1012 Snyder's Road West, Baden

Hydrogeological Assessment

Project Location:
1012 Snyder's Road West, Baden, ON

Prepared for:
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91 Caldari Road Unit 1, Concord, ON

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Engineers, Scientists, Surveyors.

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1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Snyder's Road (Baden) Developments Inc. to conduct a hydrogeological characterization and impact assessment in support of a Draft Plan of Subdivision application. The lands that comprise the Draft Plan of Subdivision are within the property limits of 1012 Snyder's Road West, located in the community of Baden, Township of Wilmot, Region of Waterloo. These lands are herein referred to as the 'Subject Lands'. Refer to **Figure 1** for the location of the Subject Lands.

The Draft Plan of Subdivision prepared by MHBC, dated August 11, 2023, is presented in **Appendix A**.

The Draft Plan includes the following:

- Nine new municipal roads;
- Single family and multiple residential blocks of approximately 583 units;
- A school block;
- A Stormwater Management Facility block;
- Trail blocks along the limits of the Subject Lands; and
- A walkway block.

The proposed development is to be municipally serviced, including sanitary sewage collection, domestic water supply, storm drainage, and utilities.

This report is to be read in conjunction with the following reports:

- Preliminary Stormwater Management Report – 1012 Snyder's Road West (October 4, 2023) prepared by MTE; and
- Functional Servicing Report – 1012 Snyder's Road West (October 4, 2023) prepared by MTE.

1.2 Scope and Methodology

The objectives of this investigation are:

1) To provide an interpretation of the geologic and hydrogeological conditions present at the Subject Lands.
2) To install a network of groundwater monitoring wells to initiate groundwater monitoring to support the civil design and municipal requirements.
3) To satisfy the Township of Wilmot requirements as described in the January 14th, 2020, pre-consultation meeting minutes as follows:
    - "Characterize current geological and hydrogeological conditions including an evaluation of the seasonal groundwater table fluctuations, groundwater flow and quality, and interactions between the wetland and the local groundwater system, review the impact on any private wells in the vicinity and assess proposed site servicing impact on the groundwater table, identifying dewatering requirements that may be necessary during construction, impact on proposed development and recommendations for long term operation/maintenance of the development".
4) To address the requirements outlined in the Township of Wilmot's draft Hydrogeological Study Standards, dated April 27, 2020 and finalized in 2022 as Wilmot's Infrastructure Standards and Specifications.

The following scope of work was implemented to meet these objectives:

Background Review

- Review available mapping from the Ministry of Natural Resources and Forestry (MNRF), Ontario Geologic Society (OGS), Ministry of Environment Conservation and Parks (MECP), Grand River Conservation Authority (GRCA), and the Region of Waterloo (the Region).
- Review of select wells within 500 m of the Subject Lands to identify:
  - Neighbouring wells;
  - Well depths;
  - Well construction details; and
  - Local geologic information.

Field Program

- Advancement of 11 boreholes to assess subsurface geologic conditions;
- Installation of 11 overburden groundwater monitoring wells within the Subject Lands;
- Installation of one mini-piezometer and staff gauge;
- Fitting of the monitoring wells and mini-piezometer with electronic pressure transducers (data loggers) to monitor groundwater and surface water levels on a continuous basis;
- Particle distribution analysis of sediments collected from within the screened interval at select monitoring well locations;
- Water quality sampling of groundwater at four representative monitoring wells; and
- Completion of a door-to-door survey of private wells within 500 m of the Subject Lands.

Analysis and Reporting

- Provide a geologic and hydrogeological summary of the Subject Lands based on the information attained during the investigation;
- Prepare geological cross-sections through the Subject Lands;
- Assess the local shallow groundwater levels, flow direction, chemistry, and interaction with surface water;
- Provide a preliminary seasonal high water table map to facilitate estimating separation distances from footings and utilities to the water table;
- Provide an assessment of impacts the proposed development may have on private water supply wells and surface water within 500 m of the Subject Lands; and
- Provide a preliminary assessment of construction dewatering requirements (if any).

Referring to the Wilmot Township Infrastructure Standards and Specifications document dated 2022, typically a water balance is part of supporting studies. However, it is understood under the current development plan there is no requirement for a post development water balance as such, a predevelopment water balance is not provided as part of this assessment report.

1.3 Additional Investigations

A Geotechnical Investigation Report was completed for the Subject Lands by Peto MacCallum Ltd. (Peto), dated August 5, 2020. Geological information collected during the geotechnical investigation was incorporated into the conceptual hydrogeological model of the Subject Lands.

A Phase I Environmental Site Assessment (ESA) was completed for the Subject Lands by MTE, dated October 19, 2015, that identified potential environmental concerns within the limits of the Subject Lands and on nearby properties. Therefore, a Phase II ESA was recommended.

A Phase II ESA is currently being completed for the Subject Lands by MTE. Geological and hydrogeological information collected to date during the Phase II ESA field investigations was incorporated into the conceptual hydrogeological model of the Subject Lands.

2.0 Subject Lands Description

The development portion within the urban boundary for the Subject Lands are 26.54 ha, while the entirety of the Subject Lands comprises an area of 52.3 ha. The development portion of the Subject Lands are generally bounded by the existing Baden Subdivision to the northeast, additional lands owned by the applicant to the northwest, existing agricultural land to the west, and Snyder's Road West to the southeast.

