	<0.00010	<0.00010	<0.00010	0.00066	0.00086	0.00087	<0.00010	<0.00010	<0.00010
Copper (Cu)	0.00020	mg/L	0.00032	0.16	0.00736	0.00218	0.00416	0.00131	<0.00020	0.0054	0.00521	0.00081	0.0149	0.0067
Iron (Fe)	0.010	mg/L	<0.010	<0.010	0.354	<0.010	<0.010	<0.010	<0.010	0.068	0.049	<0.010	<0.010	<0.010
Lead (Pb)	0.000050	mg/L	0.000054	0.000157	0.000167	0.000079	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000054	<0.000050
Magnesium (Mg)	0.0050	mg/L	35.9	19	38.5	50.3	46	52.4	26.5	29.3	33.1	27.4	26.4	27.5
Manganese (Mn)	0.00050	mg/L	0.100	0.009	0.088	0.017	0.003	0.0001	0.0898	0.0704	0.0791	0.0238	0.0219	0.0138
Molybdenum (Mo)	0.000050	mg/L	0.000721	0.001700	0.001060	0.003590	0.004490	0.004680	0.000858	0.000803	0.000886	0.000293	0.000306	0.00041
Nickel (Ni)	0.00050	mg/L	0.00158	0.00129	0.00086	0.00067	0.00052	<0.00050	0.00224	0.00093	0.00096	<0.00050	0.00052	<0.00050
Phosphorus (P)	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)	0.050	mg/L	1.70	1.24	2.37	2.29	1.99	2.70	1.01	0.967	1.14	0.64	0.741	0.724
Selenium (Se)	0.000050	mg/L	0.000063	<0.000050	<0.000050	0.000069	0.000060	0.000282	<0.000050	<0.000050	<0.000050	0.000389	0.000373	0.000364
Silicon (Si)	0.050	mg/L	4.03	5.36	4.03	7.59	7.25	6.98	5.64	5.25	5.87	6.17	5.63	6.41
Silver (Ag)	0.000050	mg/L	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010
Sodium (Na)	0.50	mg/L	97.8	23.3	128.0	42.1	44.5	52.6	4.61	5.2	5.2	2.84	3.81	2.64
Strontium (Sr)	0.0010	mg/L	0.299	0.340	0.294	0.392	0.401	0.401	0.164	0.177	0.194	0.137	0.136	0.134
Thallium (Tl)	0.000010	mg/L	<0.000010	<0.000010	<0.00020	<0.000010	<0.000010	<0.000010	<0.000010	0.00001	0.000014	0.000013	0.000014	0.000015
Tin (Sn)	0.00010	mg/L	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	0.00030	mg/L	<0.00030	<0.00040	0.00035	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Tungsten (W)	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)	0.000010	mg/L	0.0120	0.0012	0.0163	0.0040	0.00405	0.00567	0.00131	0.00102	0.00116	0.000403	0.00052	0.00049
Vanadium (V)	0.00050	mg/L	<0.00050	<0.00050	<0.00050	0.00092	0.00082	0.00086	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)	0.0010	mg/L	0.0010	0.0038	0.0039	0.0014	0.0012	<0.0010	<0.0010	0.0031	0.0039	0.0019	0.0033	0.0031
Zirconium (Zr)	0.00030	mg/L	<0.00030	<0.00030	0.00024	<0.00030	<0.00030	<0.00020	<0.00030	<0.00030	<0.00020	<0.00030	<0.00030	<0.00020

Notes: (*) Detection limit was raised

(-) not sampled

MTE CONSULTANTS INC. (Kitchener)
ATTN: ELYSHA BREARS
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 19-APR-21
Report Date: 27-APR-21 13:43 (MT)
Version: FINAL

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2578066

Project P.O. #: NOT SUBMITTED
Job Reference: 35056-104
C of C Numbers: 17-869531
Legal Site Desc:

Emily Hansen
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2578066-1 MW102 (PETO) Sampled By: TXG on 19-APR-21 @ 12:55 Matrix: WATER							
Physical Tests							
Colour, Apparent	10.6		2.0	CU		20-APR-21	R5434419
Conductivity	1350		3.0	umhos/cm		22-APR-21	R5439937
Hardness (as CaCO3)	534		0.50	mg/L		20-APR-21	
pH	7.73		0.10	pH units		22-APR-21	R5439937
Total Dissolved Solids	778	DLDS	20	mg/L		22-APR-21	R5440484
Turbidity	136		0.10	NTU	21-APR-21	21-APR-21	R5435980
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	326		10	mg/L		22-APR-21	R5439937
Ammonia, Total (as N)	0.117		0.010	mg/L		26-APR-21	R5441175
Chloride (Cl)	213		0.50	mg/L		22-APR-21	R5440508
Fluoride (F)	0.050		0.020	mg/L		22-APR-21	R5440508
Nitrate (as N)	0.046		0.020	mg/L		22-APR-21	R5440508
Nitrite (as N)	<0.010		0.010	mg/L		22-APR-21	R5440508
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		20-APR-21	R5433297
Phosphorus, Total	0.173		0.0030	mg/L	26-APR-21	27-APR-21	R5441795
Sulfate (SO4)	73.0		0.30	mg/L		22-APR-21	R5440508
Dissolved Metals							
Dissolved Metals Filtration Location	LAB					20-APR-21	R5432919
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Antimony (Sb)-Dissolved	0.00016		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Arsenic (As)-Dissolved	0.00209		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Barium (Ba)-Dissolved	0.342		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Boron (B)-Dissolved	0.030		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Cadmium (Cd)-Dissolved	0.0000085		0.0000050	mg/L	20-APR-21	20-APR-21	R5433960
Calcium (Ca)-Dissolved	155		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Cobalt (Co)-Dissolved	0.00028		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Copper (Cu)-Dissolved	0.00032		0.00020	mg/L	20-APR-21	20-APR-21	R5433960
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Lead (Pb)-Dissolved	0.000054		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Magnesium (Mg)-Dissolved	35.9		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Manganese (Mn)-Dissolved	0.100		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Molybdenum (Mo)-Dissolved	0.000721		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Nickel (Ni)-Dissolved	0.00158		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Potassium (K)-Dissolved	1.70		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Selenium (Se)-Dissolved	0.000063		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Silicon (Si)-Dissolved	4.03		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2578066-1 MW102 (PETO) Sampled By: TXG on 19-APR-21 @ 12:55 Matrix: WATER							
Dissolved Metals							
Sodium (Na)-Dissolved	97.8		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Strontium (Sr)-Dissolved	0.299		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Uranium (U)-Dissolved	0.0120		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Zinc (Zn)-Dissolved	0.0010		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960
L2578066-2 MW202-21 Sampled By: TXG on 19-APR-21 @ 14:30 Matrix: WATER							
Physical Tests							
Colour, Apparent	<2.0		2.0	CU		20-APR-21	R5434419
Conductivity	618		3.0	umhos/cm		22-APR-21	R5439937
Hardness (as CaCO3)	342		0.50	mg/L		20-APR-21	
pH	8.08		0.10	pH units		22-APR-21	R5439937
Total Dissolved Solids	375	DLDS	20	mg/L		22-APR-21	R5440484
Turbidity	2.29		0.10	NTU	21-APR-21	21-APR-21	R5435980
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	252		10	mg/L		22-APR-21	R5439937
Ammonia, Total (as N)	0.013		0.010	mg/L		26-APR-21	R5441175
Chloride (Cl)	17.5		0.50	mg/L		22-APR-21	R5440508
Fluoride (F)	0.054		0.020	mg/L		22-APR-21	R5440508
Nitrate (as N)	0.035		0.020	mg/L		22-APR-21	R5440508
Nitrite (as N)	<0.010		0.010	mg/L		22-APR-21	R5440508
Orthophosphate-Dissolved (as P)	0.0079		0.0030	mg/L		20-APR-21	R5433297
Phosphorus, Total	0.0101		0.0030	mg/L	22-APR-21	23-APR-21	R5440166
Sulfate (SO4)	67.1		0.30	mg/L		22-APR-21	R5440508
Dissolved Metals							
Dissolved Metals Filtration Location	LAB					20-APR-21	R5432919
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Arsenic (As)-Dissolved	0.00102		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Barium (Ba)-Dissolved	0.172		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Boron (B)-Dissolved	<0.010		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Cadmium (Cd)-Dissolved	0.0000081		0.0000050	mg/L	20-APR-21	20-APR-21	R5433960
Calcium (Ca)-Dissolved	93.2		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2578066-2 MW202-21 Sampled By: TXG on 19-APR-21 @ 14:30 Matrix: WATER							
Dissolved Metals							
Cobalt (Co)-Dissolved	0.00066		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	20-APR-21	20-APR-21	R5433960
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Magnesium (Mg)-Dissolved	26.5		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Manganese (Mn)-Dissolved	0.0898		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Molybdenum (Mo)-Dissolved	0.000858		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Nickel (Ni)-Dissolved	0.00224		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Potassium (K)-Dissolved	1.01		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Silicon (Si)-Dissolved	5.64		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Sodium (Na)-Dissolved	4.61		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Strontium (Sr)-Dissolved	0.164		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Uranium (U)-Dissolved	0.00131		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960
L2578066-3 MW203B-21 Sampled By: TXG on 19-APR-21 @ 15:45 Matrix: WATER							
Physical Tests							
Colour, Apparent	4.0		2.0	CU		20-APR-21	R5434419
Conductivity	540		3.0	umhos/cm		22-APR-21	R5440043
Hardness (as CaCO3)	347		0.50	mg/L		20-APR-21	
pH	7.86		0.10	pH units		22-APR-21	R5440043
Total Dissolved Solids	353	DLDS	20	mg/L		22-APR-21	R5440484
Turbidity	28.8		0.10	NTU	21-APR-21	21-APR-21	R5435980
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	255		10	mg/L		22-APR-21	R5440043
Ammonia, Total (as N)	0.017		0.010	mg/L		26-APR-21	R5441175
Chloride (Cl)	1.28		0.50	mg/L		22-APR-21	R5440508
Fluoride (F)	0.051		0.020	mg/L		22-APR-21	R5440508
Nitrate (as N)	11.3		0.020	mg/L		22-APR-21	R5440508
Nitrite (as N)	0.036		0.010	mg/L		22-APR-21	R5440508
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		20-APR-21	R5433297
Phosphorus, Total	0.0271		0.0030	mg/L	26-APR-21	27-APR-21	R5441795

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2578066-3 MW203B-21 Sampled By: TXG on 19-APR-21 @ 15:45 Matrix: WATER							
Anions and Nutrients							
Sulfate (SO4)	18.7		0.30	mg/L		22-APR-21	R5440508
Dissolved Metals							
Dissolved Metals Filtration Location	LAB					20-APR-21	R5432919
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Arsenic (As)-Dissolved	0.00014		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Barium (Ba)-Dissolved	0.0174		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Boron (B)-Dissolved	0.012		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Cadmium (Cd)-Dissolved	0.0000190		0.0000050	mg/L	20-APR-21	20-APR-21	R5433960
Calcium (Ca)-Dissolved	93.6		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Chromium (Cr)-Dissolved	0.00064		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Copper (Cu)-Dissolved	0.00081		0.00020	mg/L	20-APR-21	20-APR-21	R5433960
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	20-APR-21	20-APR-21	R5433960
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Magnesium (Mg)-Dissolved	27.4		0.0050	mg/L	20-APR-21	20-APR-21	R5433960
Manganese (Mn)-Dissolved	0.0238		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Molybdenum (Mo)-Dissolved	0.000293		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Potassium (K)-Dissolved	0.640		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Selenium (Se)-Dissolved	0.000389		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Silicon (Si)-Dissolved	6.17		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	20-APR-21	20-APR-21	R5433960
Sodium (Na)-Dissolved	2.84		0.050	mg/L	20-APR-21	20-APR-21	R5433960
Strontium (Sr)-Dissolved	0.137		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Thallium (Tl)-Dissolved	0.000013		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	20-APR-21	20-APR-21	R5433960
Uranium (U)-Dissolved	0.000403		0.000010	mg/L	20-APR-21	20-APR-21	R5433960
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	20-APR-21	20-APR-21	R5433960
Zinc (Zn)-Dissolved	0.0019		0.0010	mg/L	20-APR-21	20-APR-21	R5433960
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	20-APR-21	20-APR-21	R5433960

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2578066-1, -2, -3
Matrix Spike	Nitrate (as N)	MS-B	L2578066-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COLOUR-APPARENT-WT	Water	Colour	APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

Reference Information

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PO4-DO-COL-WT	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

17-869531

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2578066 Report Date: 27-APR-21

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: ELYSHA BREARS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R5439937								
WG3522435-2 LCS								
Alkalinity, Total (as CaCO3)			98.1		%		85-115	22-APR-21
WG3522435-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	22-APR-21
Batch R5440043								
WG3522648-2 LCS								
Alkalinity, Total (as CaCO3)			100.3		%		85-115	22-APR-21
WG3522648-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	22-APR-21
CL-IC-N-WT	**Water**							
Batch R5440508								
WG3522627-2 LCS								
Chloride (Cl)			101.0		%		90-110	22-APR-21
WG3522627-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-APR-21
COLOUR-APPARENT-WT	**Water**							
Batch R5434419								
WG3521125-2 LCS								
Colour, Apparent			104.7		%		85-115	20-APR-21
WG3521125-1 MB								
Colour, Apparent			<2.0		CU		2	20-APR-21
EC-WT	**Water**							
Batch R5439937								
WG3522435-2 LCS								
Conductivity			100.8		%		90-110	22-APR-21
WG3522435-1 MB								
Conductivity			<3.0		umhos/cm		3	22-APR-21
Batch R5440043								
WG3522648-2 LCS								
Conductivity			99.8		%		90-110	22-APR-21
WG3522648-1 MB								
Conductivity			<3.0		umhos/cm		3	22-APR-21
F-IC-N-WT	**Water**							
Batch R5440508								
WG3522627-2 LCS								
Fluoride (F)			102.9		%		90-110	22-APR-21
WG3522627-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R5440508								
WG3522627-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-APR-21
MET-D-CCMS-WT	**Water**							
Batch R5433960								
WG3520571-2 LCS								
Aluminum (Al)-Dissolved			104.6		%		80-120	20-APR-21
Antimony (Sb)-Dissolved			100.4		%		80-120	20-APR-21
Arsenic (As)-Dissolved			100.2		%		80-120	20-APR-21
Barium (Ba)-Dissolved			101.9		%		80-120	20-APR-21
Beryllium (Be)-Dissolved			104.8		%		80-120	20-APR-21
Bismuth (Bi)-Dissolved			102.0		%		80-120	20-APR-21
Boron (B)-Dissolved			102.8		%		80-120	20-APR-21
Cadmium (Cd)-Dissolved			101.1		%		80-120	20-APR-21
Calcium (Ca)-Dissolved			104.8		%		80-120	20-APR-21
Chromium (Cr)-Dissolved			100.1		%		80-120	20-APR-21
Cobalt (Co)-Dissolved			99.6		%		80-120	20-APR-21
Copper (Cu)-Dissolved			97.1		%		80-120	20-APR-21
Iron (Fe)-Dissolved			98.5		%		80-120	20-APR-21
Lead (Pb)-Dissolved			102.7		%		80-120	20-APR-21
Magnesium (Mg)-Dissolved			110.8		%		80-120	20-APR-21
Manganese (Mn)-Dissolved			97.9		%		80-120	20-APR-21
Molybdenum (Mo)-Dissolved			103.9		%		80-120	20-APR-21
Nickel (Ni)-Dissolved			98.0		%		80-120	20-APR-21
Phosphorus (P)-Dissolved			104.7		%		80-120	20-APR-21
Potassium (K)-Dissolved			98.0		%		80-120	20-APR-21
Selenium (Se)-Dissolved			98.1		%		80-120	20-APR-21
Silicon (Si)-Dissolved			108.6		%		60-140	20-APR-21
Silver (Ag)-Dissolved			101.3		%		80-120	20-APR-21
Sodium (Na)-Dissolved			107.5		%		80-120	20-APR-21
Strontium (Sr)-Dissolved			100.9		%		80-120	20-APR-21
Thallium (Tl)-Dissolved			102.9		%		80-120	20-APR-21
Tin (Sn)-Dissolved			102.1		%		80-120	20-APR-21
Titanium (Ti)-Dissolved			98.7		%		80-120	20-APR-21
Tungsten (W)-Dissolved			98.6		%		80-120	20-APR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5433960								
WG3520571-2 LCS								
Uranium (U)-Dissolved			103.8		%		80-120	20-APR-21
Vanadium (V)-Dissolved			100.8		%		80-120	20-APR-21
Zinc (Zn)-Dissolved			98.9		%		80-120	20-APR-21
Zirconium (Zr)-Dissolved			101.2		%		80-120	20-APR-21
WG3520571-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	20-APR-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	20-APR-21
Boron (B)-Dissolved			<0.010		mg/L		0.01	20-APR-21
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	20-APR-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-APR-21
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	20-APR-21
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	20-APR-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	20-APR-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-APR-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-APR-21
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	20-APR-21
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	20-APR-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-APR-21
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	20-APR-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	20-APR-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	20-APR-21
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	20-APR-21
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	20-APR-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	20-APR-21
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	20-APR-21
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	20-APR-21
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	20-APR-21
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	20-APR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5433960								
WG3520571-1 MB								
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	20-APR-21
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	20-APR-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-APR-21
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	20-APR-21
NH3-F-WT	**Water**							
Batch R5441175								
WG3523273-3 DUP		**L2578066-3**						
Ammonia, Total (as N)		0.017	0.029	J	mg/L	0.012	0.02	26-APR-21
WG3523273-2 LCS								
Ammonia, Total (as N)			107.9		%		85-115	26-APR-21
WG3523273-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	26-APR-21
WG3523273-4 MS		**L2578066-3**						
Ammonia, Total (as N)			112.7		%		75-125	26-APR-21
NO2-IC-WT	**Water**							
Batch R5440508								
WG3522627-2 LCS								
Nitrite (as N)			100.8		%		90-110	22-APR-21
WG3522627-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	22-APR-21
NO3-IC-WT	**Water**							
Batch R5440508								
WG3522627-2 LCS								
Nitrate (as N)			100.4		%		90-110	22-APR-21
WG3522627-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-APR-21
P-T-COL-WT	**Water**							
Batch R5440166								
WG3522485-3 DUP		**L2578066-2**						
Phosphorus, Total		0.0101	0.0076	J	mg/L	0.0025	0.006	23-APR-21
WG3522485-2 LCS								
Phosphorus, Total			99.1		%		80-120	23-APR-21
WG3522485-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	23-APR-21
WG3522485-4 MS		**L2578066-2**						
Phosphorus, Total			93.1		%		70-130	23-APR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	**Water**							
Batch R5441795								
WG3523235-2 LCS								
Phosphorus, Total			99.8		%		80-120	27-APR-21
WG3523235-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	27-APR-21
PH-WT	**Water**							
Batch R5439937								
WG3522435-2 LCS								
pH			7.01		pH units		6.9-7.1	22-APR-21
Batch R5440043								
WG3522648-2 LCS								
pH			7.03		pH units		6.9-7.1	22-APR-21
PO4-DO-COL-WT	**Water**							
Batch R5433297								
WG3520582-14 LCS								
Orthophosphate-Dissolved (as P)			105.2		%		80-120	20-APR-21
WG3520582-13 MB								
Orthophosphate-Dissolved (as P)			<0.0030		mg/L		0.003	20-APR-21
SO4-IC-N-WT	**Water**							
Batch R5440508								
WG3522627-2 LCS								
Sulfate (SO4)			101.9		%		90-110	22-APR-21
WG3522627-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-APR-21
SOLIDS-TDS-WT	**Water**							
Batch R5440484								
WG3521647-2 LCS								
Total Dissolved Solids			102.6		%		85-115	22-APR-21
WG3521647-1 MB								
Total Dissolved Solids			<10		mg/L		10	22-APR-21
TURBIDITY-WT	**Water**							
Batch R5435980								
WG3521497-2 LCS								
Turbidity			97.0		%		85-115	21-APR-21
WG3521497-1 MB								
Turbidity			<0.10		NTU		0.1	21-APR-21

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2578066-COFC

COC Number: 17 - 869531

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	MTE	Select Report Format: PDF EXCEL EDD (DIGITAL)	Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Elysha Breaks	Quality Control (QC) Report with Report YES NO	PRIORITY (Business Days): 4 day [P4-20%]; 3 day [P3-25%]; 2 day [P2-50%]
Phone:	519-743-6500	Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%]; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)]
	Company address below will appear on the final report	Select Distribution: EMAIL MAIL FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	520 Bingemans Centre Dr	Email 1 or Fax ebreaks@mte85.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Kitchener	Email 2	
Postal Code:		Email 3	

Invoice To		Invoice Distribution
	Same as Report To YES NO	Select Invoice Distribution: EMAIL MAIL FAX
	Copy of Invoice with Report YES NO	Email 1 or Fax
Company:		Email 2
Contact:		

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	35056-104	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:	AP	Location:	

ALS Lab Work Order # (lab use only): L2578066 ALS Contact: Emily Sampler: TKG

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Gen Chem 1	Diss. Metals only	Total Phosphorus	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	MW102 (Beta)	19-Apr-21	1255	GW	4	X		X		
	MW202-21	↓	1430	↓	4	X		X		
	MW203B-21		1545		4	X		X		

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

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? YES NO	Please lab Filter Diss. Metals
Are samples for human consumption/ use? YES NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen		SIF Observations	Yes		No
Ice Packs		Ice Cubes	Custody seal intact	Yes	No
Cooling Initiated					

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11.3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Apr 19/21	1630					4/19/21	1645

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

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

MTE CONSULTANTS INC. (Kitchener)
ATTN: ELYSHA BREARS
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 23-NOV-21
Report Date: 29-NOV-21 14:53 (MT)
Version: FINAL

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2665556

Project P.O. #: NOT SUBMITTED
Job Reference: 35056-104
C of C Numbers:
Legal Site Desc:

Emily Hansen
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2665556-1 MW107 Sampled By: TXG on 23-NOV-21 @ 09:00 Matrix: WATER							
Physical Tests							
Colour, Apparent	26.2		2.0	CU		24-NOV-21	R5656788
Conductivity	832		1.0	umhos/cm		25-NOV-21	R5657366
Hardness (as CaCO3)	390		0.50	mg/L		24-NOV-21	
pH	7.69		0.10	pH units		25-NOV-21	R5657366
Total Dissolved Solids	486	DLDS	20	mg/L		26-NOV-21	R5658383
Turbidity	81.3		0.10	NTU	24-NOV-21	24-NOV-21	R5657937
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	466		1.0	mg/L		25-NOV-21	R5657366
Ammonia, Total (as N)	0.020		0.010	mg/L		25-NOV-21	R5657947
Chloride (Cl)	4.04		0.50	mg/L		25-NOV-21	R5657888
Fluoride (F)	0.318		0.020	mg/L		25-NOV-21	R5657888
Nitrate (as N)	<0.020		0.020	mg/L		25-NOV-21	R5657888
Nitrite (as N)	<0.010		0.010	mg/L		25-NOV-21	R5657888
Orthophosphate-Dissolved (as P)	0.0058		0.0030	mg/L		24-NOV-21	R5656406
Phosphorus, Total	0.0496		0.0030	mg/L	24-NOV-21	25-NOV-21	R5657202
Sulfate (SO4)	55.8		0.30	mg/L		25-NOV-21	R5657888
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					24-NOV-21	R5656278
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	24-NOV-21	24-NOV-21	R5656632
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Arsenic (As)-Dissolved	0.00078		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Barium (Ba)-Dissolved	0.190		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	24-NOV-21	24-NOV-21	R5656632
Boron (B)-Dissolved	0.021		0.010	mg/L	24-NOV-21	24-NOV-21	R5656632
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L	24-NOV-21	24-NOV-21	R5656632
Calcium (Ca)-Dissolved	73.2		0.050	mg/L	24-NOV-21	24-NOV-21	R5656632
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	24-NOV-21	24-NOV-21	R5656632
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Copper (Cu)-Dissolved	0.00218		0.00020	mg/L	24-NOV-21	24-NOV-21	R5656632
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	24-NOV-21	24-NOV-21	R5656632
Lead (Pb)-Dissolved	0.000079		0.000050	mg/L	24-NOV-21	24-NOV-21	R5656632
Magnesium (Mg)-Dissolved	50.3		0.0050	mg/L	24-NOV-21	24-NOV-21	R5656632
Manganese (Mn)-Dissolved	0.0172		0.00050	mg/L	24-NOV-21	24-NOV-21	R5656632
Molybdenum (Mo)-Dissolved	0.00359		0.000050	mg/L	24-NOV-21	24-NOV-21	R5656632
Nickel (Ni)-Dissolved	0.00067		0.00050	mg/L	24-NOV-21	24-NOV-21	R5656632
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	24-NOV-21	24-NOV-21	R5656632
Potassium (K)-Dissolved	2.29		0.050	mg/L	24-NOV-21	24-NOV-21	R5656632
Selenium (Se)-Dissolved	0.000069		0.000050	mg/L	24-NOV-21	24-NOV-21	R5656632
Silicon (Si)-Dissolved	7.59		0.050	mg/L	24-NOV-21	24-NOV-21	R5656632
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	24-NOV-21	24-NOV-21	R5656632

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2665556-1 MW107 Sampled By: TXG on 23-NOV-21 @ 09:00 Matrix: WATER							
Dissolved Metals							
Sodium (Na)-Dissolved	42.1		0.050	mg/L	24-NOV-21	24-NOV-21	R5656632
Strontium (Sr)-Dissolved	0.392		0.0010	mg/L	24-NOV-21	24-NOV-21	R5656632
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	24-NOV-21	24-NOV-21	R5656632
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	24-NOV-21	24-NOV-21	R5656632
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	24-NOV-21	24-NOV-21	R5656632
Uranium (U)-Dissolved	0.00397		0.000010	mg/L	24-NOV-21	24-NOV-21	R5656632
Vanadium (V)-Dissolved	0.00092		0.00050	mg/L	24-NOV-21	24-NOV-21	R5656632
Zinc (Zn)-Dissolved	0.0014		0.0010	mg/L	24-NOV-21	24-NOV-21	R5656632
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	24-NOV-21	24-NOV-21	R5656632

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Selenium (Se)-Dissolved	MES	L2665556-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2665556-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2665556-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2665556-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2665556-1
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2665556-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2665556-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2665556-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2665556-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2665556-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COLOUR-APPARENT-WT	Water	Colour	APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

Reference Information

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PO4-DO-COL-WT	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: ELYSHA BREARS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R5657366								
WG3664880-2 LCS								
Alkalinity, Total (as CaCO3)			107.5		%		85-115	25-NOV-21
WG3664880-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-NOV-21
CL-IC-N-WT	**Water**							
Batch R5657888								
WG3665235-7 LCS								
Chloride (Cl)			102.0		%		90-110	25-NOV-21
WG3665235-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	25-NOV-21
COLOUR-APPARENT-WT	**Water**							
Batch R5656788								
WG3664511-2 LCS								
Colour, Apparent			103.2		%		85-115	24-NOV-21
WG3664511-1 MB								
Colour, Apparent			<2.0		CU		2	24-NOV-21
EC-WT	**Water**							
Batch R5657366								
WG3664880-2 LCS								
Conductivity			97.4		%		90-110	25-NOV-21
WG3664880-1 MB								
Conductivity			<2.0		umhos/cm		2	25-NOV-21
F-IC-N-WT	**Water**							
Batch R5657888								
WG3665235-7 LCS								
Fluoride (F)			102.8		%		90-110	25-NOV-21
WG3665235-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	25-NOV-21
MET-D-CCMS-WT	**Water**							
Batch R5656632								
WG3663932-2 LCS								
Aluminum (Al)-Dissolved			103.3		%		80-120	24-NOV-21
Antimony (Sb)-Dissolved			98.1		%		80-120	24-NOV-21
Arsenic (As)-Dissolved			104.4		%		80-120	24-NOV-21
Barium (Ba)-Dissolved			103.2		%		80-120	24-NOV-21
Beryllium (Be)-Dissolved			99.9		%		80-120	24-NOV-21
Bismuth (Bi)-Dissolved			97.1		%		80-120	24-NOV-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5656632								
WG3663932-2 LCS								
Boron (B)-Dissolved			93.6		%		80-120	24-NOV-21
Cadmium (Cd)-Dissolved			97.0		%		80-120	24-NOV-21
Calcium (Ca)-Dissolved			97.7		%		80-120	24-NOV-21
Chromium (Cr)-Dissolved			101.3		%		80-120	24-NOV-21
Cobalt (Co)-Dissolved			102.7		%		80-120	24-NOV-21
Copper (Cu)-Dissolved			100.5		%		80-120	24-NOV-21
Iron (Fe)-Dissolved			99.5		%		80-120	24-NOV-21
Lead (Pb)-Dissolved			99.5		%		80-120	24-NOV-21
Magnesium (Mg)-Dissolved			111.4		%		80-120	24-NOV-21
Manganese (Mn)-Dissolved			103.8		%		80-120	24-NOV-21
Molybdenum (Mo)-Dissolved			98.0		%		80-120	24-NOV-21
Nickel (Ni)-Dissolved			101.0		%		80-120	24-NOV-21
Phosphorus (P)-Dissolved			109.1		%		80-120	24-NOV-21
Potassium (K)-Dissolved			98.1		%		80-120	24-NOV-21
Selenium (Se)-Dissolved			99.96		%		80-120	24-NOV-21
Silicon (Si)-Dissolved			94.1		%		60-140	24-NOV-21
Silver (Ag)-Dissolved			93.9		%		80-120	24-NOV-21
Sodium (Na)-Dissolved			101.3		%		80-120	24-NOV-21
Strontium (Sr)-Dissolved			94.5		%		80-120	24-NOV-21
Thallium (Tl)-Dissolved			96.5		%		80-120	24-NOV-21
Tin (Sn)-Dissolved			97.4		%		80-120	24-NOV-21
Titanium (Ti)-Dissolved			102.2		%		80-120	24-NOV-21
Tungsten (W)-Dissolved			95.1		%		80-120	24-NOV-21
Uranium (U)-Dissolved			99.2		%		80-120	24-NOV-21
Vanadium (V)-Dissolved			102.9		%		80-120	24-NOV-21
Zinc (Zn)-Dissolved			100.7		%		80-120	24-NOV-21
Zirconium (Zr)-Dissolved			92.7		%		80-120	24-NOV-21
WG3663932-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	24-NOV-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5656632								
WG3663932-1 MB								
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-NOV-21
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	24-NOV-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	24-NOV-21
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	24-NOV-21
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	24-NOV-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	24-NOV-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-NOV-21
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	24-NOV-21
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	24-NOV-21
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	24-NOV-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-NOV-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-21
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-NOV-21
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	24-NOV-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-NOV-21
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	24-NOV-21
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	24-NOV-21
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	24-NOV-21
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	24-NOV-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	24-NOV-21
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	24-NOV-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-NOV-21
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	24-NOV-21
NH3-F-WT	**Water**							
Batch R5657947								
WG3664229-2 LCS								
Ammonia, Total (as N)			102.5		%		85-115	25-NOV-21
WG3664229-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	25-NOV-21
NO2-IC-WT	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	**Water**							
Batch R5657888								
WG3665235-7 LCS								
Nitrite (as N)			102.7		%		90-110	25-NOV-21
WG3665235-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	25-NOV-21
NO3-IC-WT	**Water**							
Batch R5657888								
WG3665235-7 LCS								
Nitrate (as N)			101.2		%		90-110	25-NOV-21
WG3665235-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	25-NOV-21
P-T-COL-WT	**Water**							
Batch R5657202								
WG3664235-3 DUP		**L2665556-1**						
Phosphorus, Total		0.0496	0.0450		mg/L	9.7	20	25-NOV-21
WG3664235-2 LCS								
Phosphorus, Total			97.2		%		80-120	25-NOV-21
WG3664235-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	25-NOV-21
WG3664235-4 MS		**L2665556-1**						
Phosphorus, Total			82.3		%		70-130	25-NOV-21
PH-WT	**Water**							
Batch R5657366								
WG3664880-2 LCS								
pH			7.00		pH units		6.9-7.1	25-NOV-21
PO4-DO-COL-WT	**Water**							
Batch R5656406								
WG3663960-7 LCS								
Orthophosphate-Dissolved (as P)			109.6		%		80-120	24-NOV-21
WG3663960-6 MB								
Orthophosphate-Dissolved (as P)			<0.0030		mg/L		0.003	24-NOV-21
SO4-IC-N-WT	**Water**							
Batch R5657888								
WG3665235-7 LCS								
Sulfate (SO4)			103.8		%		90-110	25-NOV-21
WG3665235-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	25-NOV-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	**Water**							
Batch R5658383								
WG3665821-2 LCS								
Total Dissolved Solids			99.1		%		85-115	26-NOV-21
WG3665821-1 MB								
Total Dissolved Solids			<10		mg/L		10	26-NOV-21
TURBIDITY-WT	**Water**							
Batch R5657937								
WG3664038-2 LCS								
Turbidity			94.5		%		85-115	24-NOV-21
WG3664038-1 MB								
Turbidity			<0.10		NTU		0.1	24-NOV-21

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 896310

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

L2665556-COFC

Report To	Contact and company name below will appear on the final report
Company:	MTE
Contact:	Elysha Brears
Phone:	
	Company address below will appear on the final report
Street:	
City/Province:	Kitchener
Postal Code:	
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ebrears@mte85.com
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcl
☐ 4 day [P4] if received by 3pm M-F - 20% rus
☐ 3 day [P3] if received by 3pm M-F - 25% ru
☐ 2 day [P2] if received by 3pm M-F - 50% ru
☐ 1 day [E] if received by 3pm M-F - 100% ru
☐ Same day [E2] if received by 10am M-S - 200% may apply to rush requests on weekends, statut
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	35056-104	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	L2665556	ALS Contact: Emily	Sampler: TXG

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Gen Chem 1	Diss. Metals F/P	Total Phosphorus P	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW107	23-Nov-21	0900	GW	3	X	X	X			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

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

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8.7			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: Nov 23/21	Time: 1620	Received by:	Date:	Time:	Received by:	Date: 11/23/21	Time: 16:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

MTE CONSULTANTS INC. (Kitchener)
ATTN: Timothy Greer
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9

Date Received: 18-APR-22
Report Date: 26-APR-22 08:27 (MT)
Version: FINAL

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2699539

Project P.O. #: NOT SUBMITTED
Job Reference: 35056-104
C of C Numbers: 20-946157
Legal Site Desc:

Emily Hansen
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-1 MW102 (PETO) Sampled By: CLIENT on 18-APR-22 @ 15:55 Matrix: WATER							
Physical Tests							
Colour, Apparent	52.2		2.0	CU		19-APR-22	R5766180
Conductivity	507		1.0	umhos/cm		21-APR-22	R5767639
Hardness (as CaCO3)	205		0.50	mg/L		20-APR-22	
pH	7.92		0.10	pH units		21-APR-22	R5767639
Total Dissolved Solids	314	DLDS	20	mg/L		20-APR-22	R5767551
Turbidity	142		0.10	NTU	20-APR-22	20-APR-22	R5767361
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	193		1.0	mg/L		21-APR-22	R5767639
Ammonia, Total (as N)	0.023		0.010	mg/L		25-APR-22	R5768465
Chloride (Cl)	17.0		0.50	mg/L		21-APR-22	R5767673
Fluoride (F)	0.258		0.020	mg/L		21-APR-22	R5767673
Nitrate (as N)	<0.020		0.020	mg/L		21-APR-22	R5767673
Nitrite (as N)	<0.010		0.010	mg/L		21-APR-22	R5767673
Orthophosphate-Dissolved (as P)	0.0036		0.0030	mg/L		19-APR-22	R5765571
Phosphorus, Total	0.108		0.0030	mg/L	22-APR-22	25-APR-22	R5768141
Sulfate (SO4)	56.2		0.30	mg/L		21-APR-22	R5767673
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		19-APR-22	R5766399
Total Coliforms	0		0	CFU/100mL		19-APR-22	R5766401
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					19-APR-22	R5765176
Aluminum (Al)-Dissolved	0.0126		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Arsenic (As)-Dissolved	0.00029		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Barium (Ba)-Dissolved	0.0463		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Boron (B)-Dissolved	0.079		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Cadmium (Cd)-Dissolved	0.0000100		0.0000050	mg/L	19-APR-22	19-APR-22	R5766309
Calcium (Ca)-Dissolved	50.6		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Copper (Cu)-Dissolved	0.160		0.00020	mg/L	19-APR-22	19-APR-22	R5766309
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Lead (Pb)-Dissolved	0.000157		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Magnesium (Mg)-Dissolved	19.0		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Manganese (Mn)-Dissolved	0.00911		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Molybdenum (Mo)-Dissolved	0.00170		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Nickel (Ni)-Dissolved	0.00129		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Potassium (K)-Dissolved	1.24		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-1 MW102 (PETO) Sampled By: CLIENT on 18-APR-22 @ 15:55 Matrix: WATER							
Dissolved Metals							
Silicon (Si)-Dissolved	5.36		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Sodium (Na)-Dissolved	23.3		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Strontium (Sr)-Dissolved	0.340		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Tin (Sn)-Dissolved	0.00017		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Titanium (Ti)-Dissolved	<0.00040	DLUI	0.00040	mg/L	19-APR-22	19-APR-22	R5766309
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Uranium (U)-Dissolved	0.00124		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Zinc (Zn)-Dissolved	0.0038		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
L2699539-2 MW202-21 Sampled By: CLIENT on 18-APR-22 @ 11:30 Matrix: WATER							
Physical Tests							
Colour, Apparent	2.4		2.0	CU		19-APR-22	R5766180
Conductivity	732		1.0	umhos/cm		20-APR-22	R5767275
Hardness (as CaCO3)	370		0.50	mg/L		20-APR-22	
pH	8.04		0.10	pH units		20-APR-22	R5767275
Total Dissolved Solids	420	DLDS	20	mg/L		20-APR-22	R5767551
Turbidity	0.30		0.10	NTU	20-APR-22	20-APR-22	R5767356
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	279		1.0	mg/L		20-APR-22	R5767275
Ammonia, Total (as N)	0.026		0.010	mg/L		25-APR-22	R5768465
Chloride (Cl)	30.8		0.50	mg/L		21-APR-22	R5767673
Fluoride (F)	0.049		0.020	mg/L		21-APR-22	R5767673
Nitrate (as N)	0.427		0.020	mg/L		21-APR-22	R5767673
Nitrite (as N)	0.018		0.010	mg/L		21-APR-22	R5767673
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		19-APR-22	R5765571
Phosphorus, Total	0.0040		0.0030	mg/L	22-APR-22	25-APR-22	R5768141
Sulfate (SO4)	72.1		0.30	mg/L		21-APR-22	R5767673
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		19-APR-22	R5766399
Total Coliforms	0		0	CFU/100mL		19-APR-22	R5766401
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					19-APR-22	R5765176
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Arsenic (As)-Dissolved	0.00040		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Barium (Ba)-Dissolved	0.171		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-2 MW202-21 Sampled By: CLIENT on 18-APR-22 @ 11:30 Matrix: WATER							
Dissolved Metals							
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Cadmium (Cd)-Dissolved	0.0000064		0.0000050	mg/L	19-APR-22	19-APR-22	R5766309
Calcium (Ca)-Dissolved	99.9		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Cobalt (Co)-Dissolved	0.00086		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Copper (Cu)-Dissolved	0.00540		0.00020	mg/L	19-APR-22	19-APR-22	R5766309
Iron (Fe)-Dissolved	0.068		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Magnesium (Mg)-Dissolved	29.3		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Manganese (Mn)-Dissolved	0.0704		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Molybdenum (Mo)-Dissolved	0.000803		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Nickel (Ni)-Dissolved	0.00093		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Potassium (K)-Dissolved	0.967		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Silicon (Si)-Dissolved	5.25		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Sodium (Na)-Dissolved	5.20		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Strontium (Sr)-Dissolved	0.177		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Thallium (Tl)-Dissolved	0.000010		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Uranium (U)-Dissolved	0.00102		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Zinc (Zn)-Dissolved	0.0031		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
L2699539-3 MW203B-21 Sampled By: CLIENT on 18-APR-22 @ 14:20 Matrix: WATER							
Physical Tests							
Colour, Apparent	<2.0		2.0	CU		19-APR-22	R5766180
Conductivity	621		1.0	umhos/cm		20-APR-22	R5767275
Hardness (as CaCO3)	322		0.50	mg/L		20-APR-22	
pH	8.02		0.10	pH units		20-APR-22	R5767275
Total Dissolved Solids	344	DLDS	20	mg/L		20-APR-22	R5767551
Turbidity	2.80		0.10	NTU	20-APR-22	20-APR-22	R5767356
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	272		1.0	mg/L		20-APR-22	R5767275
Ammonia, Total (as N)	0.021		0.010	mg/L		25-APR-22	R5768465
Chloride (Cl)	1.11		0.50	mg/L		21-APR-22	R5767673

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-3 MW203B-21 Sampled By: CLIENT on 18-APR-22 @ 14:20 Matrix: WATER							
Anions and Nutrients							
Fluoride (F)	0.046		0.020	mg/L		21-APR-22	R5767673
Nitrate (as N)	9.80		0.020	mg/L		21-APR-22	R5767673
Nitrite (as N)	<0.010		0.010	mg/L		21-APR-22	R5767673
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		19-APR-22	R5765571
Phosphorus, Total	0.0062		0.0030	mg/L	22-APR-22	25-APR-22	R5768141
Sulfate (SO4)	25.6		0.30	mg/L		21-APR-22	R5767673
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		19-APR-22	R5766399
Total Coliforms	27		0	CFU/100mL		19-APR-22	R5766401
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					19-APR-22	R5765176
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Arsenic (As)-Dissolved	0.00016		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Barium (Ba)-Dissolved	0.0216		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Boron (B)-Dissolved	0.012		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Cadmium (Cd)-Dissolved	0.0000166		0.0000050	mg/L	19-APR-22	19-APR-22	R5766309
Calcium (Ca)-Dissolved	85.6		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Chromium (Cr)-Dissolved	0.00065		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Copper (Cu)-Dissolved	0.0149		0.00020	mg/L	19-APR-22	19-APR-22	R5766309
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Lead (Pb)-Dissolved	0.000054		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Magnesium (Mg)-Dissolved	26.4		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Manganese (Mn)-Dissolved	0.0219		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Molybdenum (Mo)-Dissolved	0.000306		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Nickel (Ni)-Dissolved	0.00052		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Potassium (K)-Dissolved	0.741		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Selenium (Se)-Dissolved	0.000373		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Silicon (Si)-Dissolved	5.63		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Sodium (Na)-Dissolved	3.81		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Strontium (Sr)-Dissolved	0.136		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Thallium (Tl)-Dissolved	0.000014		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Uranium (U)-Dissolved	0.000520		0.000010	mg/L	19-APR-22	19-APR-22	R5766309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-3 MW203B-21 Sampled By: CLIENT on 18-APR-22 @ 14:20 Matrix: WATER							
Dissolved Metals							
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Zinc (Zn)-Dissolved	0.0033		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
L2699539-4 MW107 (PETO) Sampled By: CLIENT on 18-APR-22 @ 12:50 Matrix: WATER							
Physical Tests							
Colour, Apparent	5.2		2.0	CU		19-APR-22	R5766180
Conductivity	842		1.0	umhos/cm		20-APR-22	R5767275
Hardness (as CaCO3)	376		0.50	mg/L		20-APR-22	
pH	8.00		0.10	pH units		20-APR-22	R5767275
Total Dissolved Solids	454	DLDS	20	mg/L		20-APR-22	R5767551
Turbidity	14.3		0.10	NTU	20-APR-22	20-APR-22	R5767356
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	426		1.0	mg/L		20-APR-22	R5767275
Ammonia, Total (as N)	0.017		0.010	mg/L		25-APR-22	R5768465
Chloride (Cl)	4.08		0.50	mg/L		21-APR-22	R5767673
Fluoride (F)	0.283		0.020	mg/L		21-APR-22	R5767673
Nitrate (as N)	0.023		0.020	mg/L		21-APR-22	R5767673
Nitrite (as N)	<0.010		0.010	mg/L		21-APR-22	R5767673
Orthophosphate-Dissolved (as P)	0.0062		0.0030	mg/L		19-APR-22	R5765571
Phosphorus, Total	0.0390		0.0030	mg/L	22-APR-22	25-APR-22	R5768141
Sulfate (SO4)	56.1		0.30	mg/L		21-APR-22	R5767673
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		19-APR-22	R5766399
Total Coliforms	0		0	CFU/100mL		19-APR-22	R5766401
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					19-APR-22	R5765176
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Arsenic (As)-Dissolved	0.00054		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Barium (Ba)-Dissolved	0.164		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Boron (B)-Dissolved	0.019		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L	19-APR-22	19-APR-22	R5766309
Calcium (Ca)-Dissolved	74.5		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Copper (Cu)-Dissolved	0.00416		0.00020	mg/L	19-APR-22	19-APR-22	R5766309
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-APR-22	19-APR-22	R5766309
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2699539-4 MW107 (PETO) Sampled By: CLIENT on 18-APR-22 @ 12:50 Matrix: WATER							
Dissolved Metals							
Magnesium (Mg)-Dissolved	46.0		0.0050	mg/L	19-APR-22	19-APR-22	R5766309
Manganese (Mn)-Dissolved	0.00329		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Molybdenum (Mo)-Dissolved	0.00449		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Nickel (Ni)-Dissolved	0.00052		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Potassium (K)-Dissolved	1.99		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Selenium (Se)-Dissolved	0.000060		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Silicon (Si)-Dissolved	7.25		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	19-APR-22	19-APR-22	R5766309
Sodium (Na)-Dissolved	44.5		0.050	mg/L	19-APR-22	19-APR-22	R5766309
Strontium (Sr)-Dissolved	0.401		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	19-APR-22	19-APR-22	R5766309
Uranium (U)-Dissolved	0.00405		0.000010	mg/L	19-APR-22	19-APR-22	R5766309
Vanadium (V)-Dissolved	0.00082		0.00050	mg/L	19-APR-22	19-APR-22	R5766309
Zinc (Zn)-Dissolved	0.0012		0.0010	mg/L	19-APR-22	19-APR-22	R5766309
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	19-APR-22	19-APR-22	R5766309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2699539-1, -2, -3, -4
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L2699539-1, -2, -3, -4

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	APHA 2320B

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COLOUR-APPARENT-WT	Water	Colour	APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PO4-DO-COL-WT	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5°C for 24–2h. Method ID: WT-TM-1200

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

20-946157

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2699539 Report Date: 26-APR-22

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R5767275								
WG3719018-4 DUP		**WG3719018-3**						
Alkalinity, Total (as CaCO3)		91.3	91.2		mg/L	0.1	20	20-APR-22
WG3719018-2 LCS								
Alkalinity, Total (as CaCO3)			101.4		%		85-115	20-APR-22
WG3719018-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	20-APR-22
Batch R5767639								
WG3719206-4 DUP		**WG3719206-3**						
Alkalinity, Total (as CaCO3)		289	289		mg/L	0.0	20	21-APR-22
WG3719206-2 LCS								
Alkalinity, Total (as CaCO3)			98.8		%		85-115	21-APR-22
WG3719206-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-APR-22
CL-IC-N-WT	**Water**							
Batch R5767673								
WG3719257-9 DUP		**WG3719257-8**						
Chloride (Cl)		30.8	30.9		mg/L	0.1	20	21-APR-22
WG3719257-7 LCS								
Chloride (Cl)			102.8		%		90-110	21-APR-22
WG3719257-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	21-APR-22
WG3719257-10 MS		**WG3719257-8**						
Chloride (Cl)			102.8		%		75-125	21-APR-22
COLOUR-APPARENT-WT	**Water**							
Batch R5766180								
WG3718419-3 DUP		**L2699539-1**						
Colour, Apparent		52.2	58.5		CU	11	20	19-APR-22
WG3718419-2 LCS								
Colour, Apparent			101.5		%		85-115	19-APR-22
WG3718419-1 MB								
Colour, Apparent			<2.0		CU		2	19-APR-22
EC-MF-WT	**Water**							
Batch R5766399								
WG3718081-1 MB								
E. Coli			0		CFU/100mL		1	19-APR-22
EC-WT	**Water**							