The Subject Lands are legally described as:

Part of Lot 15-16 Concession S of Erb's Rd Wilmot;
Part of Lot Lt 16 Concession N of Snyder's Rd Wilmot
Part 2 58r1523 and as In 698958
Except Pts 1 & 2, 58r12256; S/t 698960; S/t 401465, 594399, 594400; Wilmot

The Subject Lands consist primarily of rolling agricultural land. Several buildings formerly located in the south portion of the Subject Lands have been demolished and the building foundations and debris from the demolitions remain.

One private domestic well (ID 65-2440) is located within the south portion of the Subject Lands, in the vicinity of the former buildings. The well is reportedly installed to a depth of 84.7 metres below ground surface (m bgs) within the bedrock beneath the Subject Lands. The static water level was reported on the Water Well Record at approximately 21 m bgs.

2.1 Topography and Surface Water Drainage

The subject lands generally consist of rolling topography with several low-lying areas, with slopes typically ranging from 1.0 % to 6.0 %. Existing elevations within the lands range from approximately 356.0 m to 364.3 m. Under pre-development conditions, a majority of surface runoff from the northern portion of the subject lands (outside development limits) flow towards internal low-lying depressions, small unnamed tributaries of the Nith River, and the wetland located within the adjacent Activa Lands.

The southern portion of the subject lands (within the development limits) has surface runoff flow northeasterly towards a series of ditch inlets along the adjacent Baden Subdivision, or southwesterly towards a 1000 mm diameter CSP culvert crossing on the adjacent agricultural lands. This CSP culvert directs flows under Snyder's Road West, along Brenneman Drive, and to the existing SWMF within the Baden West subdivision.

The Subject Lands are located within the Baden Creek Subwatershed.

The study area for the Subject Lands is comprised of the proposed development area and lands within 500 m of the proposed development area. The Subject Lands, proposed development area, and study area, are shown on **Figure 2**. The existing features within the proposed development area and geological cross-section locations area also provided.

3.0 Field Program

3.1 Borehole Advancement and Monitoring Well Installation

A total of eight boreholes were advanced between April 26 and May 3, 2019, under MTE coordination, by Aardvark Drilling Inc. (Aardvark) of Guelph, Ontario. Three additional boreholes were advanced on June 10, 2020, under MTE coordination, by London Soil Test Ltd. of London, Ontario. The purpose of the work was to assess the local geological profile and to allow for the installation of groundwater monitoring wells. Following borehole drilling, a 50 mm diameter PVC groundwater monitoring well (MW) was constructed within all 11 locations to depths ranging from 3.0 to 18.2m bgs. A sand pack was placed across each screened interval and the monitoring well was sealed to surface using bentonite. A protective steel casing was installed around the monitoring well and cemented into the ground. All monitoring wells were installed in accordance with Ontario Regulation 903 (as amended). Representative samples of sediments within the screen screened interval of the wells installed during the 2019 drilling event were submitted for a particle distribution analysis.

Following construction, all monitoring wells were developed with a Waterra^{TM} inertial pump system to purge any remaining sediment created by drilling to ensure representative static water levels could be obtained.

Borehole/monitoring well locations are illustrated on **Figure 2.** Borehole logs and monitoring well installation details for this, and other studies, are provided in **Appendix B**. Particle size distribution curves are provided in **Appendix C**.

3.2 Mini-Piezometer Installation

One mini-piezometer was installed in the wetland north of the proposed development area on June 18, 2020. The mini-piezometer was installed using a stainless steel drive point and the stratigraphy was documented using a hand auger advanced beside the mini-piezometer. The mini-piezometer installation details are provided in **Appendix B**. The mini-piezometer location is illustrated on **Figure 2**.

3.3 Elevation Survey and Water Levels

All monitoring wells, mini-piezometers, and boreholes used in the hydrogeological investigation were surveyed to a geodetic datum during multiple survey events between May 7, 2019 and November 6, 2020. The elevation surveys allow for groundwater and surface water levels collected from each monitoring well and mini-piezometer to be converted to elevations in metres above mean sea level, allowing for the determination of horizontal and vertical groundwater flow directions.

Manually measured groundwater levels were collected between May 2019 and August 2023 during various monitoring events throughout each year. In addition, manually measured groundwater and surface water levels were collected at the mini-piezometer have been collected over 15 events between June 2020 and July 2023. **Tables 2 and 3** summarize the manually measured groundwater and surface water levels and elevations. These manual groundwater levels were used to determine the shallow groundwater flow direction within the proposed development area of the Subject Lands.

Data loggers were installed within monitoring locations MW101-19, MW102-19, MW105-19, MW106A-19, and MW106C-19 on May 14, 2019. The remaining monitoring locations were equipped with data loggers on June 18, 2020. Data loggers measure the pressure (in centimetres of water) above the logger at a predetermined time interval, which can then be used to calculate a groundwater or surface water level and elevation. The data loggers installed at the Subject Lands were set to record a pressure every hour, and is corrected for barometric pressure. Groundwater and surface water elevation information attained from the data loggers has been compiled on hydrographs presented in **Appendix D**.

3.4 Water Quality Sampling

Groundwater samples were collected from monitoring well locations on July 16, 2020, and submitted for general chemistry parameters, including physical tests (e.g. colour, turbidity), anions and nutrients, and dissolved metals, to document groundwater chemistry prior to development. The analytical results are summarized in **Table 3**. The Laboratory Certificate of Analysis is provided in **Appendix E.** A discussion of the results is provided in **Section 5.7**, below.