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	**Water**							
Batch R5767275								
WG3719018-4 DUP		**WG3719018-3**						
Conductivity		353	353		umhos/cm	0.0	10	20-APR-22
WG3719018-2 LCS								
Conductivity			100.2		%		90-110	20-APR-22
WG3719018-1 MB								
Conductivity			<1.0		umhos/cm		1	20-APR-22
Batch R5767639								
WG3719206-4 DUP		**WG3719206-3**						
Conductivity		537	534		umhos/cm	0.6	10	21-APR-22
WG3719206-2 LCS								
Conductivity			102.0		%		90-110	21-APR-22
WG3719206-1 MB								
Conductivity			<2.0		umhos/cm		2	21-APR-22
F-IC-N-WT	**Water**							
Batch R5767673								
WG3719257-9 DUP		**WG3719257-8**						
Fluoride (F)		0.050	0.050		mg/L	0.1	20	21-APR-22
WG3719257-7 LCS								
Fluoride (F)			103.3		%		90-110	21-APR-22
WG3719257-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	21-APR-22
WG3719257-10 MS		**WG3719257-8**						
Fluoride (F)			97.6		%		75-125	21-APR-22
MET-D-CCMS-WT	**Water**							
Batch R5766309								
WG3718066-4 DUP		**WG3718066-3**						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	19-APR-22
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-APR-22
Arsenic (As)-Dissolved		0.00012	0.00012		mg/L	4.3	20	19-APR-22
Barium (Ba)-Dissolved		0.0209	0.0211		mg/L	0.7	20	19-APR-22
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-APR-22
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-APR-22
Boron (B)-Dissolved		0.023	0.023		mg/L	0.8	20	19-APR-22
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	19-APR-22
Calcium (Ca)-Dissolved		171	170		mg/L	0.7	20	19-APR-22
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5766309								
WG3718066-4 DUP		**WG3718066-3**						
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-APR-22
Copper (Cu)-Dissolved		0.00044	0.00042		mg/L	2.6	20	19-APR-22
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-APR-22
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-APR-22
Magnesium (Mg)-Dissolved		10.2	10.1		mg/L	0.8	20	19-APR-22
Manganese (Mn)-Dissolved		0.00131	0.00128		mg/L	2.2	20	19-APR-22
Molybdenum (Mo)-Dissolved		0.000099	0.000104		mg/L	4.9	20	19-APR-22
Nickel (Ni)-Dissolved		0.00057	0.00058		mg/L	0.9	20	19-APR-22
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	19-APR-22
Potassium (K)-Dissolved		1.38	1.36		mg/L	1.5	20	19-APR-22
Selenium (Se)-Dissolved		0.000152	0.000124	J	mg/L	0.000028	0.0001	19-APR-22
Silicon (Si)-Dissolved		4.94	4.91		mg/L	0.6	20	19-APR-22
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-APR-22
Sodium (Na)-Dissolved		27.8	27.5		mg/L	1.4	20	19-APR-22
Strontium (Sr)-Dissolved		0.329	0.331		mg/L	0.4	20	19-APR-22
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-APR-22
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-APR-22
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	19-APR-22
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-APR-22
Uranium (U)-Dissolved		0.000407	0.000401		mg/L	1.5	20	19-APR-22
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-APR-22
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	19-APR-22
Zirconium (Zr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	19-APR-22
WG3718066-2 LCS								
Aluminum (Al)-Dissolved			101.7		%		80-120	19-APR-22
Antimony (Sb)-Dissolved			100.1		%		80-120	19-APR-22
Arsenic (As)-Dissolved			100.1		%		80-120	19-APR-22
Barium (Ba)-Dissolved			102.9		%		80-120	19-APR-22
Beryllium (Be)-Dissolved			98.6		%		80-120	19-APR-22
Bismuth (Bi)-Dissolved			99.5		%		80-120	19-APR-22
Boron (B)-Dissolved			96.2		%		80-120	19-APR-22
Cadmium (Cd)-Dissolved			97.1		%		80-120	19-APR-22
Calcium (Ca)-Dissolved			99.0		%		80-120	19-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5766309								
WG3718066-2 LCS								
Chromium (Cr)-Dissolved			97.8		%		80-120	19-APR-22
Cobalt (Co)-Dissolved			99.0		%		80-120	19-APR-22
Copper (Cu)-Dissolved			98.1		%		80-120	19-APR-22
Iron (Fe)-Dissolved			99.3		%		80-120	19-APR-22
Lead (Pb)-Dissolved			98.8		%		80-120	19-APR-22
Magnesium (Mg)-Dissolved			108.4		%		80-120	19-APR-22
Manganese (Mn)-Dissolved			98.4		%		80-120	19-APR-22
Molybdenum (Mo)-Dissolved			96.2		%		80-120	19-APR-22
Nickel (Ni)-Dissolved			99.2		%		80-120	19-APR-22
Phosphorus (P)-Dissolved			104.6		%		80-120	19-APR-22
Potassium (K)-Dissolved			94.7		%		80-120	19-APR-22
Selenium (Se)-Dissolved			97.8		%		80-120	19-APR-22
Silicon (Si)-Dissolved			97.9		%		60-140	19-APR-22
Silver (Ag)-Dissolved			89.9		%		80-120	19-APR-22
Sodium (Na)-Dissolved			105.8		%		80-120	19-APR-22
Strontium (Sr)-Dissolved			101.4		%		80-120	19-APR-22
Thallium (Tl)-Dissolved			101.3		%		80-120	19-APR-22
Tin (Sn)-Dissolved			96.2		%		80-120	19-APR-22
Titanium (Ti)-Dissolved			96.8		%		80-120	19-APR-22
Tungsten (W)-Dissolved			97.7		%		80-120	19-APR-22
Uranium (U)-Dissolved			99.7		%		80-120	19-APR-22
Vanadium (V)-Dissolved			99.6		%		80-120	19-APR-22
Zinc (Zn)-Dissolved			99.1		%		80-120	19-APR-22
Zirconium (Zr)-Dissolved			96.1		%		80-120	19-APR-22
WG3718066-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	19-APR-22
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-APR-22
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-APR-22
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	19-APR-22
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5766309								
WG3718066-1 MB								
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	19-APR-22
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-APR-22
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-APR-22
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-APR-22
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-APR-22
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	19-APR-22
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-APR-22
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-APR-22
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	19-APR-22
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-APR-22
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-APR-22
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-APR-22
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	19-APR-22
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-APR-22
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	19-APR-22
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-APR-22
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-APR-22
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	19-APR-22
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-APR-22
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-APR-22
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-APR-22
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	19-APR-22
WG3718066-5 MS		**WG3718066-6**						
Aluminum (Al)-Dissolved			103.6		%		70-130	19-APR-22
Antimony (Sb)-Dissolved			106.9		%		70-130	19-APR-22
Arsenic (As)-Dissolved			113.7		%		70-130	19-APR-22
Barium (Ba)-Dissolved			N/A	MS-B	%		-	19-APR-22
Beryllium (Be)-Dissolved			103.5		%		70-130	19-APR-22
Bismuth (Bi)-Dissolved			97.8		%		70-130	19-APR-22
Boron (B)-Dissolved			96.5		%		70-130	19-APR-22
Cadmium (Cd)-Dissolved			103.8		%		70-130	19-APR-22
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	19-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5766309								
WG3718066-5 MS		**WG3718066-6**						
Chromium (Cr)-Dissolved			102.5		%		70-130	19-APR-22
Cobalt (Co)-Dissolved			101.2		%		70-130	19-APR-22
Copper (Cu)-Dissolved			94.4		%		70-130	19-APR-22
Iron (Fe)-Dissolved			N/A	MS-B	%		-	19-APR-22
Lead (Pb)-Dissolved			99.6		%		70-130	19-APR-22
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	19-APR-22
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	19-APR-22
Molybdenum (Mo)-Dissolved			104.7		%		70-130	19-APR-22
Nickel (Ni)-Dissolved			99.3		%		70-130	19-APR-22
Phosphorus (P)-Dissolved			114.3		%		70-130	19-APR-22
Potassium (K)-Dissolved			103.7		%		70-130	19-APR-22
Selenium (Se)-Dissolved			117.3		%		70-130	19-APR-22
Silicon (Si)-Dissolved			N/A	MS-B	%		-	19-APR-22
Silver (Ag)-Dissolved			92.6		%		70-130	19-APR-22
Sodium (Na)-Dissolved			N/A	MS-B	%		-	19-APR-22
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	19-APR-22
Thallium (Tl)-Dissolved			98.6		%		70-130	19-APR-22
Tin (Sn)-Dissolved			102.4		%		70-130	19-APR-22
Titanium (Ti)-Dissolved			102.2		%		70-130	19-APR-22
Tungsten (W)-Dissolved			102.8		%		70-130	19-APR-22
Uranium (U)-Dissolved			104.3		%		70-130	19-APR-22
Vanadium (V)-Dissolved			106.8		%		70-130	19-APR-22
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	19-APR-22
Zirconium (Zr)-Dissolved			103.7		%		70-130	19-APR-22
NH3-F-WT	**Water**							
Batch R5768465								
WG3719438-3 DUP		**L2699539-3**						
Ammonia, Total (as N)		0.021	0.015	J	mg/L	0.006	0.02	25-APR-22
WG3719438-2 LCS								
Ammonia, Total (as N)			108.2		%		85-115	25-APR-22
WG3719438-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	25-APR-22
WG3719438-4 MS		**L2699539-3**						
Ammonia, Total (as N)			117.0		%		75-125	25-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	**Water**							
Batch R5767673								
WG3719257-9 DUP		**WG3719257-8**						
Nitrite (as N)		0.018	0.018		mg/L	0.1	20	21-APR-22
WG3719257-7 LCS								
Nitrite (as N)			101.9		%		90-110	21-APR-22
WG3719257-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	21-APR-22
WG3719257-10 MS		**WG3719257-8**						
Nitrite (as N)			102.9		%		75-125	21-APR-22
NO3-IC-WT	**Water**							
Batch R5767673								
WG3719257-9 DUP		**WG3719257-8**						
Nitrate (as N)		0.426	0.427		mg/L	0.1	20	21-APR-22
WG3719257-7 LCS								
Nitrate (as N)			101.6		%		90-110	21-APR-22
WG3719257-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	21-APR-22
WG3719257-10 MS		**WG3719257-8**						
Nitrate (as N)			101.5		%		75-125	21-APR-22
P-T-COL-WT	**Water**							
Batch R5768141								
WG3719436-3 DUP		**L2699443-4**						
Phosphorus, Total		0.0343	0.0330		mg/L	4.0	20	25-APR-22
WG3719436-2 LCS								
Phosphorus, Total			97.3		%		80-120	25-APR-22
WG3719436-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	25-APR-22
WG3719436-4 MS		**L2699443-4**						
Phosphorus, Total			94.4		%		70-130	25-APR-22
PH-WT	**Water**							
Batch R5767275								
WG3719018-4 DUP		**WG3719018-3**						
pH		7.89	7.89	J	pH units	0.00	0.2	20-APR-22
WG3719018-2 LCS								
pH			6.98		pH units		6.9-7.1	20-APR-22

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R5767639								
WG3719206-4 DUP		**WG3719206-3**						
pH		8.04	7.93	J	pH units	0.11	0.2	21-APR-22
WG3719206-2 LCS								
pH			6.90		pH units		6.9-7.1	21-APR-22
PO4-DO-COL-WT	**Water**							
Batch R5765571								
WG3718091-3 DUP		**L2699204-1**						
Orthophosphate-Dissolved (as P)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	19-APR-22
WG3718091-7 DUP		**L2699539-2**						
Orthophosphate-Dissolved (as P)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	19-APR-22
WG3718091-2 LCS								
Orthophosphate-Dissolved (as P)			95.8		%		80-120	19-APR-22
WG3718091-6 LCS								
Orthophosphate-Dissolved (as P)			93.6		%		80-120	19-APR-22
WG3718091-1 MB								
Orthophosphate-Dissolved (as P)			<0.0030		mg/L		0.003	19-APR-22
WG3718091-5 MB								
Orthophosphate-Dissolved (as P)			<0.0030		mg/L		0.003	19-APR-22
WG3718091-4 MS		**L2699204-1**						
Orthophosphate-Dissolved (as P)			88.5		%		70-130	19-APR-22
WG3718091-8 MS		**L2699539-2**						
Orthophosphate-Dissolved (as P)			104.8		%		70-130	19-APR-22
SO4-IC-N-WT	**Water**							
Batch R5767673								
WG3719257-9 DUP		**WG3719257-8**						
Sulfate (SO4)		72.1	72.3		mg/L	0.2	20	21-APR-22
WG3719257-7 LCS								
Sulfate (SO4)			103.6		%		90-110	21-APR-22
WG3719257-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	21-APR-22
WG3719257-10 MS		**WG3719257-8**						
Sulfate (SO4)			104.0		%		75-125	21-APR-22
SOLIDS-TDS-WT	**Water**							
Batch R5767551								
WG3718714-3 DUP		**L2699539-3**						
Total Dissolved Solids		344	340		mg/L	1.2	20	20-APR-22
WG3718714-2 LCS								

Quality Control Report

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	**Water**							
Batch R5767551								
WG3718714-2 LCS								
Total Dissolved Solids			99.6		%		85-115	20-APR-22
WG3718714-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-APR-22
TC-MF-WT	**Water**							
Batch R5766401								
WG3718086-1 MB								
Total Coliforms			0		CFU/100mL		1	19-APR-22
TURBIDITY-WT	**Water**							
Batch R5767356								
WG3718669-3 DUP		**L2699603-6**						
Turbidity		613	610		NTU	0.5	15	20-APR-22
WG3718669-2 LCS								
Turbidity			98.5		%		85-115	20-APR-22
WG3718669-1 MB								
Turbidity			<0.10		NTU		0.1	20-APR-22
Batch R5767361								
WG3718670-3 DUP		**L2699603-7**						
Turbidity		209	204		NTU	2.4	15	20-APR-22
WG3718670-2 LCS								
Turbidity			98.0		%		85-115	20-APR-22
WG3718670-1 MB								
Turbidity			<0.10		NTU		0.1	20-APR-22

Quality Control Report

Workorder: L2699539 Report Date: 26-APR-22

Client: MTE CONSULTANTS INC. (Kitchener)
520 BINGEMANS CENTRE DRIVE
KITCHENER ON N2B 3X9
Contact: Timothy Greer

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

www.alsglobal.com

L2699539-COFC

COC Number: 20 - 946157

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	MTE
Contact:	Tim Greer
Phone:	519-743-6500
	Company address below will appear on the final report
Street:	
City/Province:	Kitchener
Postal Code:	
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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

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

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

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: tgreer@mte85.com

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax:

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs:

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

Project Information

ALS Account # / Quote #:

Job #: 35056-104

PO / AFE:

LSD:

ALS Lab Work Order # (ALS use only): L2699539

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#:

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Contact: Emily | Sampler:

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Gen Chem 1	Diss. Metals (F)	Total P	E. coli	Total Coliforms	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW102 (Peto)	18-Apr-22	15:55	GW	4	X	X	X	X	X			
	MW202-21		11:30	GW	4	X	X	X	X	X			
	MW203B-21		14:20	GW	4	X	X	X	X	X			
	MW107 (Peto)		12:50	GW	4	X	X	X	X	X			

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

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

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

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

SAMPLE RECEIPT DETAILS (ALS use only)

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

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6.9			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Sydney Bwis SB	April 18, 2022	5:15

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
AP	18-APR-22	17:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

CERTIFICATE OF ANALYSIS

Work Order	: **WT2302860**	Page	: 1 of 5
Client	: **MTE Consultants Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Elysha Brears	Account Manager	: Emily Hansen
Address	: 520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: 519 743 6500	Telephone	: +1 519 886 6910
Project	: 35056-104	Date Samples Received	: 06-Feb-2023 15:45
PO	: ----	Date Analysis Commenced	: 06-Feb-2023
C-O-C number	: 20-887437	Issue Date	: 13-Feb-2023 16:27
Sampler	: Timothy Greer		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µS/cm	microsiemens per centimetre
CFU/100mL	colony forming units per hundred millilitres
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

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW102 (Peto)	MW202-21	MW203B-21	MW107 (Peto)	----
					Client sampling date / time	06-Feb-2023 15:15	06-Feb-2023 12:10	06-Feb-2023 13:30	06-Feb-2023 14:00	----
						WT2302860-001	WT2302860-002	WT2302860-003	WT2302860-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		344	286	266	417	----
Colour, apparent	----	E330	2.0	CU		41.5	3.4	152	250	----
Conductivity	----	E100	1.0	µS/cm		1560	759	578	899	----
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		526	413	327	431	----
pH	----	E108	0.10	pH units		7.93	8.19	7.92	7.84	----
Solids, total dissolved [TDS]	----	E162	10	mg/L		904 DLDS	456 DLDS	354 DLDS	552 DLDS	----
Turbidity	----	E121	0.10	NTU		7.00	0.31	56.4	81.6	----
Anions and Nutrients										
Phosphorus, total dissolved	7723-14-0	E375-L	0.0030	mg/L		0.0056	<0.0030	<0.0030	0.0067	----
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0982	0.0058	<0.0050	<0.0050	----
Chloride	16887-00-6	E235.Cl	0.50	mg/L		254 DLDS	35.6	1.06	3.86	----
Fluoride	16984-48-8	E235.F	0.020	mg/L		<0.100 DLDS	0.048	0.055	0.282	----
Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L		<0.100 DLDS	0.572	6.81	0.053	----
Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L		<0.050 DLDS	0.020	<0.010	<0.010	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	0.0011	0.0013	0.0064	----
Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		66.2 DLDS	71.2	20.6	92.5	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL		Not Detected	Not Detected	Not Detected	Not Detected	----
Coliforms, total	----	E012.TC	1	CFU/100mL		Not Detected	Not Detected	Not Detected	Not Detected	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0122	0.0045	0.0023	0.0016	----
Antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00011	----
Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00335	0.00034	0.00016	0.00061	----
Barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.402	0.170	0.0194	0.131	----
Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	<0.000020	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.010	mg/L		0.049	0.011	0.013	0.024	----
Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000111	0.0000102	0.0000159	0.0000055	----
Calcium, dissolved	7440-70-2	E421	0.050	mg/L		147	111	85.7	86.3	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW102 (Peto)	MW202-21	MW203B-21	MW107 (Peto)	----
					Client sampling date / time	06-Feb-2023 15:15	06-Feb-2023 12:10	06-Feb-2023 13:30	06-Feb-2023 14:00	----
						WT2302860-001	WT2302860-002	WT2302860-003	WT2302860-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
Cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000018	<0.000010	<0.000010	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	0.00059	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00020	0.00087	<0.00010	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00736	0.00521	0.00670	0.00131	----
Iron, dissolved	7439-89-6	E421	0.010	mg/L		0.354	0.049	<0.010	<0.010	----
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000167	<0.000050	<0.000050	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0020	0.0038	0.0035	0.0267	----
Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		38.5	33.1	27.5	52.4	----
Manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0882	0.0791	0.0138	0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00106	0.000886	0.000410	0.00468	----
Nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00086	0.00096	<0.00050	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.050	mg/L		2.37	1.14	0.724	2.70	----
Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00214	0.00119	0.00108	0.00093	----
Selenium, dissolved	7782-49-2	E421	0.000050	mg/L		<0.000050	<0.000050	0.000364	0.000282	----
Silicon, dissolved	7440-21-3	E421	0.050	mg/L		4.03	5.87	6.41	6.98	----
Silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.050	mg/L		128	5.16	2.64	52.6	----
Strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.294	0.194	0.134	0.401	----
Sulfur, dissolved	7704-34-9	E421	0.50	mg/L		26.2	26.0	7.54	34.6	----
Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	0.000014	0.000015	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.00030	mg/L		0.00035	<0.00030	<0.00030	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.0163	0.00116	0.000490	0.00567	----
Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	0.00086	----
Zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0039	0.0039	0.0031	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		0.00024	<0.00020	<0.00020	<0.00020	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW102 (Peto)	MW202-21	MW203B-21	MW107 (Peto)	----
					Client sampling date / time	06-Feb-2023 15:15	06-Feb-2023 12:10	06-Feb-2023 13:30	06-Feb-2023 14:00	----
Analyte	CAS Number	Method	LOR	Unit		WT2302860-001	WT2302860-002	WT2302860-003	WT2302860-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
Dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

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

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2302860**	Page	: 1 of 15
Client	: **MTE Consultants Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Elysha Brears	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	: 519 743 6500	Telephone	: +1 519 886 6910
Project	: 35056-104	Date Samples Received	: 06-Feb-2023 15:45
PO	: ----	Issue Date	: 13-Feb-2023 16:27
C-O-C number	: 20-887437		
Sampler	: Timothy Greer		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

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

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW102 (Peto)	E298	06-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW107 (Peto)	E298	06-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW202-21	E298	06-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW203B-21	E298	06-Feb-2023	06-Feb-2023	----	----		07-Feb-2023	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW102 (Peto)	E235.Cl	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW107 (Peto)	E235.Cl	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW202-21	E235.Cl	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW203B-21	E235.Cl	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW102 (Peto)	E378-U	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	7 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW107 (Peto)	E378-U	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	7 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW202-21	E378-U	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	7 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW203B-21	E378-U	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	7 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW102 (Peto)	E235.F	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW107 (Peto)	E235.F	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW202-21	E235.F	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW203B-21	E235.F	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW102 (Peto)	E235.NO3	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW107 (Peto)	E235.NO3	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW202-21	E235.NO3	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW203B-21	E235.NO3	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW102 (Peto)	E235.NO2	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW107 (Peto)	E235.NO2	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW202-21	E235.NO2	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW203B-21	E235.NO2	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	7 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW102 (Peto)	E235.SO4	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW107 (Peto)	E235.SO4	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW202-21	E235.SO4	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW203B-21	E235.SO4	06-Feb-2023	06-Feb-2023	----	----		06-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW102 (Peto)	E375-L	06-Feb-2023	08-Feb-2023	3 days	2 days	✓	08-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW107 (Peto)	E375-L	06-Feb-2023	08-Feb-2023	3 days	2 days	✓	08-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW202-21	E375-L	06-Feb-2023	08-Feb-2023	3 days	2 days	✓	08-Feb-2023	28 days	0 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW203B-21	E375-L	06-Feb-2023	08-Feb-2023	3 days	2 days	✓	08-Feb-2023	28 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW102 (Peto)	E421	06-Feb-2023	07-Feb-2023	----	----		07-Feb-2023	180 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW107 (Peto)	E421	06-Feb-2023	07-Feb-2023	----	----		07-Feb-2023	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW202-21	E421	06-Feb-2023	07-Feb-2023	----	----		07-Feb-2023	180 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW203B-21	E421	06-Feb-2023	07-Feb-2023	----	----		07-Feb-2023	180 days	1 days	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW102 (Peto)	E012A.EC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	18 hrs	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW107 (Peto)	E012A.EC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	19 hrs	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW203B-21	E012A.EC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	20 hrs	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW202-21	E012A.EC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	21 hrs	✓
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW102 (Peto)	E012.TC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	18 hrs	✓
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW107 (Peto)	E012.TC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	19 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
MW203B-21	E012.TC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	20 hrs	✓
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
MW202-21	E012.TC	06-Feb-2023	----	----	----		07-Feb-2023	48 hrs	21 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
MW102 (Peto)	E290	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
MW107 (Peto)	E290	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
MW202-21	E290	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
MW203B-21	E290	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP]										
MW102 (Peto)	E330	06-Feb-2023	----	----	----		10-Feb-2023	48 hrs	95 hrs	× EHT
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP]										
MW107 (Peto)	E330	06-Feb-2023	----	----	----		10-Feb-2023	48 hrs	96 hrs	× EHT
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP]										
MW203B-21	E330	06-Feb-2023	----	----	----		10-Feb-2023	48 hrs	97 hrs	× EHT

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP] MW202-21	E330	06-Feb-2023	----	----	----		10-Feb-2023	48 hrs	98 hrs	× EHT
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW102 (Peto)	E100	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW107 (Peto)	E100	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW202-21	E100	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW203B-21	E100	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	28 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW102 (Peto)	E108	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW107 (Peto)	E108	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW202-21	E108	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW203B-21	E108	06-Feb-2023	07-Feb-2023	----	----		08-Feb-2023	14 days	2 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW102 (Peto)	E162	06-Feb-2023	----	----	----		09-Feb-2023	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW107 (Peto)	E162	06-Feb-2023	----	----	----		09-Feb-2023	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW202-21	E162	06-Feb-2023	----	----	----		09-Feb-2023	7 days	3 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW203B-21	E162	06-Feb-2023	----	----	----		09-Feb-2023	7 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW102 (Peto)	E121	06-Feb-2023	----	----	----		13-Feb-2023	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW107 (Peto)	E121	06-Feb-2023	----	----	----		13-Feb-2023	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW202-21	E121	06-Feb-2023	----	----	----		13-Feb-2023	3 days	7 days	× EHT
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW203B-21	E121	06-Feb-2023	----	----	----		13-Feb-2023	3 days	7 days	× EHT

Legend & Qualifier Definitions

EHT: Exceeded ALS recommended hold time prior to analysis.

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	827103	1	5	20.0	5.0	✓
Ammonia by Fluorescence	E298	825518	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	825605	1	4	25.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	830859	1	18	5.5	5.0	✓
Conductivity in Water	E100	827102	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	825961	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	825914	1	6	16.6	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	826188	1	11	9.0	5.0	✓
Fluoride in Water by IC	E235.F	825602	1	4	25.0	5.0	✓
Nitrate in Water by IC	E235.NO3	825603	1	4	25.0	5.0	✓
Nitrite in Water by IC	E235.NO2	825604	1	4	25.0	5.0	✓
pH by Meter	E108	827101	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	825606	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	826143	1	4	25.0	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	826179	0	6	0.0	5.0	✗
Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)	E375-L	827390	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	832746	2	9	22.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	827103	1	5	20.0	5.0	✓
Ammonia by Fluorescence	E298	825518	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	825605	1	4	25.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	830859	1	18	5.5	5.0	✓
Conductivity in Water	E100	827102	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	825961	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	825914	1	6	16.6	5.0	✓
Fluoride in Water by IC	E235.F	825602	1	4	25.0	5.0	✓
Nitrate in Water by IC	E235.NO3	825603	1	4	25.0	5.0	✓
Nitrite in Water by IC	E235.NO2	825604	1	4	25.0	5.0	✓
pH by Meter	E108	827101	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	825606	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	826143	1	4	25.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)	E375-L	827390	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	832746	2	9	22.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	827103	1	5	20.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	825518	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	825605	1	4	25.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	830859	1	18	5.5	5.0	✓
Conductivity in Water	E100	827102	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	825961	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	825914	1	6	16.6	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	826188	1	11	9.0	5.0	✓
Fluoride in Water by IC	E235.F	825602	1	4	25.0	5.0	✓
Nitrate in Water by IC	E235.NO3	825603	1	4	25.0	5.0	✓
Nitrite in Water by IC	E235.NO2	825604	1	4	25.0	5.0	✓
Sulfate in Water by IC	E235.SO4	825606	1	5	20.0	5.0	✓
TDS by Gravimetry	E162	826143	1	4	25.0	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	826179	1	6	16.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)	E375-L	827390	1	4	25.0	5.0	✓
Turbidity by Nephelometry	E121	832746	2	9	22.2	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	825518	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	825605	1	4	25.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	825961	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	825914	1	6	16.6	5.0	✓
Fluoride in Water by IC	E235.F	825602	1	4	25.0	5.0	✓
Nitrate in Water by IC	E235.NO3	825603	1	4	25.0	5.0	✓
Nitrite in Water by IC	E235.NO2	825604	1	4	25.0	5.0	✓
Sulfate in Water by IC	E235.SO4	825606	1	5	20.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.003 mg/L)	E375-L	827390	1	4	25.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms (MF-mEndo)	E012.TC Waterloo - Environmental	Water	APHA 9222B (mod)	Following filtration (0.45 µm), and incubation at 35.0 ±0.5°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
E. coli (MF-mFC-BCIG)	E012A.EC Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
Conductivity in Water	E100 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Waterloo - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Waterloo - Environmental	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 Waterloo - Environmental	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 Dissolved Phosphorus by Colourimetry (0.003 mg/L)	E375-L Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Waterloo - Environmental	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.
Dissolved Metals in Water by CRC ICPMS	E421 Waterloo - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 Waterloo - Environmental	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

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

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Dissolved Phosphorus in water	EP375 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Waterloo - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

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QUALITY CONTROL REPORT

Work Order	: **WT2302860**	Page	: 1 of 13
Client	: MTE Consultants Inc.	Laboratory	: Waterloo - Environmental
Contact	: Elysha Brears	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	: 35056-104	Date Samples Received	: 06-Feb-2023 15:45
PO	: ----	Date Analysis Commenced	: 06-Feb-2023
C-O-C number	: 20-887437	Issue Date	: 13-Feb-2023 16:27
Sampler	: Timothy Greer 519 743 6500		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 826143)											
WT2302860-002	MW202-21	Solids, total dissolved [TDS]	----	E162	20	mg/L	456	455	0.219%	20%	----
Physical Tests (QC Lot: 827101)											
WT2302860-001	MW102 (Peto)	pH	----	E108	0.10	pH units	7.93	7.92	0.126%	4%	----
Physical Tests (QC Lot: 827102)											
WT2302860-001	MW102 (Peto)	Conductivity	----	E100	1.0	µS/cm	1560	1560	0.385%	10%	----
Physical Tests (QC Lot: 827103)											
WT2302860-001	MW102 (Peto)	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	344	347	0.833%	20%	----
Physical Tests (QC Lot: 830859)											
WT2302860-001	MW102 (Peto)	Colour, apparent	----	E330	2.0	CU	41.5	42.4	2.17%	20%	----
Physical Tests (QC Lot: 832746)											
WT2302865-002	Anonymous	Turbidity	----	E121	0.10	NTU	3.28	3.30	0.608%	15%	----
Physical Tests (QC Lot: 832890)											
WT2302860-001	MW102 (Peto)	Turbidity	----	E121	0.10	NTU	7.00	6.90	1.44%	15%	----
Anions and Nutrients (QC Lot: 825518)											
WT2302666-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	1.00	mg/L	66.7	68.6	2.79%	20%	----
Anions and Nutrients (QC Lot: 825602)											
WT2302860-001	MW102 (Peto)	Fluoride	16984-48-8	E235.F	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 825603)											
WT2302860-001	MW102 (Peto)	Nitrate (as N)	14797-55-8	E235.NO3	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 825604)											
WT2302860-001	MW102 (Peto)	Nitrite (as N)	14797-65-0	E235.NO2	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 825605)											
WT2302860-001	MW102 (Peto)	Chloride	16887-00-6	E235.Cl	2.50	mg/L	254	252	0.430%	20%	----
Anions and Nutrients (QC Lot: 825606)											
WT2302860-001	MW102 (Peto)	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	66.2	65.4	1.20%	20%	----
Anions and Nutrients (QC Lot: 825914)											
WT2302860-001	MW102 (Peto)	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	0.0010	0.00002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 827390)											
WT2302860-001	MW102 (Peto)	Phosphorus, total dissolved	7723-14-0	E375-L	0.0030	mg/L	0.0056	<0.0030	0.0026	Diff <2x LOR	----
Microbiological Tests (QC Lot: 826188)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Microbiological Tests (QC Lot: 826188) - continued											
WT2302870-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	4	4	0.00%	65%	----
Dissolved Metals (QC Lot: 825961)											
WT2302860-001	MW102 (Peto)	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0122	0.0120	1.58%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00335	0.00338	0.883%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.402	0.406	1.01%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.049	0.049	0.0006	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000111	0.0000093	0.0000018	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	147	145	1.64%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000018	0.000018	0.0000005	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00020	0.00020	0.000001	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00736	0.00737	0.117%	20%	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.354	0.353	0.411%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000167	0.000165	0.000002	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0020	0.0020	0.00008	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	38.5	38.6	0.0435%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0882	0.0879	0.323%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00106	0.00102	3.49%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00086	0.00086	0.000002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.37	2.35	1.09%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00214	0.00216	0.766%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.03	4.11	2.03%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	128	127	0.711%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.294	0.297	0.982%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	26.2	26.6	1.63%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 825961) - continued											
WT2302860-001	MW102 (Peto)	Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00035	0.00036	0.000008	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0163	0.0162	0.645%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0039	0.0036	0.0002	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00024	0.00024	0.000002	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: 826143)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 827102)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 827103)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.1	----
Physical Tests (QCLot: 830859)						
Colour, apparent	----	E330	2	CU	<2.0	----
Physical Tests (QCLot: 832746)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 832890)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 825518)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 825602)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 825603)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 825604)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 825605)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 825606)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 825914)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 827390)						
Phosphorus, total dissolved	7723-14-0	E375-L	0.003	mg/L	<0.0030	----
Microbiological Tests (QCLot: 826179)						
Coliforms, total	----	E012.TC	1	CFU/100mL	<1	----
Microbiological Tests (QCLot: 826188)						
Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Dissolved Metals (QCLot: 825961)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 825961) - continued						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 825961) - continued						
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 826143)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	85.3	85.0	115	----
Physical Tests (QCLot: 827101)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 827102)									
Conductivity	----	E100	1	µS/cm	1409 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 827103)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 830859)									
Colour, apparent	----	E330	2	CU	25 CU	107	70.0	130	----
Physical Tests (QCLot: 832746)									
Turbidity	----	E121	0.1	NTU	200 NTU	91.5	85.0	115	----
Physical Tests (QCLot: 832890)									
Turbidity	----	E121	0.1	NTU	200 NTU	92.0	85.0	115	----
Anions and Nutrients (QCLot: 825518)									
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: 825602)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 825603)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	97.8	90.0	110	----
Anions and Nutrients (QCLot: 825604)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 825605)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 825606)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 825914)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.0212 mg/L	111	80.0	120	----
Anions and Nutrients (QCLot: 827390)									
Phosphorus, total dissolved	7723-14-0	E375-L	0.003	mg/L	0.845 mg/L	96.1	80.0	120	----
Dissolved Metals (QCLot: 825961)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 825961) - continued									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	105	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	107	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	104	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	103	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	106	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	104	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.0025 mg/L	106	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.0125 mg/L	102	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.0125 mg/L	96.3	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.0125 mg/L	94.6	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	99.6	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	102	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.0125 mg/L	100	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	113	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.0125 mg/L	103	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.0125 mg/L	104	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	109	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	106	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	106	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	105	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	103	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	96.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	101	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.0125 mg/L	105	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	104	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	107	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	105	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	105	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.0125 mg/L	101	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	98.7	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.00025 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 825961) - continued									
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	104	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	102	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	98.1	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: 825518)										
WT2302666-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 825602)										
WT2302860-001	MW102 (Peto)	Fluoride	16984-48-8	E235.F	4.94 mg/L	5 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 825603)										
WT2302860-001	MW102 (Peto)	Nitrate (as N)	14797-55-8	E235.NO3	12.0 mg/L	12.5 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 825604)										
WT2302860-001	MW102 (Peto)	Nitrite (as N)	14797-65-0	E235.NO2	2.48 mg/L	2.5 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 825605)										
WT2302860-001	MW102 (Peto)	Chloride	16887-00-6	E235.Cl	485 mg/L	500 mg/L	97.1	75.0	125	----
Anions and Nutrients (QCLot: 825606)										
WT2302860-001	MW102 (Peto)	Sulfate (as SO4)	14808-79-8	E235.SO4	488 mg/L	500 mg/L	97.6	75.0	125	----
Anions and Nutrients (QCLot: 825914)										
WT2302860-001	MW102 (Peto)	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0171 mg/L	0.0196 mg/L	87.3	70.0	130	----
Anions and Nutrients (QCLot: 827390)										
WT2302860-001	MW102 (Peto)	Phosphorus, total dissolved	7723-14-0	E375-L	0.0890 mg/L	0.1 mg/L	89.0	70.0	130	----
Dissolved Metals (QCLot: 825961)										
WT2302860-002	MW202-21	Aluminum, dissolved	7429-90-5	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0507 mg/L	0.05 mg/L	101	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0576 mg/L	0.05 mg/L	115	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00527 mg/L	0.005 mg/L	105	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0462 mg/L	0.05 mg/L	92.4	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.048 mg/L	0.05 mg/L	95.5	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00518 mg/L	0.005 mg/L	104	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00258 mg/L	0.0025 mg/L	103	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0124 mg/L	0.0125 mg/L	99.6	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0113 mg/L	0.0125 mg/L	90.7	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0109 mg/L	0.0125 mg/L	87.4	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
Dissolved Metals (QCLot: 825961) - continued										
WT2302860-002	MW202-21	Iron, dissolved	7439-89-6	E421	0.055 mg/L	0.05 mg/L	110	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0249 mg/L	0.025 mg/L	99.5	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0131 mg/L	0.0125 mg/L	105	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0125 mg/L	0.0125 mg/L	99.9	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0240 mg/L	0.025 mg/L	95.9	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.550 mg/L	0.5 mg/L	110	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	2.54 mg/L	2.5 mg/L	102	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00512 mg/L	0.005 mg/L	102	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0594 mg/L	0.05 mg/L	119	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	0.5 mg/L	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00400 mg/L	0.005 mg/L	80.0	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00548 mg/L	0.005 mg/L	110	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0511 mg/L	0.05 mg/L	102	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00507 mg/L	0.005 mg/L	101	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0254 mg/L	0.025 mg/L	102	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0125 mg/L	0.0125 mg/L	99.9	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00494 mg/L	0.005 mg/L	98.8	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	ND mg/L	0.00025 mg/L	ND	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0258 mg/L	0.025 mg/L	103	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0242 mg/L	0.025 mg/L	96.6	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00478 mg/L	0.005 mg/L	95.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 887437

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Waterloo
Work Order Reference
WT2302860

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	MTE Consultants Inc.	Select Report Format: ☒ PDF ☐ EXCEL ☒ EDD (DIGITAL)	☒ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Elysha Breacs	Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge
Phone:	519-743-6500	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge
	Company address below will appear on the final report	Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge
Street:	520 Bingemans Centre Dr.	Email 1 or Fax ebreacs@mte85.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge
City/Province:	Kitchener ON	Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge may apply to rush requests on weekends, statutory holidays ar
Postal Code:	N2T 1A8	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☒ YES ☐ NO	Invoice Recipients	For all tests with rush TATs requested
	Copy of Invoice with Report ☐ YES ☒ NO	Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX	Analy
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	35056-104	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	WT2302860	ALS Contact: EH	Sampler: TXG

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Gen Chem PKI	Total P	E. Coli	Total Coliforms	SAMPLES ON HOL	EXTENDED STORAGE R	SUSPECTED HAZARD (see notes)
	MW102 (Peto)	06-Feb-23	1515	GW	4	X	X	X	X			
	MW202-21		1210	GW	4	X	X	X	X			
	MW203B-21		1330	GW	4	X	X	X	X			
	MW107 (Peto)		1400	GW	4	X	X	X	X			

Indicate Filtered (F), Preserved (P) or Fi

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO	please analyze dissolved metals field filtered. Analyze total P using Colourimetry
Are samples for human consumption/ use? ☐ YES ☒ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

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

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				5.2			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: Feb 6/23	Time: 1543	Received by:	Date:	Time:	Received by:	Date: Feb 6 2023	Time: 15:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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

GC-380 MM 618 N-555

Appendix E

Private Well Survey and MECP Water Well Records Search

MTE Consultants
520 Bingemans Centre Drive, Kitchener, Ontario N2B 3X9

March 23, 2021

MTE File No.: C35056-104

Dear Homeowner:

RE: Private Well and Septic System Survey

MTE Consultants Inc. (MTE) has been retained by a local developer to complete a private well and septic system survey in accordance with the Township of Wilmot's Guidelines for Hydrogeological Assessments (April 2020) and the Conservation Authority Guidelines for Development Applications for Hydrogeological Assessment Submissions (June 2013). Your response and completion of the survey will be used to identify potential private water users and septic systems within the vicinity of the proposed development; however, your participation in this private well and septic system survey is voluntary.

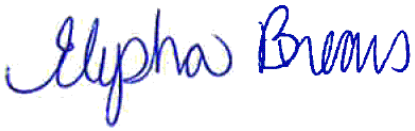
We kindly request you complete the attached survey to the best of your ability and return the completed questionnaire, attached, using the stamped envelope included with this package, electronically via email, or fax to the undersigned. We request that you return this information by April 9, 2021.

If you have any questions or comments, or require any assistance with completing the survey please do not hesitate to contact the undersigned.

Thank you for your assistance and I look forward to hearing from you.

Yours truly,

MTE Consultants Inc.



Elysha Brears, P.Geo., M.E.S.
Hydrogeologist
519-743-6500 ext. 1342 or 226-749-3495
ebrears@mte85.com

EMB:
Encl.
M:\35056\104\02 - Reports\MTE Reports\Hydrogeology\04-Draft Deliverables\20210325__Residential Letter_V_EB.docx

40P7E

UTM 17 Z 524000 E
5 R 4803900 N
Elev. 5 R 1125
Basin 23

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

WILMOT

County or District Waterloo (Township), ~~Village~~, ~~Town or City~~ (New Hamburg)

[redacted] completed 17 (day) 3 (month) 61 (year)

[redacted]ress New Hamburg RR #3

Casing and Screen Record

Inside diameter of casing 30"
Total length of casing 58'
Type of screen Gravelpack
Length of screen
Depth to top of screen
Diameter of finished hole 30"

Pumping Test

Static level 48'
Test-pumping rate 12 G.P.M.
Pumping level 58'
Duration of test pumping 1 hr
Water clear or cloudy at end of test clear
Recommended pumping rate 6 G.P.M.
with pumping level of 57'

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Top Soil	0	1	51'	2 ~~12~~	Fresh
Brown clay	1	18			
Blue clay	18	41			
Blue sand (gravel)	41	51			
Gravel + sand	51	58			

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

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

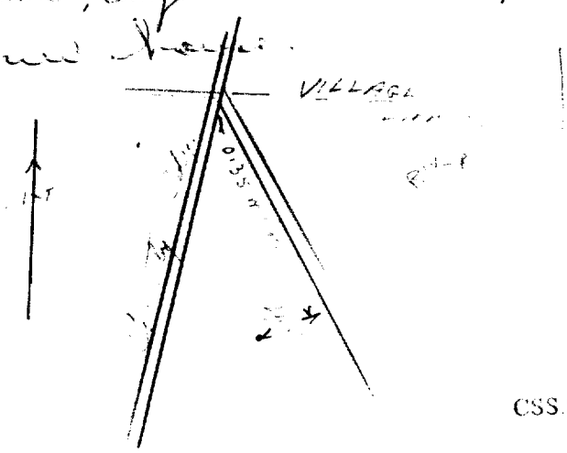
Drilling Firm Hodgins Well Digging
Address Elmira Ont.

Licence Number 596
Name of Driller R. Hambleton
Address Alma Ont.
Date 17/3/61
R. C. Hambleton
(Signature of Licensed Drilling Contractor)

Location of Well

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

Into New Hamburg going East to Peel St. Go straight north 1 mile, left hand side of road.



Form 5

CSS.S8

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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

11 — 6507963

Municipality 65004 — Con. SR S

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
[redacted]	WILMOT	S.S.R.	21

Address: RR#2 BADEN — Date completed: 17 (day) 6 (month) 96 (year)

21 — Northing — RC — Elevation — RC — Basin Code — ii — iii — iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BROWN	TOP SOIL			0	1
BROWN	SAND			1	9
BROWN	SAND & GRAVEL			9	12
GREY	CLAY	SILT LAYERS	STONES	12	27
GREY	SAND &	CLAY LAYERS		27	28
GREY	CLAY	SILT LAYERS		28	30

31

32

41 WATER RECORD

Water found at – feet	Kind of water
8-12	[x] Fresh [ ] Salty; [ ] Sulphur [ ] Minerals [ ] Gas
15	[x] Fresh [ ] Salty; [ ] Sulphur [ ] Minerals [ ] Gas
27	[x] Fresh [ ] Salty; [ ] Sulphur [ ] Minerals [ ] Gas
	[ ] Fresh [ ] Salty; [ ] Sulphur [ ] Minerals [ ] Gas
	[ ] Fresh [ ] Salty; [ ] Sulphur [ ] Minerals [ ] Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
36	[x] Concrete	3	0	30
	[ ] Steel [ ] Galvanized [ ] Concrete [ ] Open hole [ ] Plastic			
	[ ] Steel [ ] Galvanized [ ] Concrete [ ] Open hole [ ] Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet

Material and type: GRAVEL — Depth at top of screen: feet

61 PLUGGING & SEALING RECORD

[ ] Annular space [ ] Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0	7	CONCRETE &
		SAKITE JOINTS

71 PUMPING TEST

Pumping test method: [ ] Pump [ ] Bailer — Pumping rate: GPM — Duration of pumping: ..... Hours ..... Mins

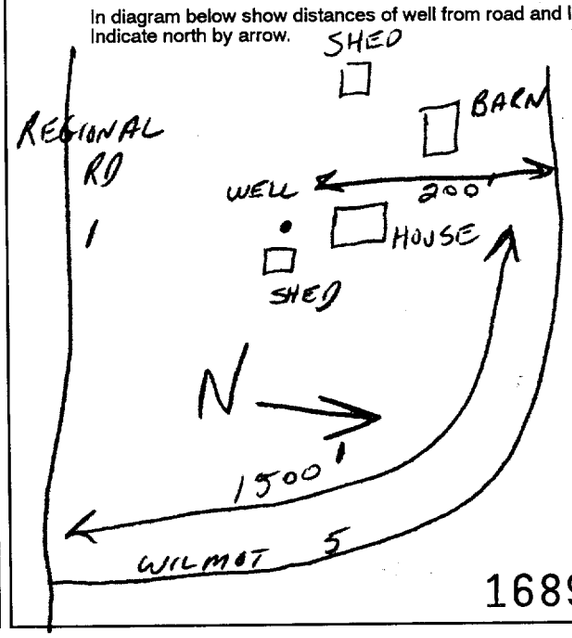
Static level	Water level end of pumping	Water levels during: [ ] Pumping [ ] Recovery — 15 minutes	30 minutes	45 minutes	60 minutes
8 feet	feet	feet	feet	feet	feet

If flowing give rate: GPM — Pump intake set at: feet — Water at end of test: [ ] Clear [ ] Cloudy

Recommended pump type: [ ] Shallow [ ] Deep — Recommended pump setting: 27 feet — Recommended pump rate: 3 GPM

LOCATION OF WELL

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



168953

FINAL STATUS OF WELL

[x] Water supply; [ ] Observation well; [ ] Test hole; [ ] Recharge well; [ ] Abandoned, insufficient supply; [ ] Abandoned, poor quality; [ ] Abandoned (Other); [ ] Dewatering; [ ] Unfinished; [ ] Replacement well

WATER USE

[x] Domestic; [ ] Stock; [ ] Irrigation; [ ] Industrial; [ ] Commercial; [ ] Municipal; [ ] Public supply; [ ] Cooling & air conditioning; [ ] Not used; [ ] Other

METHOD OF CONSTRUCTION

[ ] Cable tool; [ ] Rotary (conventional); [ ] Rotary (reverse); [ ] Rotary (air); [ ] Air percussion; [x] Boring; [ ] Diamond; [ ] Jetting; [ ] Driving; [ ] Digging; [ ] Other

Name of Well Contractor	Well Contractor's Licence No.
JOHNSON & BAETZ	3030

Address: RR#1 MT. PLEASANT

Name of Well Technician	Well Technician's Licence No.
JOHN BAETZ	T-0333

Signature of Technician/Contractor — Submission date: day mo yr

MINISTRY USE ONLY

Data source — Contractor: 3030 — Date received: JUL 16 1996

Date of inspection — Inspector

Remarks: CSS.ES

0506 (07/94) Front Form 9

2- MINISTRY OF ENVIRONMENT & ENERGY COPY

No. 4 40P7E

UTM | 17 | Z | 523650 | E

| 5 | R | 4804350 | N

Elev. | 5 | R | 1120 |

Basin | 23 | | |

[redacted]

65 № 363

The Ontario Water Resources Commission Act, 1957

WILMOT (New Hamburg)

WATER WELL RECORD

County or District Waterloo ~~Township, Village, Town or City~~

Con. — Lot — Date completed 29 (day) AUG. (month) 60 (year)

Owner Village of New Hamburg (print in block letters) Address New Hamburg

Casing and Screen Record

Inside diameter of casing 6 1/4"

Total length of casing 50'

Type of screen none

Length of screen

Depth to top of screen

Diameter of finished hole 6 1/4

Pumping Test

Static level 5 ft

Test-pumping rate 27 G.P.M.