3.5 Door to Door Private Well Inventory

MTE conducted a door-to-door private well survey of properties within 500 metres of the boundary of the Subject Lands. The purpose of the door-to-door survey was to document existing private water supply wells including their construction and depths compared to Ministry of the Environment Conservation and Parks (MECP) Well Record database records. The door-to-door private well survey was completed in August 2020. Each property that may have been supplied by a private well (i.e. was not on municipal services) was visited by MTE staff who completed a questionnaire with the property representative where possible. Where the property owner or other representative was not available, an information package containing a cover letter, survey questionnaire, a self-addressed envelope, and digital contact details was left at the property to be returned to MTE.

Seven private well survey packages were distributed to surrounding properties as shown on **Figure 2**. Of the seven packages distributed, a total of two responses were obtained. Copies of completed well surveys are provided in **Appendix F.**

4.0 Regional Hydrogeological Setting

4.1 Physiography

The Subject Lands are located within the physiographic region known as the Waterloo Hills. The surface is comprised of sandy hills consisting of ridges of sandy till, kames or kame moraines (Chapman and Putnam, 1984). The soils in the area are generally well-drained loams and loamy tills (Chapman and Putnam, 1984). Physiographic mapping of the area illustrates the Subject Lands as being located within an undrumlinized till plain physiographic landform (**Figure 3**).

4.2 Quaternary Geology

Ontario Geological Survey (OGS) published map sheet (Map 2559) (**Figure 4**) shows the surficial geology of the Subject Lands includes clay to silt textured till, which is characterized as the Maryhill Till and consists of clay till and clayey diamicton (OGS, 2010). A small area in the northeast portion of the Subject Lands consists of ice-contact sand comprised of fine to coarse sand and gravel that is poorly to well sorted.

4.3 Regional Hydrostratigraphic Units

The Region of Waterloo obtains approximately 80% of its water supply from groundwater within bedrock and sedimentary aquifers, with approximately half being supplied from the Waterloo Moraine (Bajc et. al., 2014). The Waterloo Moraine is located almost entirely within the Region of Waterloo and is comprised of three separate units, which grade from coarse-grained sediments (gravel) to finer-grained sediments (silt and clay) with decreasing depth (Bajc et. al., 2014).

The fine-grained sediments of the Waterloo Moraine are referred to as the Upper, Middle, and Lower Maryhill Tills. These units represent regionally significant aquitards and will “act as a significant barrier to vertical water movement where present in a thickness greater than 5 metres” (Terraqua Ltd., 1995). The Maryhill Till consists primarily of sandy silt to silty clay and

clayey silt diamictons (Bajc et. al., 2014). The Waterloo Moraine Aquifer Units are characterized by interbedded layers of silt, sand and gravels. Clay-rich glaciolacustrine deposits with gravels and pebbles are also present.

These Waterloo Moraine sediments overlie the Catfish Creek Till, characterized as a stoney to sandy diamicton, which is often over-consolidated and forms an important marker horizon within the Region of Waterloo (Karrow, 1987). The Catfish Creek Till acts as an important, relatively continuous regional aquitard that is compositionally distinct and widely distributed across the Region of Waterloo (Terraqua Ltd., 1995; Bajc and Shirota, 2007; Aquaresource Inc., 2009).

The Subject Lands are located on the western flank of the Waterloo Moraine. The units most likely to be present in the vicinity of the Subject Lands are **bolded** in the table below (AquaResource Inc., 2012; Stantec Consulting Ltd, 2012).

Table 4.3.1. Geological Formations within the Waterloo Moraine:

OGS Name	Geologic Formation	Geologic Material	Regional Aquifer Name
ATB1	**Upper Maryhill Till, Port Stanley Till, Tavistock Till, Mornington Till Silty to clayey till**	**Silty to clayey till**	**Aquitard 1**
AFB1	**Upper Waterloo Moraine stratified sediments and equivalents**	**Mainly fine sand, some gravel**	**Aquifer 1**
ATB2	Middle Maryhill Till and equivalents	Silty to clayey till, silt, clay	
AFB2	**Middle Waterloo Moraine Stratified Sediments and equivalents**	**Mainly fine sand, some gravel**	
ATB3	**Lower Maryhill Till and stratified equivalents**	**Silty to clayey till, silt, clay**	**Aquitard 2**
AFB3	Lower Waterloo Moraine Aquifer or Catfish Creek Till outwash	Sand and gravel	Aquifer 2
ATC1	**Upper / Main Catfish Creek Till**	**Stoney, silty to sandy till**	**Aquitard 3**
AFD1	Pre-Catfish Creek coarse-textured glacio fluvial/lacustrine deposits	Sand and gravel	Aquifer 3
ATE1	**Canning Drift (till and associated fine-textured glaciolacustrine deposits)**	**Silty to clayey till, silt, clay**	**Aquitard 4**
AFF1	Pre-Canning coarse-textured glaciofluvial/glaciolacustrine deposit	Sand and gravel	Aquifer 4
ATG1	Pre-Canning coarse-textured till	Stony, silty to sandy till	Aquitard 4

4.4 Source Water Protection Considerations

4.4.1 Significant Groundwater Recharge Areas (SGRAs)

Groundwater recharge occurs where precipitation and snowmelt infiltrate to the ground to feed aquifers, watercourses, and wetlands. SGRAs are typically associated with coarse-grained sediments (i.e. sands and gravels) or very shallow overburden material covering upland areas on the landscape.