Pumping level 6

Duration of test pumping 4 hrs

Water clear or cloudy at end of test clear

Recommended pumping rate G.P.M.

with pumping level of

Will pump to test before further pumping rate is recommended

Well Log / Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
clay	1	4			
silty sand	4	28			
soft blue clay	28	47			
hard stoney clay	47	54			
very stoney gravel hardpan	54	55'	54-55'	50	fresh

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

Village

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

Drilling Firm C. & H. Kerr

Address

Licence Number 134

Name of Driller Harry Kerr

Address New Hamburg

Date Oct. 19/60

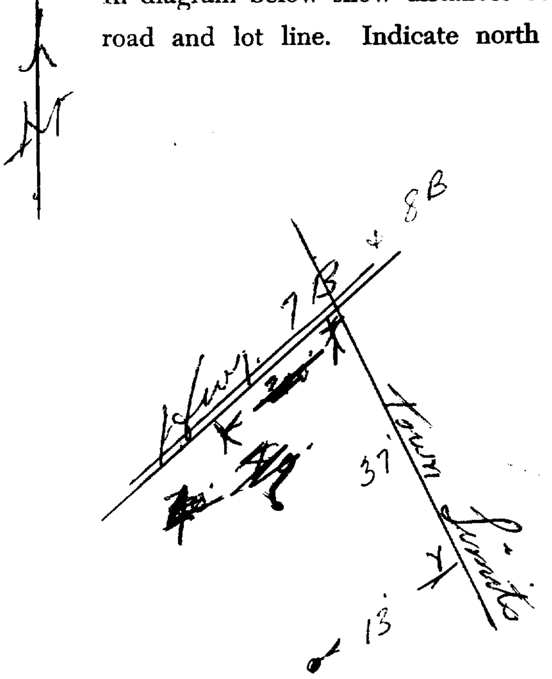
Harry A Kerr

(Signature of Licensed Drilling Contractor)

Form 5

Location of Well

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



CSS.S8

40P7E

UTM 17 Z 523625 E
5 R 4804450 N

Elev. Lot 5 R 26 1/5

Basin 23
County or District WATERLOO

Con. SWR Rd. 5 Lot 20

GROUNDWATER BRANCH
SEP 16 1963
ONTARIO WATER RESOURCES COMMISSION

No. 2524

The Ontario Water Resources Commission Act

WATER WELL RECORD

Township, Village, Town or City [redacted]

Date completed 17 (day) AUGUST (month) 1963 (year)

[redacted]ress NEW HAMBURG

Casing and Screen Record

Inside diameter of casing 30 ϕ 24

Total length of casing 24

Type of screen GRAVELPACK

Length of screen

Depth to top of screen

Diameter of finished hole 24"

Pumping Test

Static level 5'

Test-pumping rate 3 G.P.M.

Pumping level 16'

Duration of test pumping 1/2 HR

Water clear or cloudy at end of test CLOUDY

Recommended pumping rate 3 G.P.M.

with pump setting of 16' feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Sandy clay	0	3	5'	FRESH
Sand & gravel	3	5		
Sand	5	8		
	9	18		

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

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

Drilling or Boring Firm HADCO WELL DIGGING

Address

Licence Number 989

Name of Driller or Borer L. J. COLE

Address 24 Sulby Cr. Downsview ONT

Date

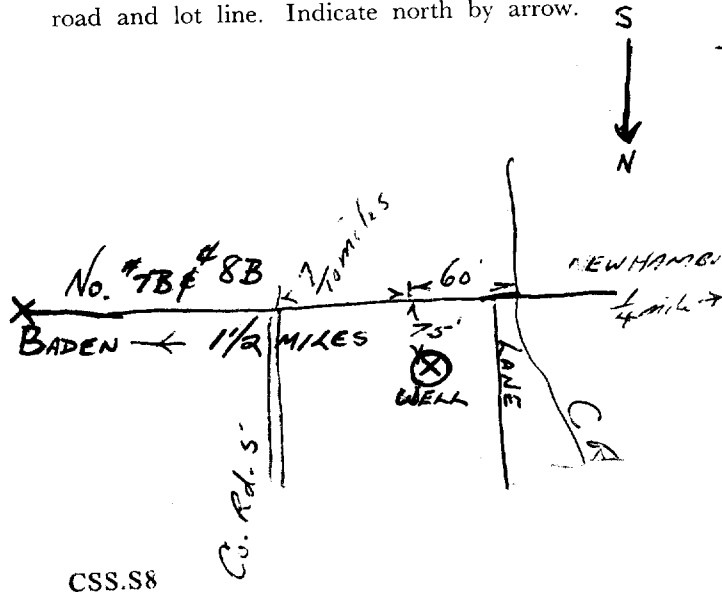
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



CSS.S8

Ontario — Ministry of the Environment

Well Tag No. (158033) **Tag#: A158033**

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	PFENNINGS ORGANIC VEGETABLE FARM		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
1209 WATERLOO ST WILMONT	NEW HAMBURG	ONT	N3A 1T1	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	WILMONT	20	con s of S R

County/District/Municipality	City/Town/Village	Province	Postal Code
REGOIN OF WATERLOO		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	524021	4804776		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	SILTY CLAY & STONES			0	43ft
GRAY	GRAVEL LAYERS CLAY			43ft	65ft
GRAY	CLAY & STONES			65ft	126ft
BROWN	LIMESTONE			126ft	175ft
GRAY	LIMESTONE SHALE			175ft	182ft

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	130ft	BENTONITE SLURRY *60gal	

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6½	PLASTIC	SDR21	0	130ft
6in	open hole		130ft	182ft

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
163ft	☒ Fresh ☐ Untested	☐ Gas ☐ Other, specify
174ft	☒ Fresh ☐ Untested	☐ Gas ☐ Other, specify
(m/ft)	☐ Fresh ☐ Untested	☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	130ft	8.75in
130ft	182ft	6in

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 100ft

Pumping rate (l/min / GPM): 60gpm

Duration of pumping: 2 hrs + 0 min

Final water level end of pumping (m/ft): 92ft

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 100ft

Recommended pump rate (l/min / GPM): 60gpm

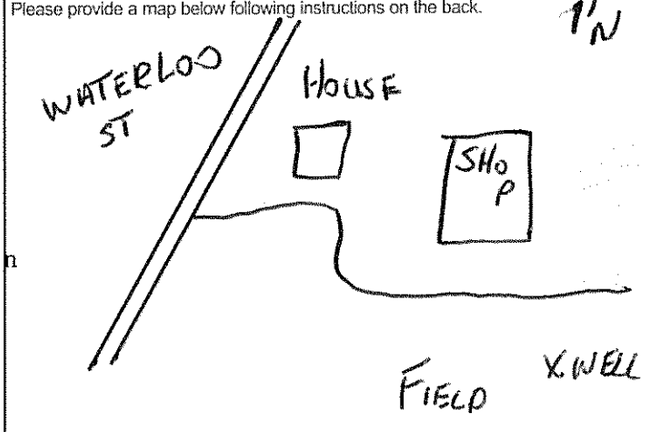
Well production (l/min / GPM)

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		15ft		
1			1	
2			2	
3			3	
4			4	
5	38ft		5	32ft
10	67ft		10	18ft
15	73ft		15	15ft
20	77ft		20	
25	82ft		25	
30	85ft		30	
40	89ft		40	
50	92ft		50	
60	92ft		60	15ft

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
KEITH LANG WELL DRILLING INC	7154

Business Address (Street Number/Name)	Municipality
251 ELDON ST GODERICH	

Province	Postal Code	Business E-mail Address
ONT	N7A3R9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
	KEITH LANG

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T446	K. LANG	

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No		2015 7 22

Ministry Use Only

Audit No. Z 198060

Received AUG 10 2015

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Ministry's Copy

40 PTE

6

UTM 17 Z 524150 E
5 R 4804825 N

50 65 № 2523

Elev. 5 R 1125

Basin 23

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

County or District Waterloo Tp. Wilmot SSR - 20 Con. Lot 236 Pt. Lot C

[redacted] Acres

cluding pump)

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	4"	Date	
Length(s) of casing(s)		Developed Capacity	
Length of screen		Duration of Test	10 G.P.M.
Type of screen		Pumping Rate	
Type of pump		Drawdown	
Capacity of pump		Static level of completed well	28'
Depth of pump setting		Is well a gravel-wall type?	

Water Record

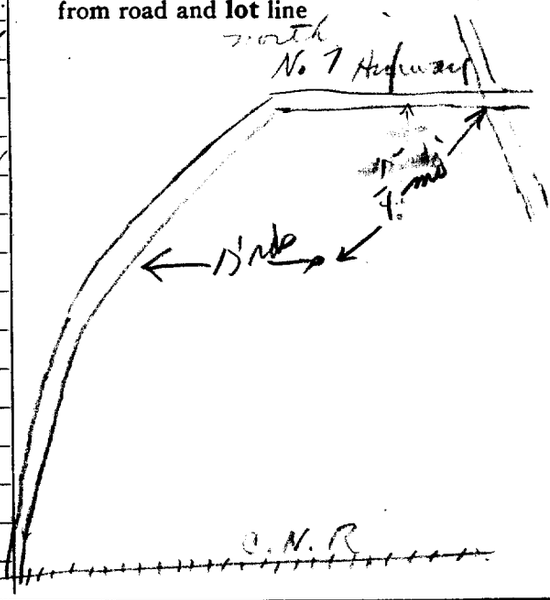
	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
Kind (fresh or mineral)		clear &	28'
Quality (hard, soft, contains iron, sulphur etc.) sulphur		sulphur	
Appearance (clear, cloudy, coloured) clear			
For what purpose(s) is the water to be used?			
How far is well from possible source of contamination?			
What is source of contamination?			
Enclose a copy of any mineral analysis that has been made of water			

Well Log

Drift and Bedrock Record	From	To
	0 ft.	..... ft.
blue clay & sand	1	54
sand	54	66
Till	66	170
Rock	170	194

Location of Well

In diagram below show distances of well from road and lot line



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

Drilling Firm

Address

Recorded by Address

Date Licence Number

CS8.58

Table E.1
Private Well Survey Delivery Addresses

Address	Response Received	Date Received	Name	Water Supply Status	Notes
60 Neville St					
100 Neville St.					
1010 Christner Rd					
1022 Christner Rd					
1034 Christner Rd					
1041 Christner Rd	Yes	26-Apr-21	Mike Roth	Private Dug Well (4.5m deep)	Owner has indicated they run into supply issues during dry summers. Well owner indicated they are a willing to participate in a private well monitoring program.
1107 Christner Rd					
1145 Christner Rd	Yes	9-Apr-21	David and Naomi Witzer	Private Well - WWR No. 6507963	Are willing to participate in a private well monitoring program
55 Hamilton Rd	Yes	3-Dec-21	Riverside Brass	Connected to Municipal Water and Sewer	No further action required.
89 Hamilton Rd					
95 Hamilton Rd					
107 Hamilton Rd					
125 Hamilton Rd					
141 Hamilton Rd					
150 Hamilton Rd					
1356 Nafziger Rd					
A-1140 Waterloo St					
B-1140 Waterloo St	Yes	7-Apr-21	Craig and Brenda Swartzentruber	Connected to Municipal Water and Sewer	No further action required.
1122 Waterloo St					
1148 Waterloo St					
1154 Waterloo St					
1164 Waterloo St					
1166 Waterloo St					
1170 Waterloo St	Yes	5-May-21	Hilda Parsons Krist	Private dug well for watering garden, Municipal water for the house	Has a private dug well but indicated that she is hooked to municipal water. Hilda has indicated she would not like to participate in a water level monitoring program, but would be willing to have the well sampled. Hilda called E. Brears on April 29th, 2021 to discussed and I encouraged her to complete the form and send it in for the records.
1176 Waterloo St					
1206 Waterloo St					
1209 Waterloo St	Yes	12-Apr-21	Pfennings	No - Private Well	Well A, as identified on the survey, is a bedrock well (WWR No. 7246229). Well B, may be WWR No. 6502523 however this well is mapped outside the 500m radius of the Subject Lands property boundary. It is noted the well owner is was willing to participate in a monitoring program and that both wells should be monitored for quality and quantity.
1223 Waterloo St					

Notes:
Modified Door-to-Door Survey completed on March 26, 2021 - letters were mailed to properties within a 500m radius of the Site
A second modified door-to-door Survey was completed on November 23, 2021 - letters were mailed to properties within a 500m radius of the Site that did not respond in March 2021
A private well survey was returned with an address listed as 40 Centennial Crescent. No letter was delivered to this location; therefore, it is unclear which address the original letter had been mailed to.

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: APRIL 15/2021

(1) PROPERTY DATA

Concession: SSR Lot: _____ Township: Wilmot

Current Owner: MIKE ROTH Previous Owner: ALLAN BANKERT

Address: 1041 CHRISTNER RD

Telephone (Home): 519-275-4167 (Business):

(2) WATER QUANTITY

MECP Well Record No.: _____

Well Type: (Private well) Municipal well Well Use: (Residential) Commercial (Agricultural) Other

Aquifer Type: Bedrock Overburden Measured Well Depth: 15' Diameter: 36'

Date constructed: _____ Pump Intake Depth: 14'

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? (YES) NO

If yes, what type of problems have you experienced? Shortage in dry Summers

If necessary, would you permit MTE to monitor the water levels in your well? (YES) NO

(3) WATER QUALITY

Appearance: clear Taste: normal, nothing special

Water treated? UV Light & filter (micron) Odour: none

Staining of water fixtures? calcium

Have there been any tests done on your well water? If so, what were the results? 2020, good potable results

If necessary, could we sample your well for water quality testing? YES NO

(4) SITE SKETCH

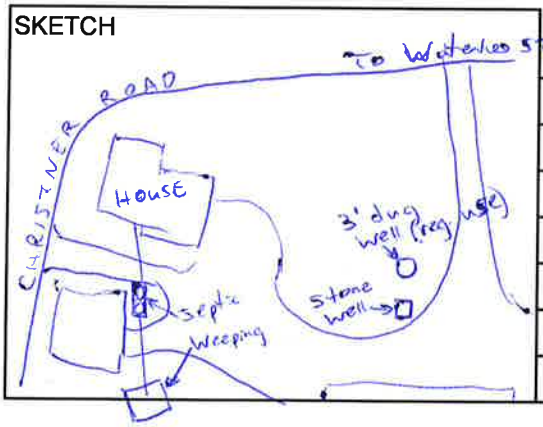
Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed (YES) NO

Comments: _____

SKETCH



(5) GENERAL COMMENTS

PLEASE RETURN TO:

MTE Consultants - Attention: Elysha Brears, P. Geo., M.E.S.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

Tel: (519) 743-6500 (ext.1342)
Fax: (519) 743-6513
Cell: (226) 749-3495
E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? 2009, OCTOBER

How often is your septic system pumped out? 5-6 years

Additional Comments: _____

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes (-No) Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug (- Other).....) concrete cap
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
(-Yes) -No Surface Seal Intact
(-Yes) -No Drainage away from well
-Yes (-No) Casing Lock (Type: G O C)

☐ (Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☒ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

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Cell: (226) 749-3495

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: APRIL 2/2021

(1) PROPERTY DATA

Concession: _____ Lot: _____ Township: _____

Current Owner: DAVID & NAOMI WITZER Previous Owner: BILL KLASSEN

Address: 1145 CHRISTNER RD, NEW HAMBURG, ON.

Telephone (Home): 519-616-3322 (Business): 519-594-0182 x 202

(2) WATER QUANTITY

MECP Well Record No.: _____

Well Type: (Private well) Municipal well Well Use: (Residential) Commercial (Agricultural) Other

Aquifer Type: Bedrock Overburden Measured Well Depth: 9.2m Diameter: 36"

Date constructed: 1996 Pump Intake Depth: ?

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES (NO)

If yes, what type of problems have you experienced? _____

If necessary, would you permit MTE to monitor the water levels in your well? (YES) NO

(3) WATER QUALITY

Appearance: CLEAR, CLEAN Taste: NORMAL,

Water treated? SOFTENED, UV. Odour: NONE

Staining of water fixtures? NOT WHEN SOFTENED.

Have there been any tests done on your well water? If so, what were the results? 5 YEARS AGO POTABLE.

If necessary, could we sample your well for water quality testing? (YES) NO

(4) SITE SKETCH

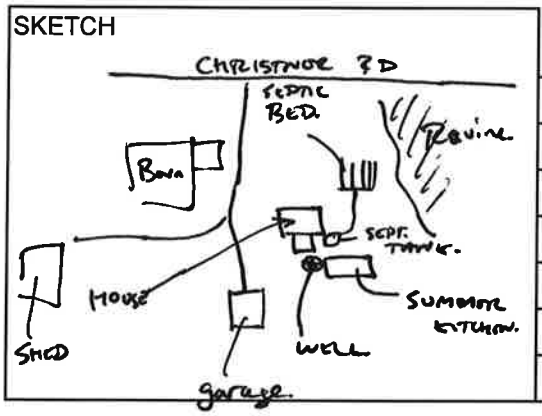
Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed (YES) NO

Comments: _____

SKETCH



(5) GENERAL COMMENTS

I HAVE A SITE PLAN WITH ACCURATE LOCATIONS IF HELPFUL. PLEASE CALL IF YOU NEED THEM.

PLEASE RETURN TO:

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E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE
Page 2 of 2

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? UNKNOWN - AUDIT COMP. 2004 & 2017

How often is your septic system pumped out? 5 YEARS AGO WAS LAST TIME

Additional Comments: WE HAVE ONLY BEEN HERE 5 YEARS. NO ISSUES AS OF NOW. WE DID HAVE AN AUDIT COMPLETED FOR RENOVATION IN 2017.

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
-Yes -No Surface Seal Intact
-Yes -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

☐ Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

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Cell: (226) 749-3495

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: 11/30/21

(1) PROPERTY DATA

Concession: _____ Lot: _____ Township: WILMOT

Current Owner: RIVERSIDE BRASS Previous Owner: _____

Address: 55 HAMILTON ROAD NEW HAMBURG N3A2H1

Telephone (Home): _____ (Business) 519 662 2500

(2) WATER QUANTITY

MECP Well Record No.: _____

Well Type: Private well Municipal well Well Use: Residential Commercial Agricultural Other

Aquifer Type: Bedrock Overburden Measured Well Depth: _____ Diameter: _____

Date constructed: _____ Pump Intake Depth: _____

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES NO

If yes, what type of problems have you experienced? _____

If necessary, would you permit MTE to monitor the water levels in your well? YES NO

(3) WATER QUALITY

Appearance: _____ Taste: _____

Water treated? _____ Odour: _____

Staining of water fixtures? _____

Have there been any tests done on your well water? If so, what were the results? _____

If necessary, could we sample your well for water quality testing? YES NO

(4) SITE SKETCH

Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed YES NO

Comments: _____

SKETCH

NO WELLS

USE MUNICIPAL WATER

(5) GENERAL COMMENTS

PLEASE RETURN TO:

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Cell: (226) 749-3495
E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE

_____

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES NO

If yes, what type of problems have you experienced? _____

What year was your septic system installed? _____

How often is your septic system pumped out? _____

Additional Comments: _____

_____

_____

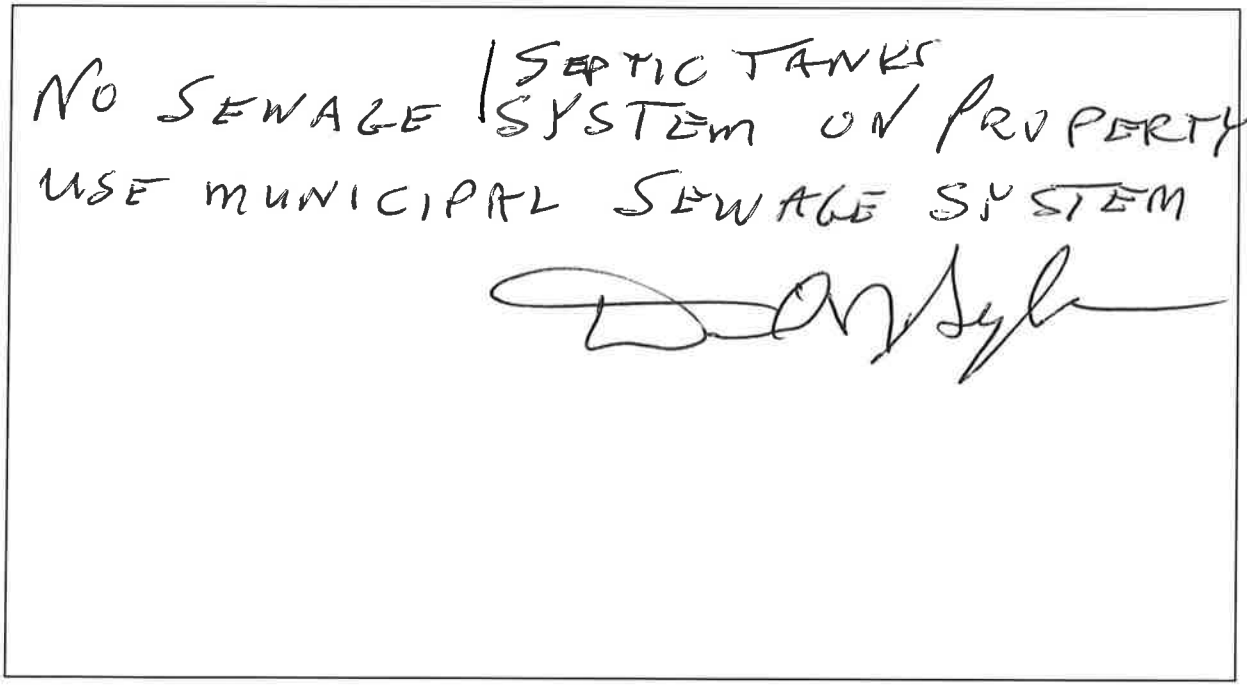
(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
-Yes -No Surface Seal Intact
-Yes -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

☐ Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO



Additional Comments:

_____

_____

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N2B 3X9

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Fax: (519) 743-6513
Cell: (226) 749-3495

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: Mar 31/21

(1) PROPERTY DATA

Concession: Snyder's Rd S Lot: 20 Township: Wilmot

Current Owner: Craig + Brenda Swartzentruber Previous Owner: _____

Address: 1140B Waterloo St New Hamburg Ont N3A-1T3

Telephone (Home): 519-501-9614 (Business): _____

(2) WATER QUANTITY MECP Well Record No.: _____

Well Type: Private well (Municipal well) Well Use: Residential Commercial Agricultural Other

Aquifer Type: Bedrock Overburden Measured Well Depth: _____ Diameter: _____

Date constructed: _____ Pump Intake Depth: _____

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES NO

If yes, what type of problems have you experienced? _____

If necessary, would you permit MTE to monitor the water levels in your well? YES (NO)

(3) WATER QUALITY

Appearance: _____ Taste: _____

Water treated? _____ Odour: _____

Staining of water fixtures? _____

Have there been any tests done on your well water? If so, what were the results? _____

If necessary, could we sample your well for water quality testing? YES (NO)

(4) SITE SKETCH Site Location E: _____

NAD83 UTM Cord. N: _____

El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed YES NO

Comments: _____

SKETCH

(5) GENERAL COMMENTS

We are on town water
Do not use well water

PLEASE RETURN TO:
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N2B 3X9

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Cell: (226) 749-3495
E-mail: ebrears@mte85.com

MTE#_____
Rec'd APR 07 2021
FY EM B INIT._____

WATER WELL INVENTORY - QUESTIONNAIRE

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? not sure - (1999).

How often is your septic system pumped out? every 3 years)

Additional Comments: _____

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
-Yes -No Surface Seal Intact
-Yes -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

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☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

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WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: Apr. 30/21

(1) PROPERTY DATA

Concession: _____ Lot: _____ Township: Wilmot

Current Owner: Hilda Parsons Krist Previous Owner: A

Address: 1170 Waterloo St

Telephone (Home): 519-662-4957 (Business):

(2) WATER QUANTITY

MECP Well Record No.: _____

Well Type: (Private well) Municipal well Well Use: Residential Commercial Agricultural (Other) Watering Gardens

Aquifer Type: Bedrock Overburden Measured Well Depth: 25' to 30' ? Diameter: 36"

Date constructed: 1984 approx. Pump Intake Depth: 1' from bottom approx.

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? (YES) NO

If yes, what type of problems have you experienced? Ran dry during dry Season.