The GRCA GIS indicates that no portion of the proposed development area is located within a SGRA. The SGRAs are illustrated on **Figure 5.**

In addition, the Source Protection Mapping (MECP, 2021) generated under the Clean Water Act to protect municipal water supplies indicates that the Subject Lands are not located above a Highly Vulnerable Aquifer (HVA).

4.4.2 Municipal Well Fields

The nearest municipal wellfields are Foxboro Green, located approximately 2km north-northwest; Wilmot Centre, located approximately 5km southeast; and New Hamburg; located approximately 5km southeast of the development limits of the Subject Lands.

The water supply for the Foxboro Green and New Hamburg wellfields is obtained from bedrock production wells which are open to the Salina Formation at depths ranging from 47 to 76m bgs. The water supply for the Wilmot Centre wellfield is obtained from production wells screened within the semi-confined Middle Waterloo Moraine Sands (AFB2) at depths ranging from 30 to 40m bgs.

The GRCA GIS indicates that no portion of the proposed development area is located within a WHPA. The location of the WHPAs is illustrated on **Figure 6.**

4.5 Paleozoic Geology

Map sheets in publication regarding the Paleozoic geology illustrate bedrock beneath the Subject Lands consists of the upper Silurian Salina Formation which is characterized by irregularly bedded shale interbedded with thin layers of brown dolostone (Armstrong and Dodge, 2007). Based on available information, the bedrock is expected to be encountered at depths in the order of 40 metres below grade in the vicinity of the Subject Lands (AquaResource Inc., 2012).

5.0 Local Hydrogeological Setting

5.1 Local Geology

The monitoring wells and boreholes advanced during the hydrogeological, geotechnical, and environmental investigations were used to interpret the local hydrostratigraphic units and generate four local geological cross-sections. The cross-section stratigraphy was drawn using HydroGeo Analyst (HGA), which is a relational database system used to store and query the project database to create cross-sections.

Geological Cross-section A-A' (**Figure 7**):

- Extends approximately 290 m from west to east through the Subject Lands;
- Illustrates rolling topography;
- Shows the Subject Lands are underlain by a clayey silt till deposit ranging in thickness from 1.7 m to 10.4 m;
- Shows the clayey silt till deposit as being underlain by a sand deposit; and
- Interprets the shallow groundwater table at the Subject Lands as being located at an elevation of 352.9m amsl in the southeast portion of the Subject Lands and drops to 350.2m amsl in the southwest portion of the Subject Lands, indicating a westerly component to the shallow groundwater flow direction.

Geological Cross-section B-B' (**Figure 8**):

- Extends 771 m from north to south through the proposed development area of the Subject Lands;
- Illustrates rolling topography;

- Shows the surficial geological unit in the northwest portion of the proposed development area is comprised of sand and the surficial geological unit in the southwest portion of the proposed development area is comprised of clayey silt till that is underlain by the sand deposit;
- Shows and a transition zone between the sand and clayey silt till is present where the sand overlies the clayey silt till and an isolated perched water table is interpreted to be present at an elevation of 359.1m amsl;
- Shows an isolated area of fill material located within the approximate extents of the former pond; and
- Interprets the shallow groundwater table as being located at an elevation of 353.0m amsl in the north portion of the proposed development area and drops to 350.7m amsl in the south portion of the Subject Lands, indicating a southerly component to the shallow groundwater flow direction.

Geological Cross-Section C-C' (**Figure 9**)

- Extends 1,256 m from north to south within the east portion of the Subject Lands;
- Illustrates rolling topography;
- Shows the surficial geological unit in the northeast portion of the proposed development area is comprised of clayey silt till that is underlain by a sand deposit with the northern extent of the sand deposit unknown;
- Shows a wetland and surface water body is present within the Subject Lands, 338 m north of the proposed development area;
- Illustrates the stratigraphic units beneath the wetland to be comprised of a thin layer of peat underlain by the clayey silt till deposit;
- Interprets the shallow groundwater table as being located at an elevation of 358.0m amsl in the north portion of the cross-section and 352.2m amsl in the south portion, indicating a southerly component to the shallow groundwater flow direction; and
- Illustrates a downward vertical gradient between the wetland and the shallow groundwater table.

Cross-Section D-D' (**Figure 10**)

- Extends 297 m from west to east through the central portion of the proposed development area;
- Illustrates rolling topography;
- Shows the surficial geological unit in the west portion of the cross-section is comprised of sand and the surficial geological unit in the east portion of the cross-section is comprised of clayey silt till that is underlain by the sand deposit;
- Shows a transition zone between the sand and clayey silt till is present where the sand overlies the clayey silt till and an isolated perched water table is interpreted to be present at an elevation of 359.1m amsl;
- Shows an isolated area of fill material located within the approximate extents of a former building; and
- Interprets the shallow groundwater table as being located at an elevation of 351.2m amsl in the west portion of the cross-section and 354.0m amsl in the east portion of the cross-section, indicating a westerly component to the shallow groundwater flow direction.