If necessary, would you permit MTE to monitor the water levels in your well? YES (NO)

(3) WATER QUALITY

Appearance: _____ Taste: _____

Water treated? _____ Odour: _____

Staining of water fixtures? _____

Have there been any tests done on your well water? If so, what were the results? Not tested since before July 2005

If necessary, could we sample your well for water quality testing? (YES) NO

(4) SITE SKETCH

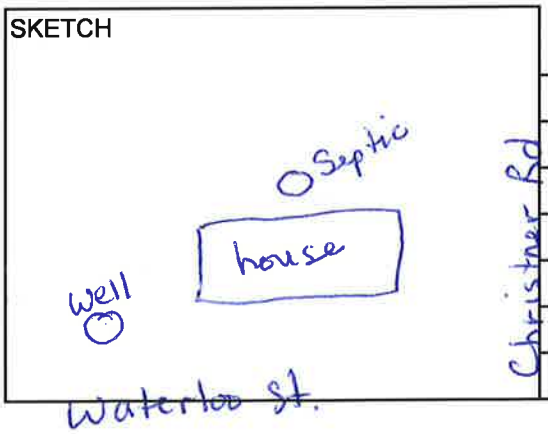
Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed (YES) NO

Comments: _____

SKETCH



(5) GENERAL COMMENTS

Well is used for gardening

House water supplied by Township

Feel free to call with questions as I haven't answered every one Hilda

PLEASE RETURN TO:
MTE Consultants - Attention: Elysha Brears, P. Geo., M.E.S.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

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Fax: (519) 743-6513
Cell: (226) 749-3495
E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? 1984

How often is your septic system pumped out? every 5 yrs.

Additional Comments: _____

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
-Yes -No Surface Seal Intact
-Yes -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

☐ Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

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N2B 3X9

Tel: (519) 743-6500 (ext.1342)
Fax: (519) 743-6513
Cell: (226) 749-3495

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: 06/04/21

(1) PROPERTY DATA

Concession: South of Snyders Rd Lot: 20 Township: Wilmot

Current Owner: Pfennings Previous Owner: _____

Address: 1207 Waterloo ST

Telephone (Home): 519-662-3468 x27 (Business): _____

(2) WATER QUANTITY

MECP Well Record No.: _____

Well Type: Private well Municipal well Well Use: Residential Commercial Agricultural Other

Aquifer Type: Bedrock Overburden Measured Well Depth: _____ Diameter: _____

Date constructed: _____ Pump Intake Depth: _____

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES (NO)

If yes, what type of problems have you experienced? _____

If necessary, would you permit MTE to monitor the water levels in your well? (YES) NO

(3) WATER QUALITY

Appearance: _____ Taste: _____

Water treated? NO Odour: _____

Staining of water fixtures? NO

Have there been any tests done on your well water? If so, what were the results? Potable.

If necessary, could we sample your well for water quality testing? (YES) NO

(4) SITE SKETCH

Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed (YES) NO

Comments: _____

SKETCH

(5) GENERAL COMMENTS

See attached.

PLEASE RETURN TO:
MTE Consultants - Attention: Elysha Brears, P. Geo., M.E.S.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

Tel: (519) 743-6500 (ext.1342)
Fax: (519) 743-6513
Cell: (226) 749-3495
E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE
Page 2 of 2

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? A- 1982 B-2005

How often is your septic system pumped out? 2 yrs Annual

Additional Comments: _____

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

(Yes) -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
(Yes) -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
(Yes) -No Surface Seal Intact
(Yes) -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

☐ Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

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N2B 3X9

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Fax: (519) 743-6513
Cell: (226) 749-3495


BED 'A'
BED 'B'
HOUSE WELL A
BARN WELL B
1:500
40m

WATER WELL INVENTORY - QUESTIONNAIRE

Project: _____ Job No.: 35056-104 Date: _____

(1) PROPERTY DATA

Concession: _____ Lot: _____ Township: _____

Current Owner: DAVID SEYLER Previous Owner: _____

Address: 40 CENTENNIAL CRESC. NEW HAMBURG N3A 1K9

Telephone (Home): (Business):

(2) WATER QUANTITY

MECP Well Record No.: MUNICIPAL WELL/WATER

Well Type: Private well Municipal well Well Use: Residential Commercial Agricultural Other

Aquifer Type: Bedrock Overburden Measured Well Depth: _____ Diameter: _____

Date constructed: _____ Pump Intake Depth: _____

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES NO

If yes, what type of problems have you experienced? _____

If necessary, would you permit MTE to monitor the water levels in your well? YES NO

(3) WATER QUALITY

Appearance: _____ Taste: _____

Water treated? _____ Odour: _____

Staining of water fixtures? _____

Have there been any tests done on your well water? If so, what were the results? _____

If necessary, could we sample your well for water quality testing? YES NO

(4) SITE SKETCH

Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

Can the well be easily accessed YES NO

Comments: _____

SKETCH

(5) GENERAL COMMENTS

PLEASE RETURN TO:

MTE Consultants - Attention: Elysha Brears, P. Geo., M.E.S.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

Tel: (519) 743-6500 (ext.1342)
Fax: (519) 743-6513
Cell: (226) 749-3495
E-mail: ebrears@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE

(5) SEPTIC SYSTEM

Have you had any problems with your septic system? YES (NO)

If yes, what type of problems have you experienced? _____

What year was your septic system installed? _____

How often is your septic system pumped out? _____

Additional Comments: NO SEPTIC SYSTEM

(5) WELL SECURITY AND MEASUREMENTS

Water Level Measurement: _____ mbTOC

-Yes -No Secure (access requires keys or tools)
-Yes -No Cap (- Threaded - Unthreaded
- J-Plug - Other .....)
-Yes -No Well Casing Unmovable
-Yes -No Protective Casing Unmovable
-Yes -No Surface Seal Intact
-Yes -No Drainage away from well
-Yes -No Casing Lock (Type: G O C)

☐ Good – can measure full depth, no physical damage to well casing
☐ Fair – can measure full depth, no holes in casing, but well casing is bent or damaged, cap is difficult to remove/replace
☐ Poor – can measure water, but cannot get probe to full depth, well casing is damaged
☐ None of the Above (see Comments)
☐-Yes ☐-No Needs Repair (see Comments)

PHOTO

Additional Comments:

PLEASE RETURN TO:
MTE Consultants - Attention: Elysha Brears, P. Geo., M.E.S.
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N2B 3X9

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Cell: (226) 749-3495

Appendix F

Manual Water Level Measurements & Hydrographs

Table F.1
Manual Water Level Measurements (mbtoc)

Date	Well ID															
	MW101	MW102	MW103	MW104	MW105	MW106	MW107	MW108	MW109	MW110	MW201-21	MW202-21	MW203A-21	MW203B-21	MP01-22 (IN)	MP01-22 (OUT)
	Groundwater Level (mbtoc)															
3-Mar-21	2.25	2.51	3.20	2.06	1.98	2.35	3.48	6.71	1.13	1.60	NI	NI	NI	NI	NI	NI
16-Mar-21	1.96	2.33	Blocked	1.66	1.97	2.26	3.47	6.83	0.98	1.12	NI	NI	NI	NI	NI	NI
8-Apr-21	NM	NM	Decomm.	NM	NM	NM	NM	NM	NM	NM	2.60	1.82	2.99	2.76	NI	NI
20-Apr-21	NM	2.36	Decomm.	NM	NM	NM	NM	NM	NM	NM	NM	1.80	2.90	2.66	NI	NI
26-May-21	2.65	NM	Decomm.	NM	2.20	2.57	3.52	7.00	1.35	1.56	NM	2.04	3.20	2.89	NI	NI
2-Jun-21	NM	2.68	Decomm.	2.38	NM	2.62	3.53	7.06	1.36	1.62	3.18	NM	NM	NM	NI	NI
5-Aug-21	2.89	2.70	Decomm.	4.02	2.48	2.85	4.21	7.09	1.68	2.47	3.89	2.30	3.56	3.23	NI	NI
14-Oct-21	2.40	2.55	Decomm.	2.50	2.05	2.40	3.45	6.80	1.13	1.43	3.60	1.83	3.16	2.90	NI	NI
23-Nov-21	NM	NM	Decomm.	1.54	1.98	NM	3.37	NM	0.94	NM	NM	NM	NM	NM	NI	NI
25-Nov-21	2.13	NM	Decomm.	NM	2.00	NM	NM	NM	NM	0.93	2.98	NM	NM	NM	NI	NI
24-Jan-22	2.47	2.66	Decomm.	2.02	2.14	2.53	3.61	6.42	1.12	1.11	3.07	1.98	2.94	2.65	1.87	Dry
8-Apr-22	2.13	2.35	Decomm.	1.14	1.99	2.28	3.20	6.38	0.99	0.80	2.42	1.79	2.66	2.39	1.37	Dry
22-Jul-22	3.42	2.89	Decomm.	4.01	2.40	3.57	4.83	7.10	2.49	3.15	4.08	2.42	3.37	3.02	NM	NM
27-Oct-22	2.93	2.80	Decomm.	5.48	2.52	5.94	Dry	Dry	2.48	3.29	4.29	2.60	3.77	3.54	Dry	Dry
16-Jan-23	2.27	2.50	Decomm.	2.67	2.06	2.97	3.78	Dry	1.14	1.64	3.14	1.90	3.29	3.11	Dry	Dry
6-Feb-23	2.40	2.58	Decomm.	2.34	2.09	2.90	3.47	Dry	1.16	1.59	3.15	1.89	3.26	3.05	Dry	Dry

Table F.2
Manual Water Level Measurements (mbgs)

	Well ID															
	MW101	MW102	MW103	MW104	MW105	MW106	MW107	MW108	MW109	MW110	MW201-21	MW202-21	MW203A-21	MW203B-21	MP01-22 (IN)	MP01-22 (OUT)
Stick up (m)	0.92	1.07	0.93	1.09	1.07	1.17	1.05	1.12	0.86	0.88	1.03	1.04	0.97	0.95	1.25	1.25
		0.97		0.93						0.71	0.86					
Date	Groundwater Level (mbgs)															
3-Mar-21	1.33	1.44	2.27	0.97	0.91	1.17	2.43	5.58	0.27	0.71	NI	NI	NI	NI	NI	NI
16-Mar-21	1.04	1.26	Blocked	0.57	0.90	1.09	2.42	5.71	0.12	0.24	NI	NI	NI	NI	NI	NI
8-Apr-21	NM	NM	Decomm.	NM	NM	NM	NM	NM	NM	NM	1.57	0.78	2.02	1.81	NI	NI
20-Apr-21	NM	1.29	Decomm.	NM	NM	NM	NM	NM	NM	NM	NM	0.76	1.93	1.71	NI	NI
26-May-21	1.73	NM	Decomm.	NM	1.13	1.40	2.47	5.88	0.49	0.68	NM	1.00	2.23	1.94	NI	NI
2-Jun-21	NM	1.71	Decomm.	1.45	NM	1.45	2.48	5.94	0.50	0.91	2.32	NM	NM	NM	NI	NI
5-Aug-21	1.97	1.73	Decomm.	3.09	1.41	1.68	3.16	5.97	0.82	1.76	3.03	1.26	2.59	2.28	NI	NI
14-Oct-21	1.48	1.58	Decomm.	1.57	0.98	1.23	2.40	5.68	0.27	0.72	2.74	0.79	2.19	1.95	NI	NI
23-Nov-21	NM	NM	Decomm.	0.61	0.91	NM	2.32	NM	0.08	NM	NM	NM	NM	NM	NI	NI
25-Nov-21	1.21	NM	Decomm.	NM	0.93	NM	NM	NM	NM	0.22	2.12	NM	NM	NM	NI	NI
24-Jan-22	1.55	1.69	Decomm.	1.09	1.07	1.36	2.56	5.30	0.26	0.40	2.21	0.94	1.97	1.70	0.62	Dry
8-Apr-22	1.21	1.38	Decomm.	0.21	0.92	1.11	2.15	5.26	0.13	0.09	1.56	0.75	1.69	1.44	0.12	Dry
22-Jul-22	2.50	1.92	Decomm.	3.08	1.33	2.40	3.78	5.98	1.63	2.44	3.22	1.38	2.40	2.07	NM	NM
27-Oct-22	2.01	1.83	Decomm.	4.55	1.45	4.77	Dry	Dry	1.62	2.58	3.43	1.56	2.80	2.59	Dry	Dry
16-Jan-23	1.35	1.53	Decomm.	1.74	0.99	1.80	2.73	Dry	0.28	0.93	2.28	0.86	2.32	2.16	Dry	Dry
6-Feb-23	1.48	1.61	Decomm.	1.41	1.02	1.73	2.42	Dry	0.30	0.88	2.29	0.85	2.29	2.10	Dry	Dry

Table F.3
Groundwater Elevations (mamsl)

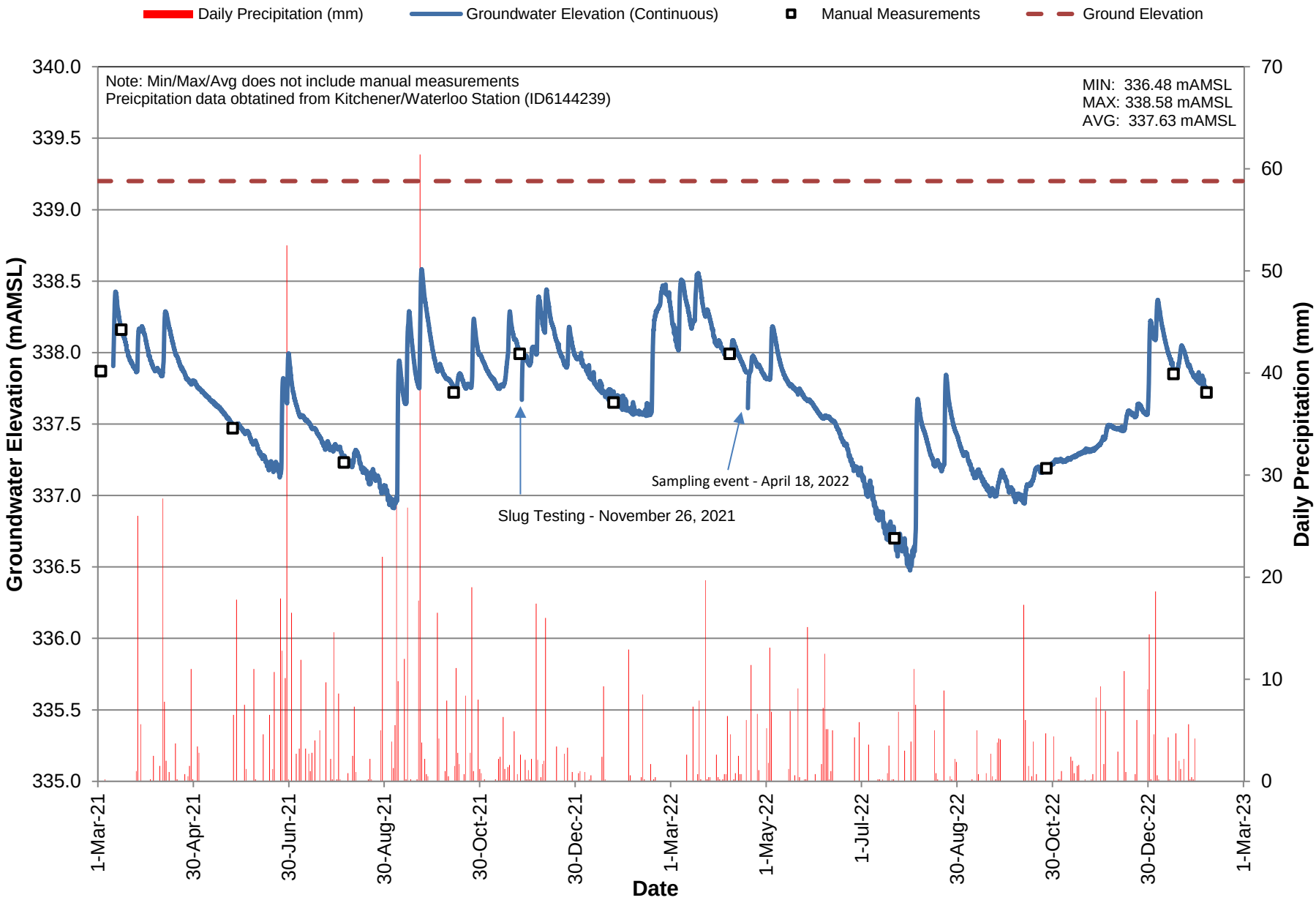
	Well ID															
	MW101	MW102	MW103	MW104	MW105	MW106	MW107	MW108	MW109	MW110	MW201-21	MW202-21	MW203A-21	MW203B-21	MP01-22 (IN)	MP01-22 (OUT)
TOC Elevation (mamsl)	340.12	341.12	344.24	345.96	342.16	344.13	348.06	346.42	340.92	340.92	344.49	343.13	345.70	345.72	342.22	342.22
		341.11		345.88						340.75	344.38					
Date	Groundwater Level (mamsl)															
3-Mar-21	337.87	338.61	341.04	343.90	340.18	341.79	344.58	339.72	339.79	339.32	NI	NI	NI	NI	NI	NI
16-Mar-21	338.16	338.79	Blocked	344.30	340.19	341.87	344.59	339.59	339.94	339.80	NI	NI	NI	NI	NI	NI
8-Apr-21	NM	NM	Decomm.	NM	NM	NM	NM	NM	NM	NM	342.91	341.31	342.71	342.96	NI	NI
20-Apr-21	NM	338.76	Decomm.	NM	NM	NM	NM	NM	NM	NM	NM	341.33	342.80	343.06	NI	NI
26-May-21	337.47	NM	Decomm.	NM	339.96	341.56	344.54	339.42	339.57	339.36	NM	341.09	342.50	342.83	NI	NI
2-Jun-21	NM	338.43	Decomm.	343.50	NM	341.51	344.53	339.36	339.56	339.13	341.20	NM	NM	NM	NI	NI
5-Aug-21	337.23	338.41	Decomm.	341.86	339.68	341.28	343.85	339.33	339.24	338.28	340.49	340.83	342.14	342.49	NI	NI
14-Oct-21	337.72	338.56	Decomm.	343.38	340.11	341.73	344.61	339.62	339.79	339.32	340.78	341.30	342.54	342.82	NI	NI
23-Nov-21	NM	NM	Decomm.	344.34	340.18	NM	344.69	NM	339.98	NM	NM	NM	NM	NM	NI	NI
25-Nov-21	337.99	NM	Decomm.	NM	340.16	NM	NM	NM	NM	339.82	341.40	NM	NM	NM	NI	NI
24-Jan-22	337.65	338.45	Decomm.	343.86	340.02	341.60	344.45	340.00	339.80	339.64	341.31	341.15	342.76	343.07	340.35	Dry
8-Apr-22	337.99	338.76	Decomm.	344.74	340.17	341.85	344.86	340.04	339.93	339.95	341.96	341.34	343.04	343.33	340.85	Dry
22-Jul-22	336.70	338.22	Decomm.	341.87	339.76	340.56	343.23	339.32	338.43	337.60	340.30	340.71	342.33	342.70	NM	NM
27-Oct-22	337.19	338.31	Decomm.	340.40	339.64	338.19	Dry	Dry	338.44	337.46	340.09	340.53	341.93	342.18	Dry	Dry
16-Jan-23	337.85	338.61	Decomm.	343.21	340.10	341.16	344.28	Dry	339.78	339.11	341.24	341.23	342.41	342.61	Dry	Dry
6-Feb-23	337.72	338.53	Decomm.	343.54	340.07	341.23	344.59	Dry	339.76	339.16	341.23	341.24	342.44	342.67	Dry	Dry

Table F.4
Minimum, Maximum and Average Groundwater Elevations (mamsl)

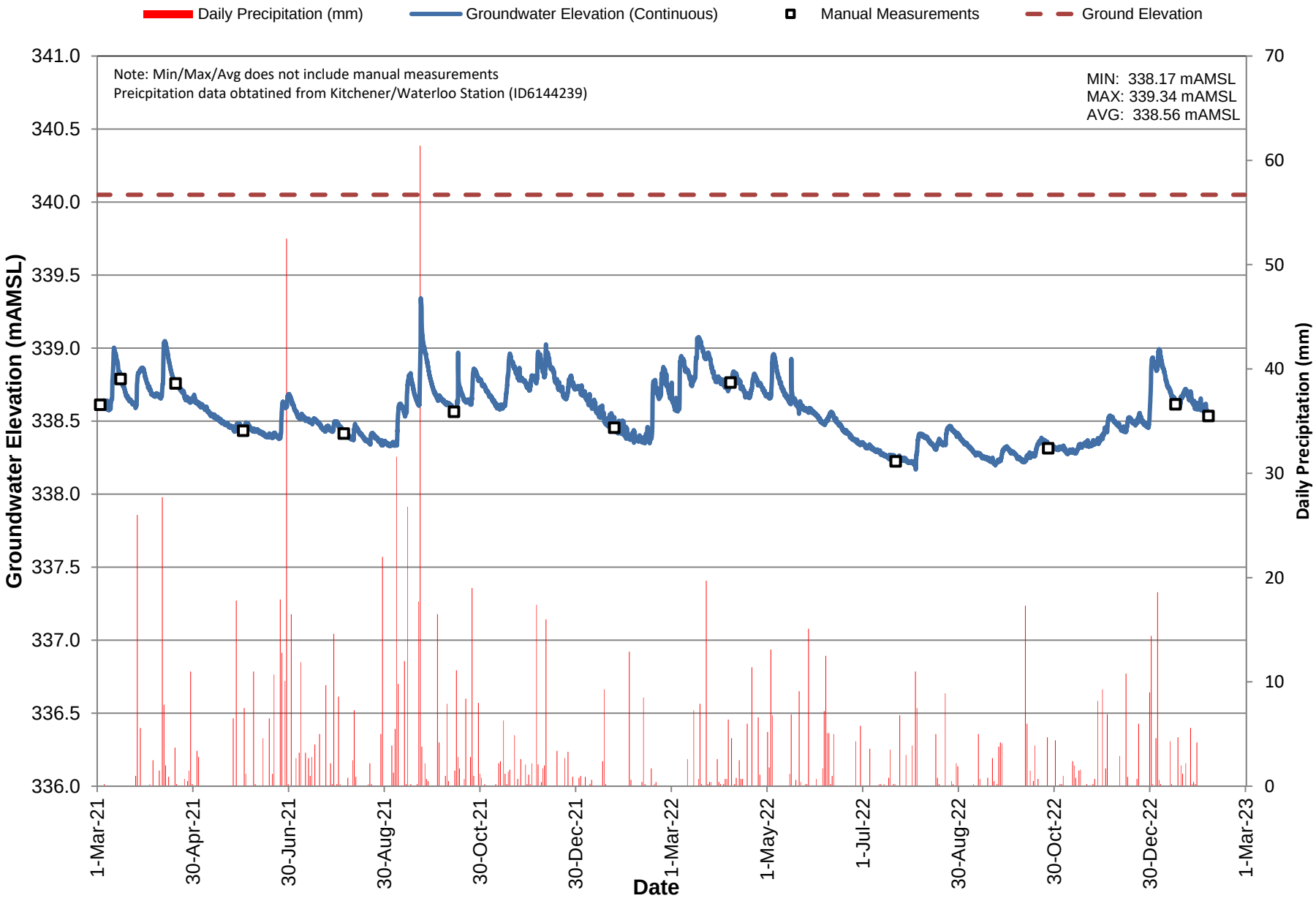
Date	Groundwater Level (mamsl)															
Minimum	336.70	338.22	341.04	340.40	339.64	338.19	343.23	339.32	338.43	337.46	340.09	340.53	341.93	342.18	340.35	-
Maximum	338.16	338.79	341.04	344.74	340.19	341.87	344.86	340.04	339.98	339.95	342.91	341.34	343.04	343.33	340.85	-
Average	337.63	338.54	341.04	343.24	340.02	341.20	344.40	339.60	339.54	339.07	341.18	341.09	342.51	342.79	340.60	-

Notes
1. NI = not installed
2. NM = not measured
3. mbtoc = metres below top of casing
4. MW103 was decommissioned on April 1, 2021 due to a silted in screen. MW201-21 was installed next to it at approximately the same depth
5. MW102, MW104, and MW201-21 were found to be damaged during a site visit on May 26, 2021
6. MW102, MW104, MW110 and MW201-21 were repaired and June 2, 2021 and resurveyed on June 8, 2021
7. MP101-22 was installed on January 11, 2022 and surveyed by MTE on February 9, 2022