Cross-Section E-E' (**Figure 11**)

- Extends 342 m from northwest to southeast through the central portion of the proposed development area;
- Illustrates rolling topography;
- Shows the surficial geological unit in the northwest portion of the cross-section is comprised of sand and the surficial geological unit in the southeast portion of the cross-section is comprised of clayey silt till that is underlain by the sand deposit;
- Shows a transition zone between the sand and clayey silt till is present where the sand overlies the clayey silt till and an isolated perched water table is interpreted to be present at an elevation of 359.1m amsl;
- Shows an isolated area of fill material located within the approximate extents of a former pond; and
- Interprets the shallow groundwater table as being located at an elevation of 351.9m amsl in the west portion of the cross-section and 352.4m amsl in the east portion of the cross-section, indicating a westerly component to the shallow groundwater flow direction.

The clayey silt till present at surface over portions of the Subject Lands is interpreted as representing the Upper Maryhill Till (Regional Aquitard 1). The sand unit present at surface or beneath the clayey silt till is interpreted as representing the Upper Waterloo Moraine (Regional Aquifer 1).

5.2 Particle Size Distribution Analysis

As part of the hydrogeological investigation field program, select sediment samples were collected and submitted for particle size distribution analysis. Sediment samples were collected from the screened interval in the saturated unit (below the water table) at depths ranging between 6.1 and 17.4m bgs. A comparison between the samples submitted for particle size distribution analysis and the field observations found that they were generally consistent with the exception of the samples collected at monitoring locations MW105-19 and MW106A-19 which the particle size distribution analysis were found to be more fine-grained than expected based on field observations.

Particle size distribution analysis results from this investigation are provided in **Appendix C**.

5.3 Hydraulic Conductivity and Porosity

Published hydraulic conductivity values for the geological units observed at the Subject Lands during the hydrogeological investigation range between 1×10^{-3} m/s to 1×10^{-7} m/s (sand/silty sand) and 1×10^{-6} m/s to 1×10^{-12} m/s (silt/glacial till, Freeze and Cherry, 1979).

Hydraulic conductivity can be estimated from the particle size distribution analyses using empirical relationships. The geometric mean for the samples of sand/silty sand (Upper Waterloo Moraine) is 1.5×10^{-5} m/sec which is within and consistent with the published range described above.

The hydraulic conductivity of the clayey silt till (Upper Maryhill Till) could not be estimated from the particle size distribution analysis due to the high content of fine-grained sediments.

Estimated porosity values for the geological units observed at the Subject Lands during the hydrogeological investigation based on published literature range between 0.2 to 0.5 (sand/silt) and 0.1 to 0.5 (silt/till) (Fetter, 2001).

As with hydraulic conductivity, porosity can also be estimated from the particle size distribution analyses using empirical relationships. The average or the samples of sand/silty sand (Upper

Waterloo Moraine) is 0.4; the average for the samples of clayey silt sand (Upper Maryhill Till) is 0.26. These values are consistent with the published ranges for porosity described above.

The details of these calculations are provided in **Appendix C**. It should be noted that these estimates are based on the examination of a relatively small sample volume of sediment that was removed from the sample cores and may not be representative of the entire geologic unit.

5.4 Local Shallow Groundwater Flow and Trends

5.4.1 Local Shallow Groundwater Flow Interpretation

Manually measured groundwater levels and elevations are provided in **Tables 1 and 2**. Groundwater elevation contours and the interpreted local shallow groundwater flow direction using water levels collected on June 29, 2020, are illustrated on **Figure 12**. June 20, 2020 was selected for interpretation as the water levels observed on that date were representative of the stable water table and not influenced by recent sampling events. The water level in MW102-19 in the southeast corner of the Subject Lands was not included in the interpretation as the groundwater elevation as measured in the silty clay till appears to be anomalous when compared to other monitoring locations.

The interpreted local shallow groundwater flow direction is westerly to southwesterly across the proposed development area of the Subject Lands. This is consistent with the regional shallow groundwater flow direction as published by others (southwesterly, GRCA, 2016).

5.4.2 Local Perched Water

A local perched water condition is interpreted to be present in the central portion of the proposed development limit, as documented using the nested wells (MW106A, B, C-19). The estimated extents of the perched groundwater system are shown on **Figure 13**.

The stratigraphy observed in this area consists of a surficial sand underlain by clayey silt till followed by sand. It is interpreted that the hydraulic conductivity differential between the sand and the clayey silt till units causes the clayey silt till to dampen vertical groundwater flow in this area, allowing for a perched groundwater condition to arise.

The perched groundwater elevation measured during the June 20, 2020 manual water level event was at an elevation of 359.1m amsl, recorded at MW106C-19 (installed in the upper sand unit). The groundwater elevations within monitoring locations MW106A-19 and MW106B-19 were 352.1m amsl. Monitoring well MW106B-19 is screened in the sand unit below the intervening clayey silt till. The groundwater elevation recorded at MW106B-19 coincides with the screened portion of this location, indicating the sediments above are dry. In addition, the sediments immediately below the upper sand unit and intervening silt unit were described as moist and the moisture content of a sand layer immediately below the silt layer reported a moisture content reduction from 25% to 13%.

5.4.3 Local Shallow Groundwater Trends

The hydrographs provided in **Appendix D** indicate the local shallow groundwater table is subject to seasonal fluctuations with highs generally observed during the spring freshet and following months into the summer period annually.

Immediate responses to precipitation events are generally not observed which is considered to result from the high distance to the water table in the areas where sand is the underlying geological unit which acts to dampen the impact precipitation will have on the water table. In addition, monitoring wells screened in the Upper Maryhill Till and in Upper Waterloo Moraine where it is overlain by clayey silt till do not show immediate responses to precipitation events due to the low permeable nature of the sediments. This is likely also a result of the depth of the well screen and the clayey silt till unit acting to impede groundwater infiltration and percolation through the subsurface, also dampening the impact of precipitation on the water table.

The exception to the above is observed at monitoring location MW106C-19, installed in the shallow sand unit overlying the clayey silt unit where shallow perched groundwater is interpreted to be present. As shown on the MW106C-19 hydrograph (hydrograph 8), more immediate responses to precipitation events are observed.

5.5 Horizontal Hydraulic Gradient and Average Linear Groundwater Velocity

Horizontal hydraulic gradient is a measure of the slope of the water table surface. Groundwater elevations measured on June 20, 2020 were used to calculate the horizontal hydraulic gradient for the proposed development area. The horizontal hydraulic gradient in the Upper Waterloo Moraine Aquifer was calculated to be -0.01 m/m based on the groundwater elevation contours provided on **Figure 10**. This value indicates that the water table surface across the proposed development area is relatively flat.

The average horizontal linear groundwater velocity was not calculated in the Maryhill Till unit as flow in an aquitard is predominantly vertical, not horizontal.

The average horizontal linear groundwater velocity for the Upper Waterloo Moraine Aquifer was estimate using:

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

Where:

v = average linear groundwater velocity (m/sec)
K =hydraulic conductivity (m/sec) ($1x10^{-6}$ m/sec, Section 5.3)
i = horizontal hydraulic gradient (dh/dl) (-0.01 m/m)
n_e= effective sediment porosity (0.4, Section 5.3)

The average linear horizontal groundwater velocity was estimated to be $3.2x10^{-7}$ m/sec (10 m/year) for the groundwater system within the Upper Waterloo Moraine Aquifer.

5.6 Groundwater / Surface Water Interaction

Manual surface water and groundwater measurements within the wetland are provided in **Table 4**. Surface water and groundwater elevation measurements collected within the wetland north of the proposed development area indicate a downward vertical gradient between the surface water and local groundwater in this area. Therefore, surface water within the wetland is acting to recharge the groundwater as noted between the water levels found within the mini-piezometer (MPP1-20) which is installed within the upper sediment sequence and MW203-20.

5.7 Groundwater Quality

5.7.1 Anions and Nutrients

Concentrations of Nitrite were below the detectable limit (0.01 mg/L) at monitoring well locations MW102-19 and MW106A-19 while a concentration of 0.025 mg/L was reported for monitoring location MW202-20 and a concentration of 2.73 mg/L was reported at monitoring location MW106C-19.

The Nitrate concentration was below the detectable limit (0.02 mg/L) at monitoring location MW106A-19 while concentrations were reported as 0.06 mg/L, 0.126 mg/L, and 6.76 mg/L at monitoring locations MW102-19, MW202-20, and MW106C-20, respectively.

Nitrate is commonly found in the aquifers in the Baden area (Lake Erie Region Source Protection Committee, 2015), likely because of agricultural activities. At the Subject Lands, Nitrate is found in higher concentrations in the shallow perched sand at MW106C-19 than in the deeper sands at MW106B-19 and MW106A-19 which is further evidence for a surficial source of Nitrate.

5.7.2 Metals

Various dissolved metal concentrations were reported at detectable levels in all of the groundwater samples collected. These concentrations are considered to reflect the groundwater chemistry resulting from the geological units the groundwater samples were collected from.

6.0 Development Considerations

6.1 Groundwater Separation

Area Grading plans are presented in the Functional Servicing Report, drawings 40777-104-AG1.1 to AG1.3 (MTE, October 4, 2023).

The shallow groundwater within the proposed development area is influenced by the two distinct geological units present at surface (Upper Waterloo Moraine and Upper Maryhill Till). Refer to Hydrograph 16 provided in **Appendix D** which provides all monitoring well hydrographs compiled on one plot for comparison.

Where the sand unit is the surficial geological unit, the shallow groundwater table is found at greater depths (in excess of 9m bgs). In the central area of the proposed development limit where the perched water table is located, groundwater is found at shallower depths of approximately 1.5m bgs. This perched water table is a result of the native sediments being fine grained and transmit water slowly compared to the sand unit.

Where the clayey silt till unit is the surficial geological unit, the shallow groundwater table is found at average depths of approximately 5m bgs with the exception of MW202-20 which has an average depth to groundwater of approximately 2m bgs. This is interpreted to result from the clayey silt till unit acting as an aquitard unit at the Site whereby the predominant groundwater flow direction through the unit is vertical and groundwater moves vertically through the subsurface as a “slug”. Once groundwater moving through the clayey silt till encounters the sand unit, the predominant groundwater flow direction changes to horizontal flow as is characteristic of aquifers.

The seasonal high groundwater map with the perched groundwater system removed is provided on **Figure 15**. The perched water condition in the vicinity of MW106C-19 will be removed during grading of the Subject Lands.