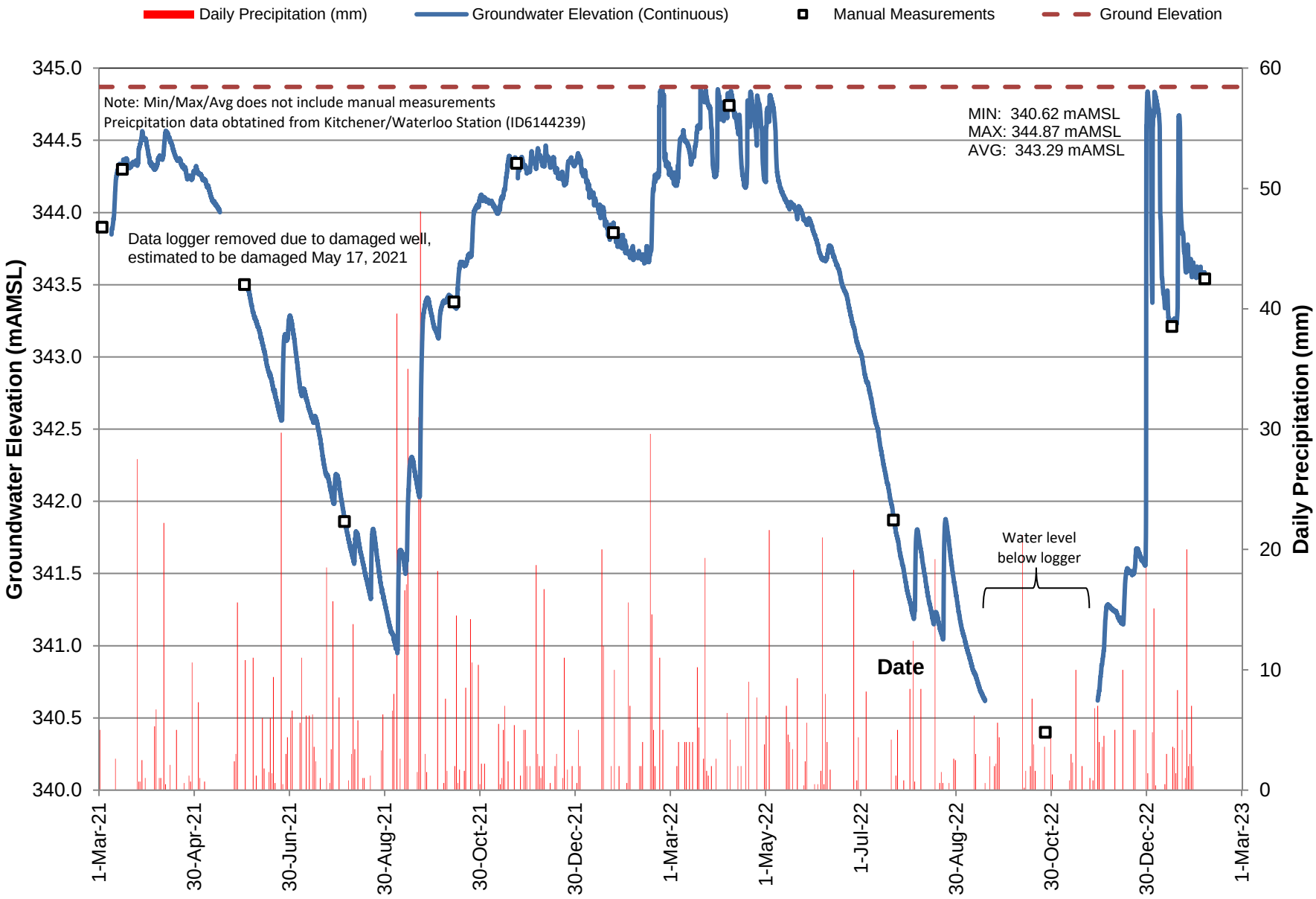
Hydrograph 1: Groundwater Elevations (mAMSL) - MW101-18



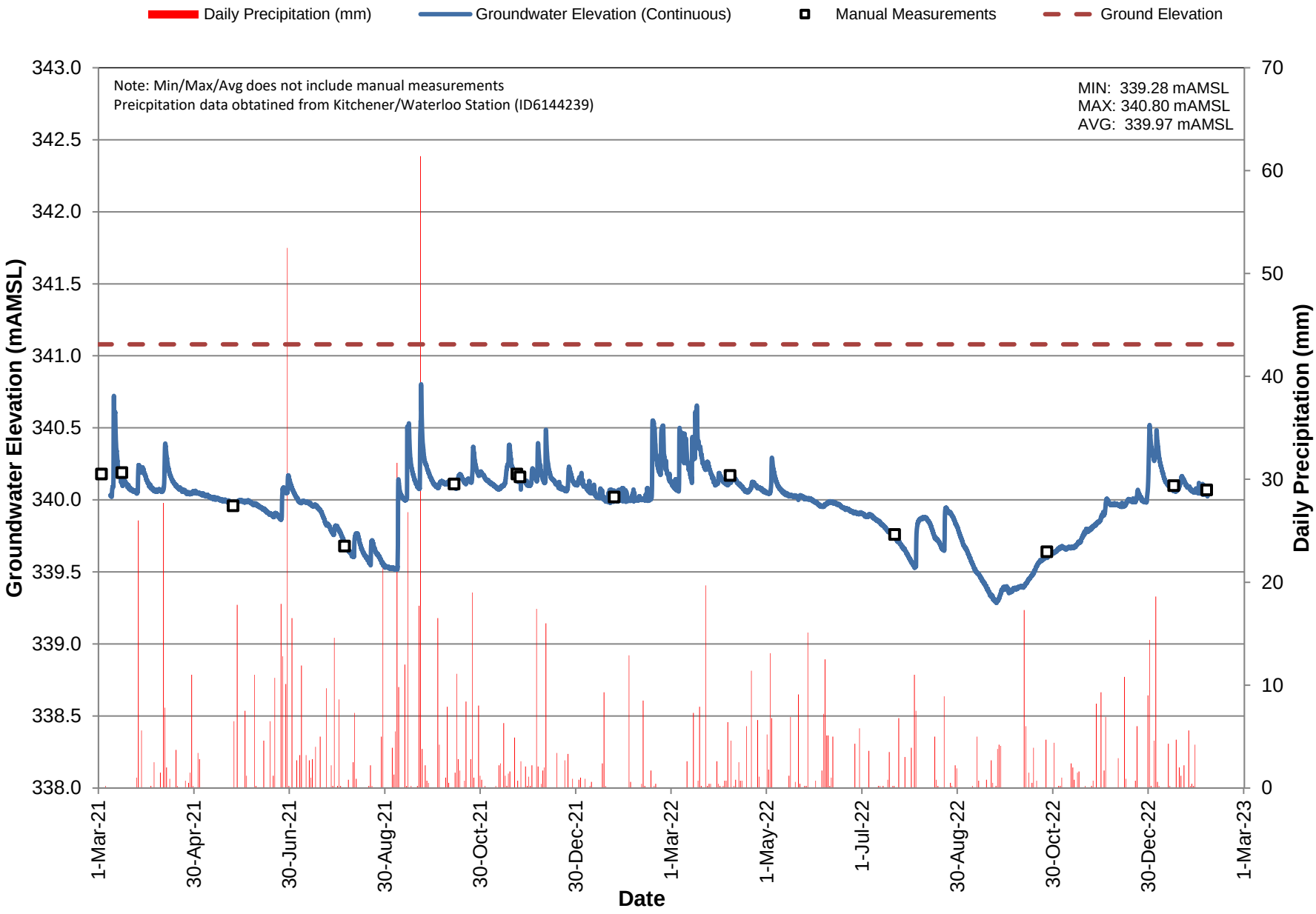
Hydrograph 2: Groundwater Elevations (mAMSL) - MW102-18



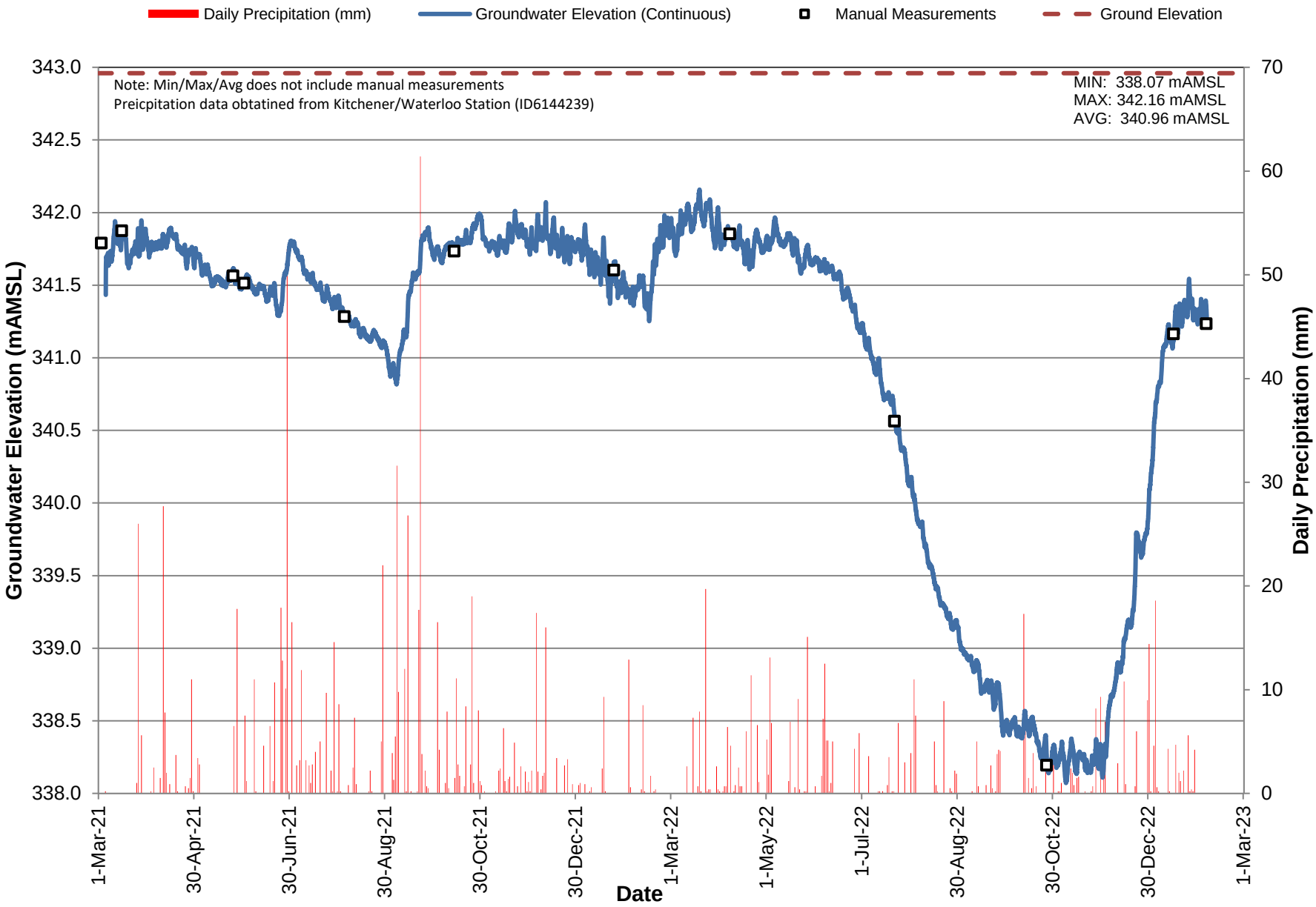
Hydrograph 3: Groundwater Elevations (mAMSL) - MW104-18



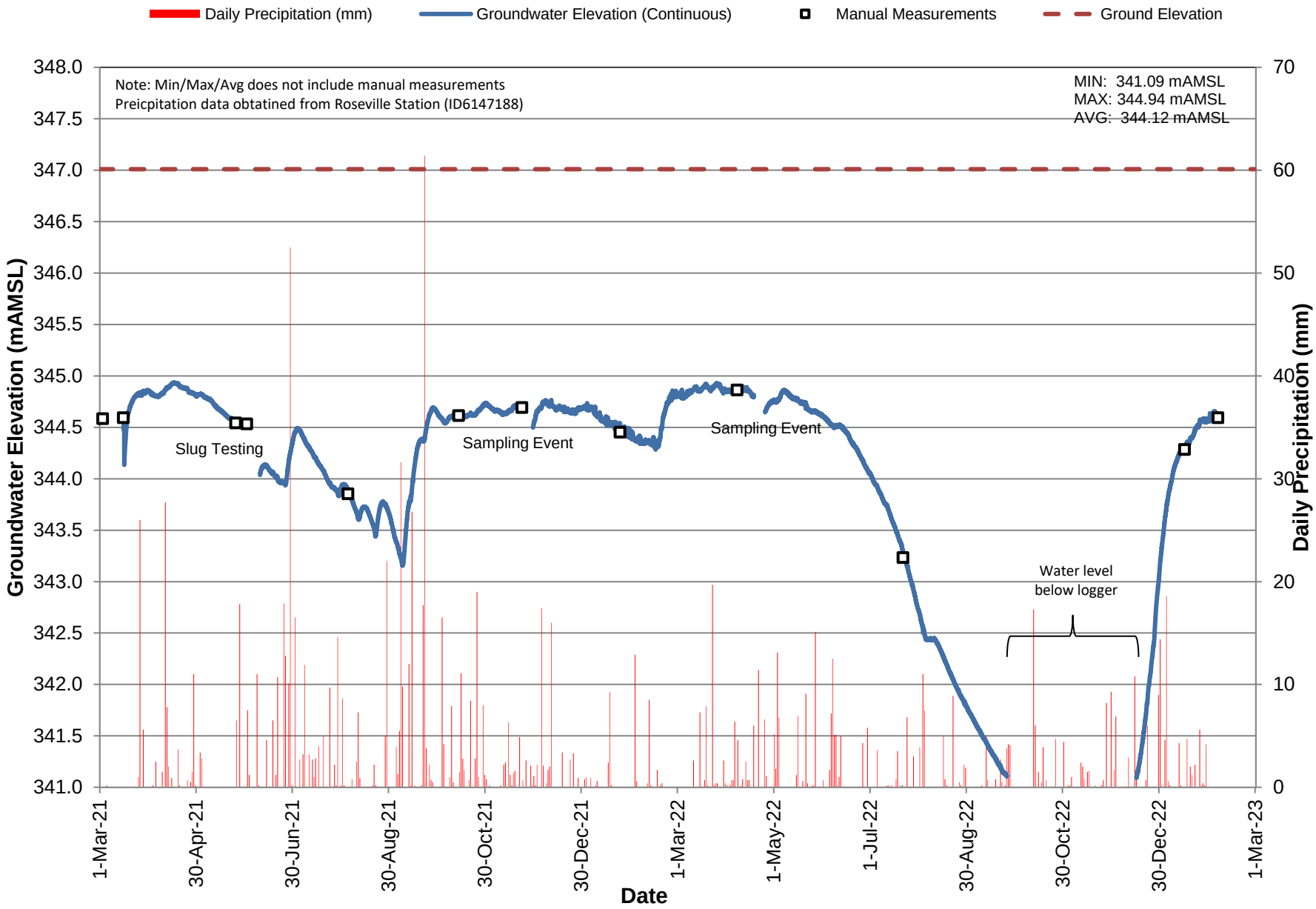
Hydrograph 4: Groundwater Elevations (mAMSL) - MW105-18



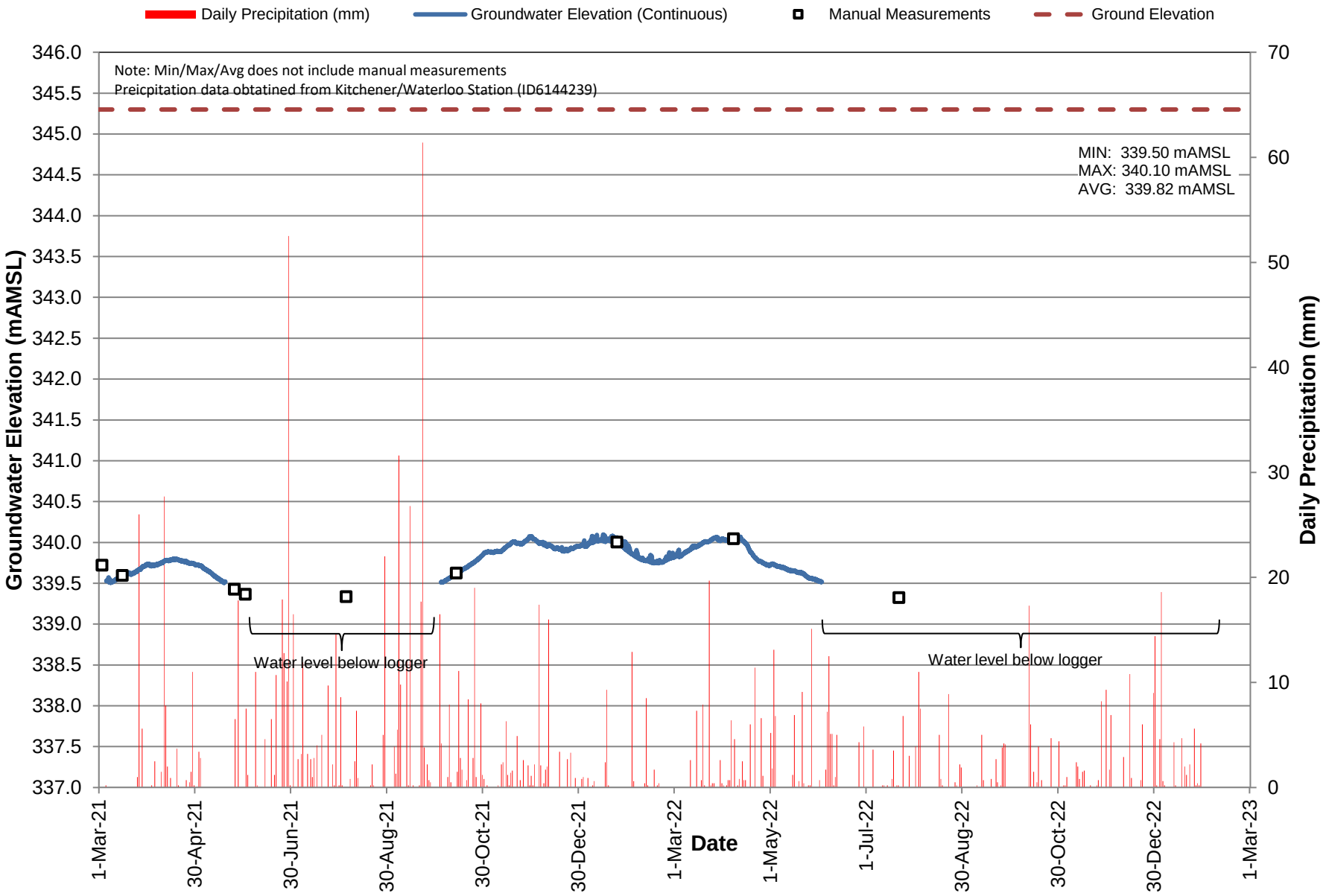
Hydrograph 5: Groundwater Elevations (mAMSL) - MW106-18



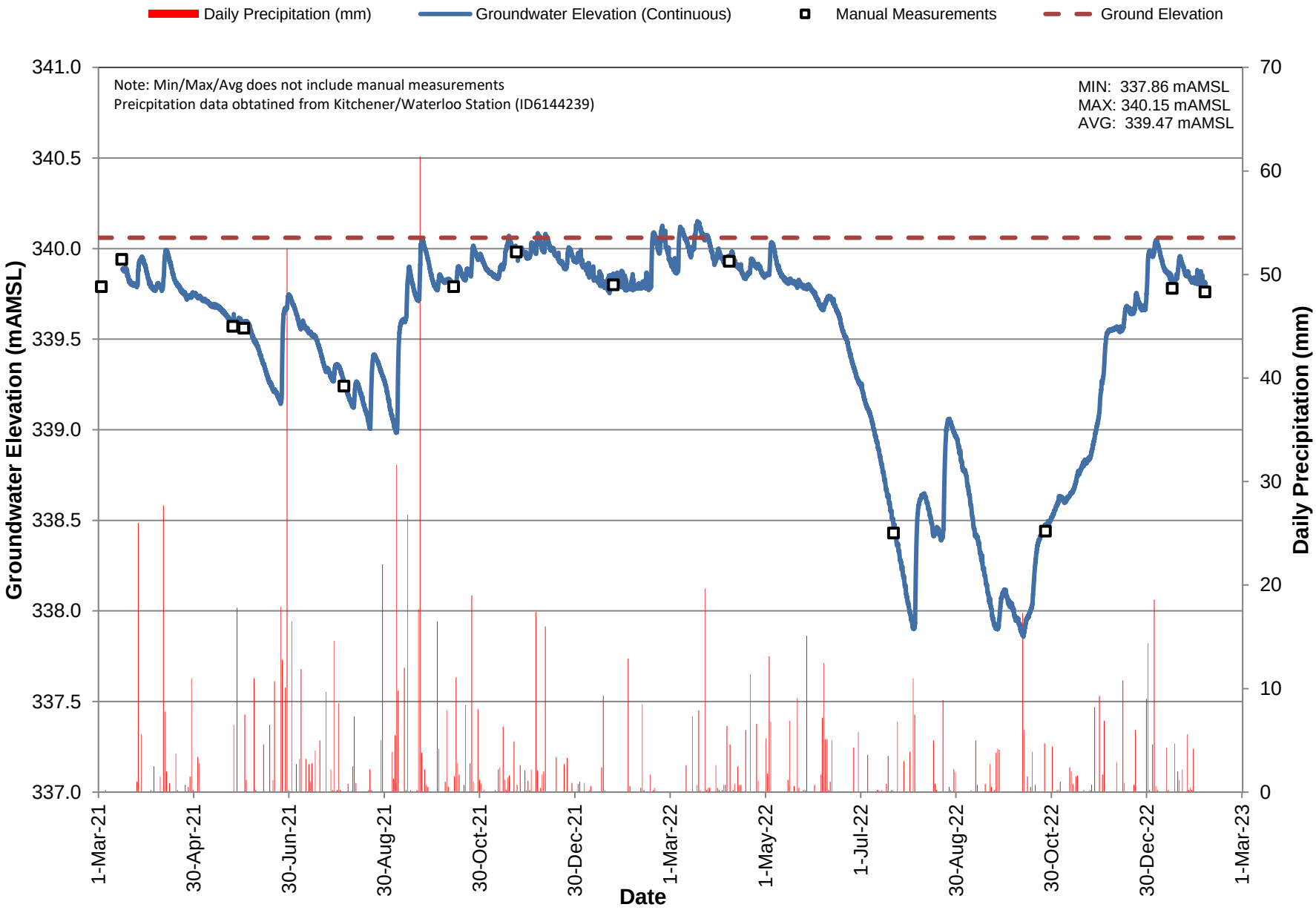
Hydrograph 6: Groundwater Elevations (mAMSL) - MW107-18