Once final grades and excavation depths are confirmed, a dewatering assessment may be required to assess whether a Permit to Take Water (PTTW) or registration on the Environmental Activity and Sector Registry (EASR) is required for temporary construction dewatering.

7.0 Impact Assessment

7.1 Environmental Features

There are no significant environmental features within the proposed development area of the Subject Lands. There is a small wetland located 338 m north of the northern proposed development limit within the Subject Lands. Based on the local shallow groundwater flow interpretation, the wetland is interpreted to be located hydraulically up- and cross-gradient from the proposed development limit and acts to recharge the local groundwater. Therefore, impacts to the wetland from the proposed development are not anticipated.

7.2 Private Well Assessment

The two private well survey responses indicate the properties located adjacently west (1056 Snyder’s Road West) and approximately 40 m south (118 Snyder’s Road West) of the proposed development area are municipally serviced. Private wells are located within these properties; however, these are used for agricultural purposes and/or landscaping. All other properties within

the immediate vicinity of the proposed development were confirmed to be municipally serviced. Other properties potentially supplied by private wells for drinking water are located in excess of 200 m from the proposed development area. These properties have been provided a private well survey package which has not been returned to MTE at this time. The impacts to private wells are deemed to be not substantive.

Since stormwater infiltration is not a proposed stormwater management strategy for the proposed development, impacts to groundwater through stormwater infiltration is not anticipated.

A dewatering assessment should be completed upon finalizing the detailed design.

8.0 Ongoing Monitoring

A monitoring program will be implemented and will serve to monitor groundwater conditions under Pre-Construction, and the During and Post-Construction. A summary table outlining the monitoring program (obtained from MTE 2023 Preliminary Stormwater Management Report) is provided in **Appendix G**. The proposed monitoring program will be completed in conjunction with other monitoring being conducted for the proposed development.

8.1 Pre-Construction Monitoring Program

This stage of the monitoring is intended to establish the detailed site background conditions and baseline data. The pre-construction monitoring for groundwater will include monitoring water level (continuous via datalogger) and annual general chemistry. Groundwater monitoring has been on-going on the Site since May 2019.

8.2 During-Construction Monitoring Program

The purpose of this stage of the monitoring is to continue with the pre-construction monitoring program to monitor groundwater levels as the grading and construction is completed for the proposed development. It should be noted that some of the monitoring wells may need to be decommissioned during grading and servicing operations. Monitoring wells requiring decommissioning will be decommissioned in accordance with Ontario Regulation 903.

This stage will begin at the commencement of area grading of the subdivision and will continue until 90% buildout of the subdivision.

8.3 Post-Development Monitoring Program

This period of the monitoring will begin following 90% buildout of the subdivision (buildings are constructed, lots are sodded/landscaped, and open spaces are stabilized). The purpose of this stage of the monitoring is to ensure that the SWMF continues to operate as designed. The post-construction monitoring period will extend for a 2-year period. Monitoring during this stage will include all components from the pre-construction and during-construction monitoring program.

Depending on grading operations, supplemental monitoring wells may be recommended for the post construction monitoring program. Monitoring wells will be decommissioned at the end of the 2 year post construction monitoring period.

9.0 Conclusions and Recommendations

Based on this report, MTE offers the following findings:

Geology and Physiography

- The Subject Lands are located within the Waterloo Hills physiographic region which consists of sandy hills and till plains. A sand hill is present to the west, extending east and south to within the limits of Subject Lands and proposed development area.
- Shallow sediments beneath the proposed development area of the Subject Lands consist of a sand unit and a clayey silt till unit. These units are interpreted to be part of the Waterloo Moraine geological formation with the sand unit interpreted to be the Upper Waterloo Moraine and equivalents unit (Aquifer 1) and the clayey silt till unit interpreted to be the Upper Maryhill Till unit (Aquitard 1).

Hydrogeology

- The regional groundwater flow direction is interpreted to be southwesterly towards the Nith River.
- The interpreted local shallow groundwater flow direction is westerly to southwesterly across the proposed development area which is consistent with the regional shallow groundwater flow direction (southwesterly).
- The horizontal hydraulic gradient is estimated to be 0.01 m/m.
- Hydraulic conductivity values are predicted to range between 1×10^{-3} m/s to 1×10^{-7} m/s (sand/silty sand) and 1×10^{-6} m/s to 1×10^{-12} m/s (silt / glacial till) which are based on published values for these units.
- The average linear groundwater velocity was estimated to be 2.37×10^{-5} m/sec (748 m/year) for the shallow groundwater system within the sand unit and 2.64×10^{-8} m/sec (0.83 m/year) for the shallow groundwater system within the clayey silt till unit which utilized the median value of the published hydraulic conductivity values.
- A local perched groundwater condition is interpreted to be present in the central portion of the proposed development limit. The stratigraphy observed in this area consists of a surficial sand underlain by clayey silt till followed by sand. It is interpreted that the hydraulic conductivity differential between the sand and the clayey silt till units causes the clayey silt till to dampen vertical groundwater flow in this area, allowing for a perched groundwater condition to arise.
- Surface water and groundwater elevation measurements collected within the wetland north of the proposed development area indicate a downward vertical gradient between the surface water and local groundwater in this area. Therefore, surface water within the wetland is acting to recharge the groundwater.