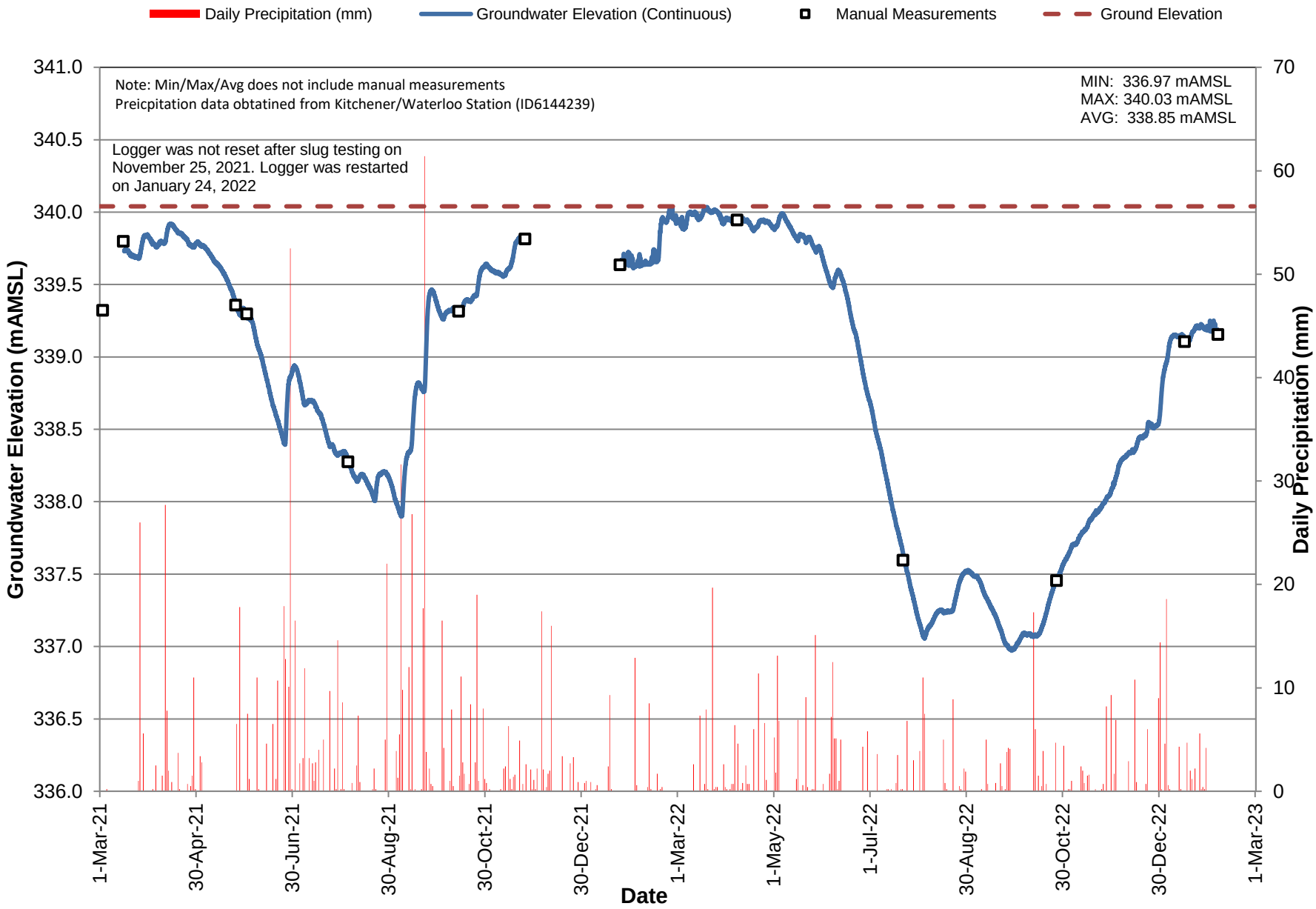
Hydrograph 7: Groundwater Elevations (mAMSL) - MW108-18



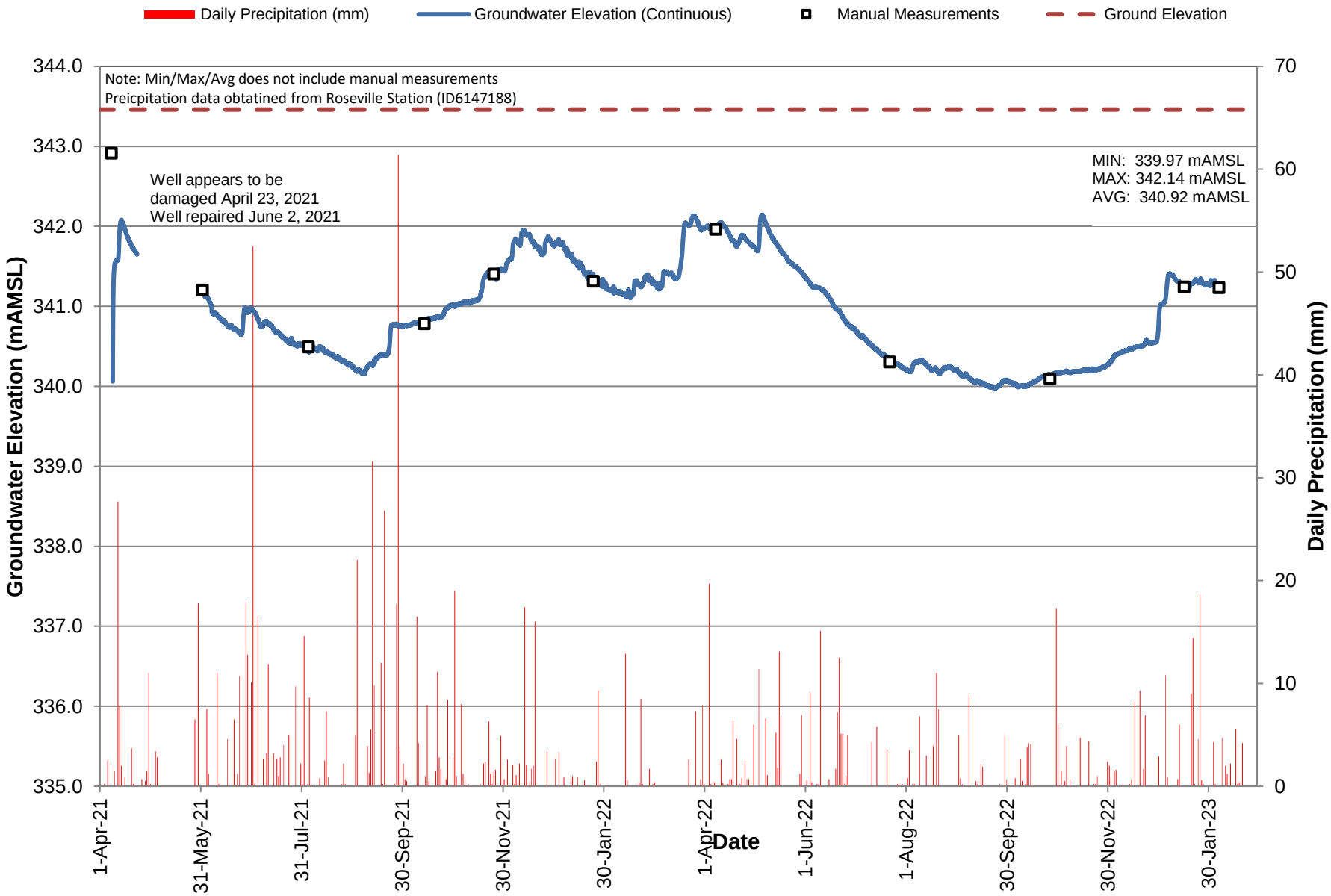
Hydrograph 8: Groundwater Elevations (mAMSL) - MW109-18



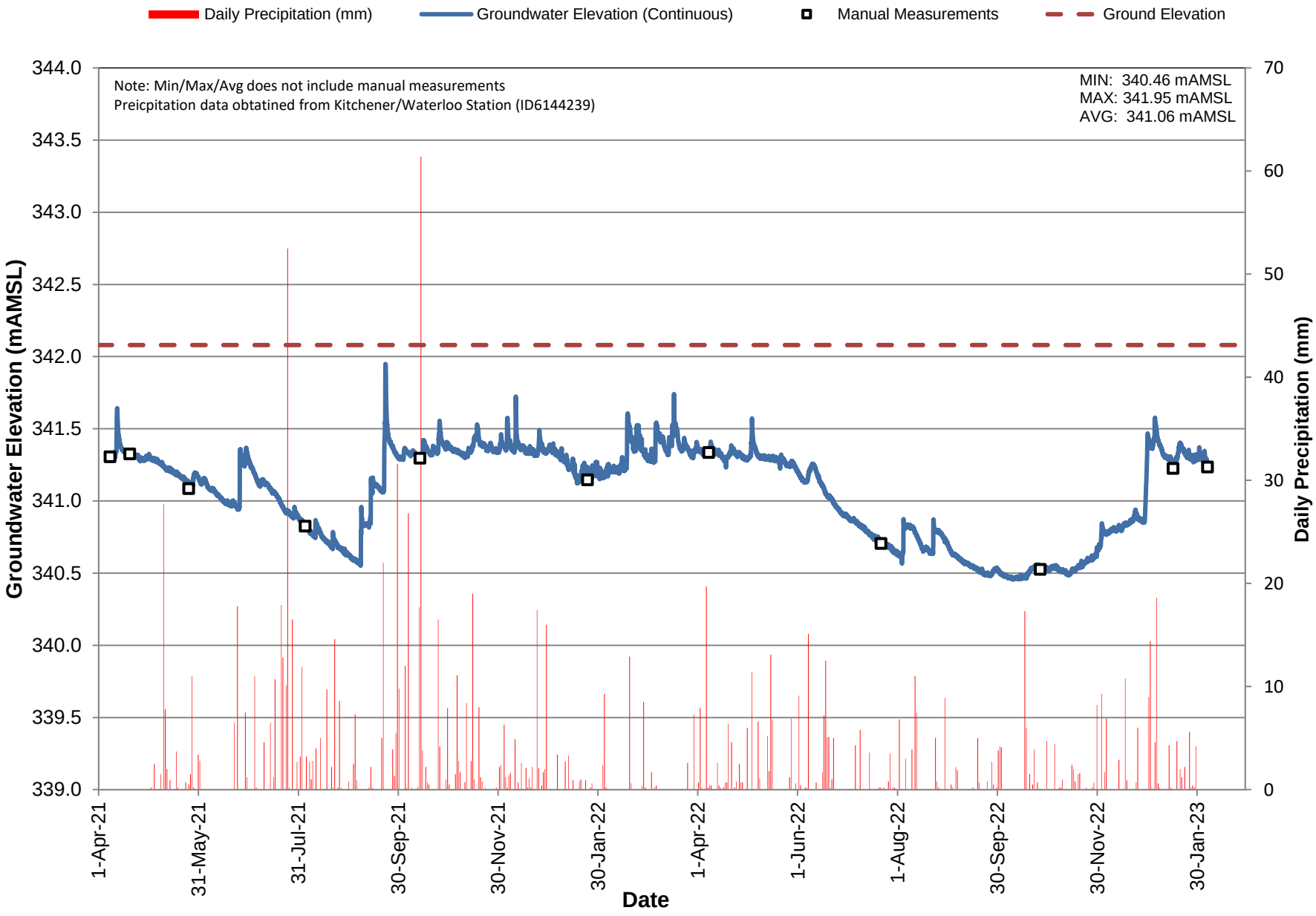
Hydrograph 9: Groundwater Elevations (mAMSL) - MW110-18



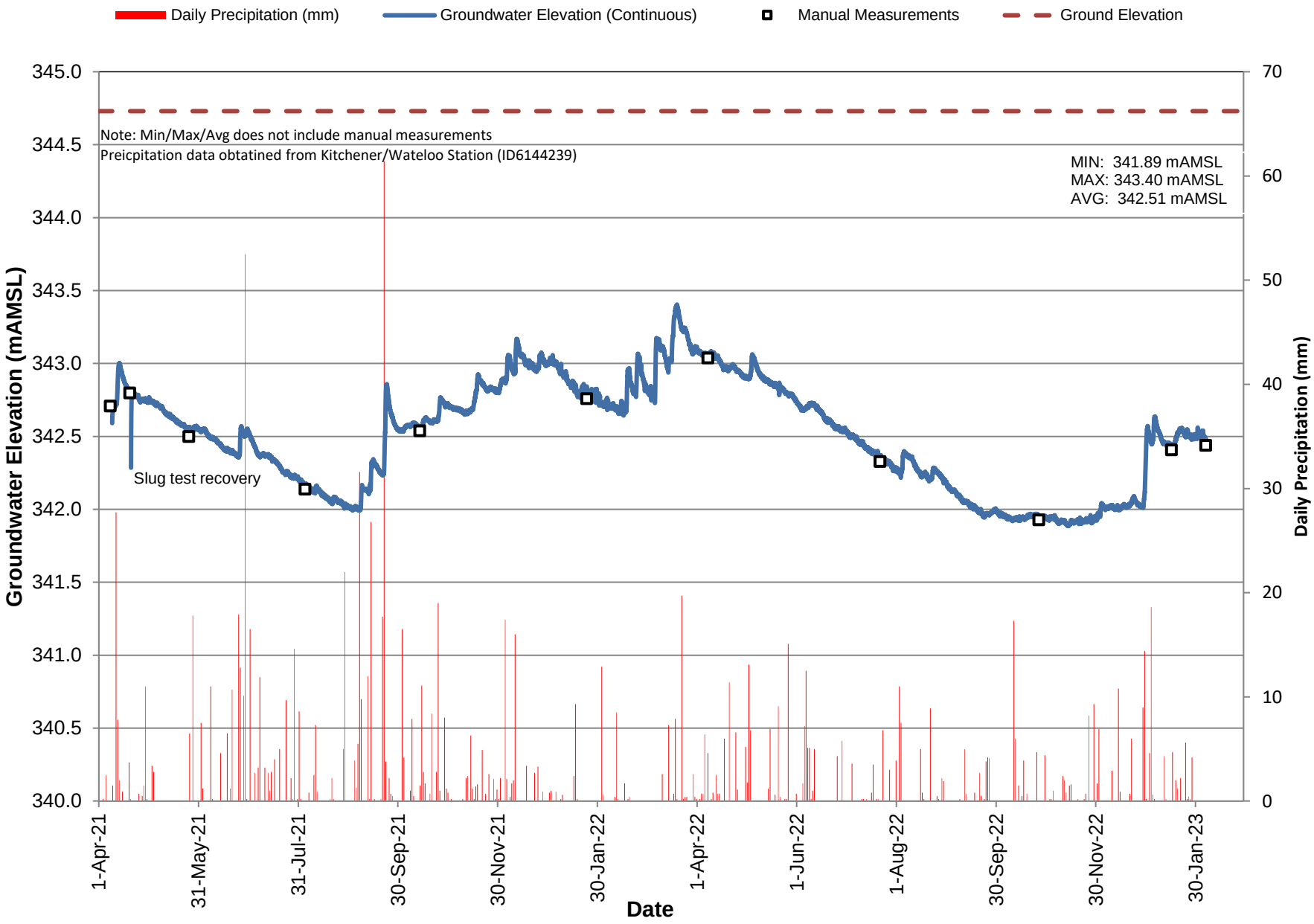
Hydrograph 10: Groundwater Elevations (mAMSL) - MW201-21



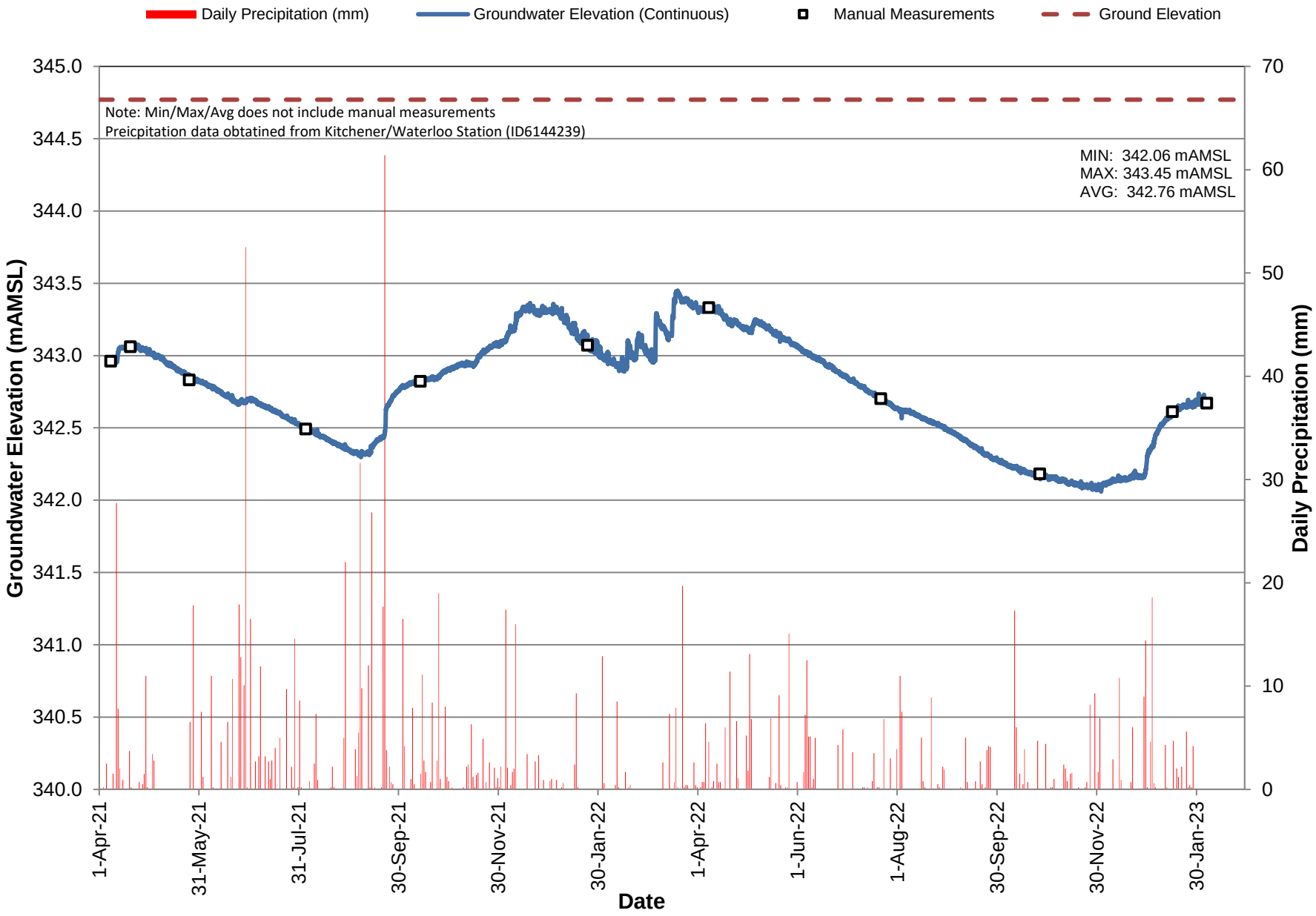
Hydrograph 11: Groundwater Elevations (mAMSL) - MW202-21



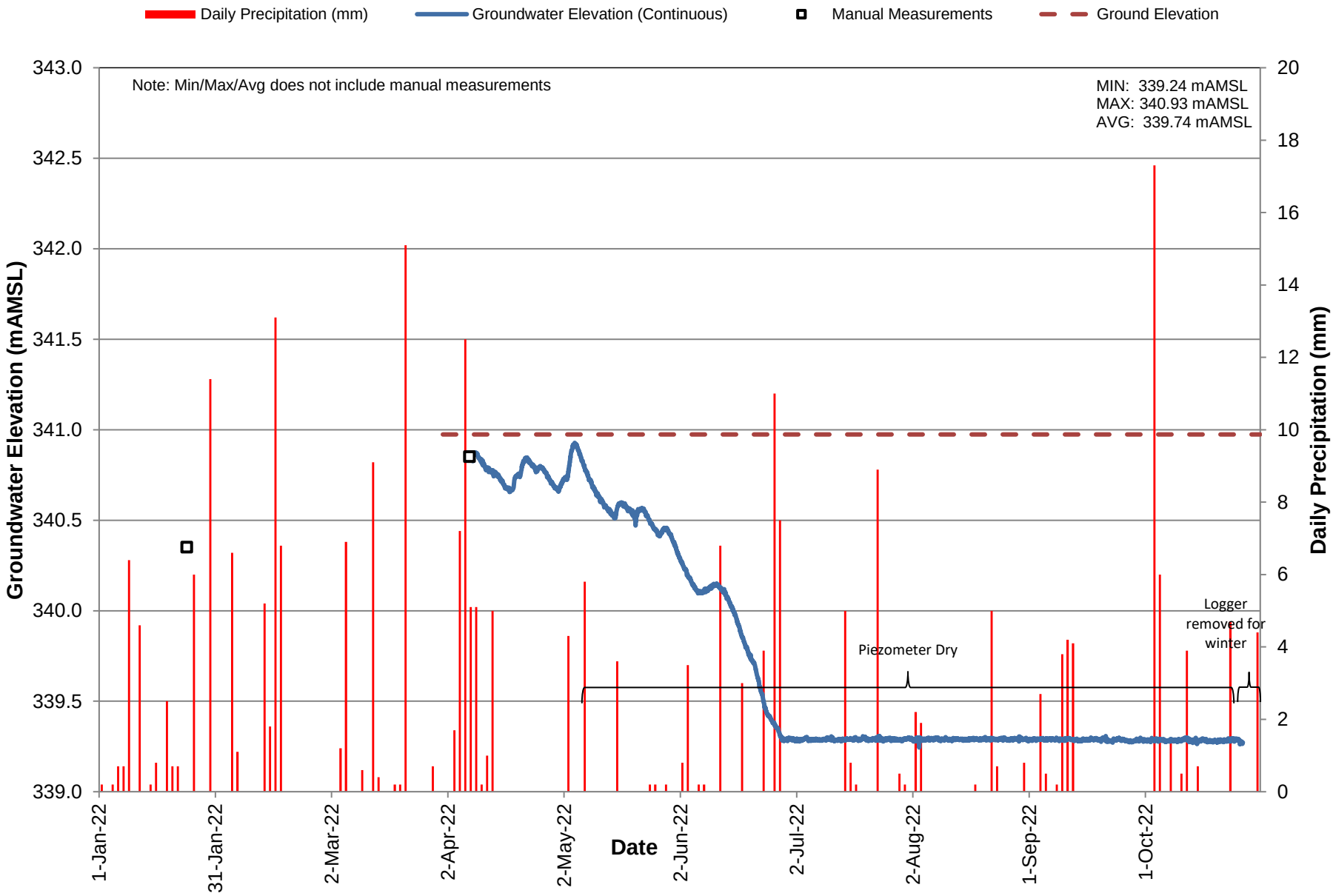
Hydrograph 12: Groundwater Elevations (mAMSL) - MW203A-21



Hydrograph 13: Groundwater Elevations (mAMSL) - MW203B-21



Hydrograph 14: Groundwater Elevations (mAMSL) - MP101-21



Appendix G

Monitoring Table G1

TABLE G.1 SURFACE AND GROUNDWATER MONITORING PROGRAM - WILMOT WOODS

Monitoring Component	Type of Monitoring	Development Phase	Sampling Frequency	Location(s)	Methodology / Timing
SWM Facilities	Water Quality	During/Post-Construction	Event-based (>15mm rain events)	SW1, SW2, SW3, SW4 - Forebays and Outlet of SWMF1 and SWMF2	TSS samples captured seasonally following significant rainfall events
Wetland Feature	Water Quality	All	4x per year (seasonally)	Wetland north of CN Railway	Grab samples will be taken 4 times per year (once per season) under base flow conditions. Samples will be analyzed for chlorides, nitrates, total phosphorous, and TSS.
	Water Temperature	All	Continuous (6 hour interval)	Wetland north of CN Railway	Water temperatures will be continuously measured with recordings taken every 1 hour.
	Water Levels	All	Continuous (6 hour interval)	Wetland north of CN Railway	Water levels will be continuously measured with recordings taken every 1 hour.
Groundwater	Water Levels	Pre-Construction	4x per year	On site monitoring wells MW101, MW102, MW104, MW105, MW106, MW107, MW108, MW109, MW110, MW201-21, MW202-21, MW203A-21, MW203B-21, MP101-22	Monitored on a quarterly basis (either with manual water level measurements or with electronic data loggers) for two continuous years. It is noted that the datalogger within MP101-22 is removed during periods of below zero temperatures and is reinstalled when temperatures are consistently above zero degrees.
		During/Post-Construction	4x per year	On site monitoring wells MW101, MW104, MW105, MW106, MW109, MW110	Monitored on a quarterly basis (either with manual water level measurements or with electronic data loggers). It is recognized that as development of a Phase progresses, some monitoring wells will be decommissioned (per O. Reg. 903) due to their locations. It is noted that the datalogger within MP101-22 is removed during periods of below zero temperatures and is reinstalled when temperatures are consistently above zero degrees.
	Chemistry	Pre-Construction	1x per year	On site monitoring wells MW101, MW102, MW107, MW110, MW202-21, MW203B-21	Sampled on an annual basis and analyzed for general chemistry parameters (including major anions, cations, nutrients, metals, e-coli and fecal coliforms).
		During/Post-Construction	1x per year	On site monitoring wells MW101, MW110	Sampled on an annual basis and analyzed for general chemistry parameters.
Surface Water	Water Levels and Temperature	Pre-Construction	4x per year	Ivan Gingerich Municipal Drain (IGMD) (270P).	Monitored on a quarterly basis (either with manual water level measurements or with electronic data loggers) for two continuous years.
		During/Post-Construction	4x per year	Ivan Gingerich Municipal Drain (IGMD) (270P).	Monitored on a quarterly basis (either with manual water level measurements or with electronic data loggers).
	Water Quality	All	4x per year (seasonally)	Ivan Gingerich Municipal Drain (IGMD) at 270P location.	Grab samples will be taken 4 times per year (once per season) under base flow conditions. Samples will be analyzed for chlorides, nitrates, total phosphorous, and TSS.