Development Considerations

<u>Groundwater Separation</u>

- In the areas of the proposed development area where sand is the surficial geological unit and they clayey silt till unit is not observed in the subsurface, groundwater separation distances are anticipated to be high (in excess of 9m bgs; with the exception of MW101-19 which has an average depth to groundwater of approximately 5m bgs) and the potential for encountering the water table during installation of below grade services is anticipated to be low.

- Where clayey silt till is the surficial geological unit, the shallow groundwater table is found at average depths of approximately 5m bgs with the exception of MW202-20 which has an average depth to groundwater of approximately 2m bgs.
- Excavation into the clayey silt till unit during construction activities may generate an inflow of groundwater due to the clayey silt till unit acting as an aquitard unit at the Site whereby the predominant groundwater flow direction through the unit is vertical and groundwater moves vertically through the subsurface as a “slug”. In this instance, the inflow rate of the groundwater is anticipated to be low due to the fine-grained, low permeable nature of the sediments and corresponding low hydraulic conductivity. Therefore; it is anticipated that the inflow of groundwater in these areas could be managed by conventional methods (e.g. sumps). Construction during the summer months may also help mange groundwater encountered.
- Once final grades and excavation depths are confirmed, a dewatering assessment may be required to assess whether a Permit to Take Water (PTTW) or registration on the Environmental Activity and Sector Registry (EASR) is required.

Impact Assessment

Environmental Features

- There are no significant environmental features within the proposed development area of the Subject Lands.
- There is a small wetland located 338 m north of the northern proposed development limit within the Subject Lands. The wetland is interpreted to be located hydraulically up- and cross-gradient from the proposed residential development limit and acts to recharge the local groundwater. Therefore, impacts to the wetland from the proposed development are not anticipated.

Private Well Assessment

- Properties within the immediate vicinity of the proposed development were confirmed to be municipally serviced.
- Two private well survey responses indicate the properties located adjacently west (1056 Snyder’s Road West) and approximately 40 m south (118 Snyder’s Road West) of the proposed development area contain private wells in addition to being municipally serviced. The wells are reportedly used for agricultural purposes and/or landscaping.
- Other properties in the Study Area that potentially rely on private wells for drinking water are located in excess of 200 m from the proposed development area and were provided with a private well survey package that has not been returned at this time.
- Since stormwater infiltration is not a proposed stormwater management strategy for the proposed development, impacts to groundwater through stormwater infiltration is not anticipated.
- A dewatering assessment should be completed upon finalizing the detailed design.

10.0 Limitations

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

This report was completed for the sole use of MTE and their client. It was completed in accordance with the scope of work identified in the introduction of the text. As such, this report may not deal with all issues potentially applicable to the Subject Lands and may omit issues, which are, or may be, of interest to the reader. MTE makes no representation that the present report has dealt with any and all of the important features, including any or all important environmental features, except as provided in the Introduction. All findings and conclusions presented in this report are based on conditions as they existed during the time period of the investigation. This report is not intended to be exhaustive in scope or to imply a risk-free facility.

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 may affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change. Should additional information become available, MTE recommends that it be brought to our attention in order that we may re-assess the contents of this report.

We trust this meets your current requirements. If you have any questions or comments, please do not hesitate to contact the undersigned directly at (519) 743 6500.

All of which is respectfully submitted,

MTE Consultants Inc.

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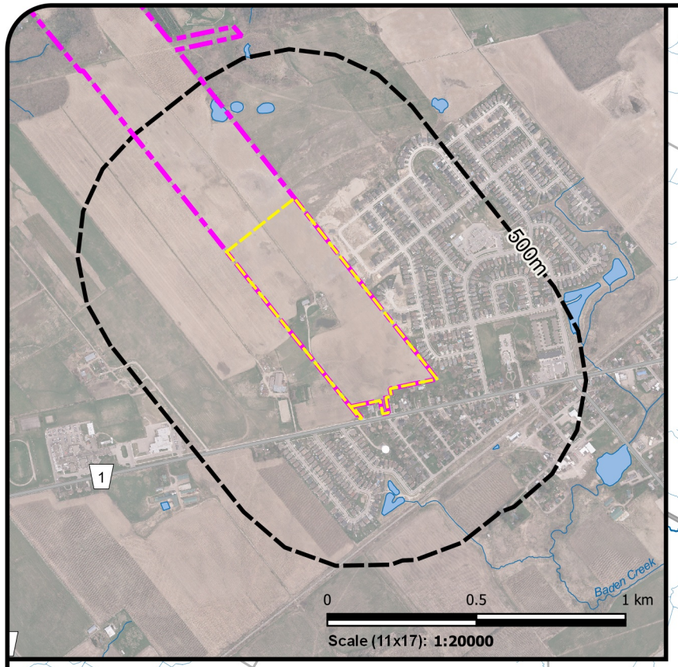
Figures



N
NORTH

N
PROJECT NORTH

Legend

- Subject Lands
- Proposed Development Area
- Study Area (500m)

Surface Water

- Surface Water Body
- Watercourse

Data Sources:

Contains information licensed under the Open Government License Ontario.

Project CRS: NAD83 / UTM zone 17N

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

Client
Snyder's Road (Baden) Developments Inc.

Project
Hydrogeological Investigation

Site
1012 Snyder's Road West, Baden, ON

Title
Subject Lands Location

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	1
Date	February 2021		

Project No: 40777-800 Q:\40777\800\Hydrogeology\Maps\40777-800 QGIS.qgz

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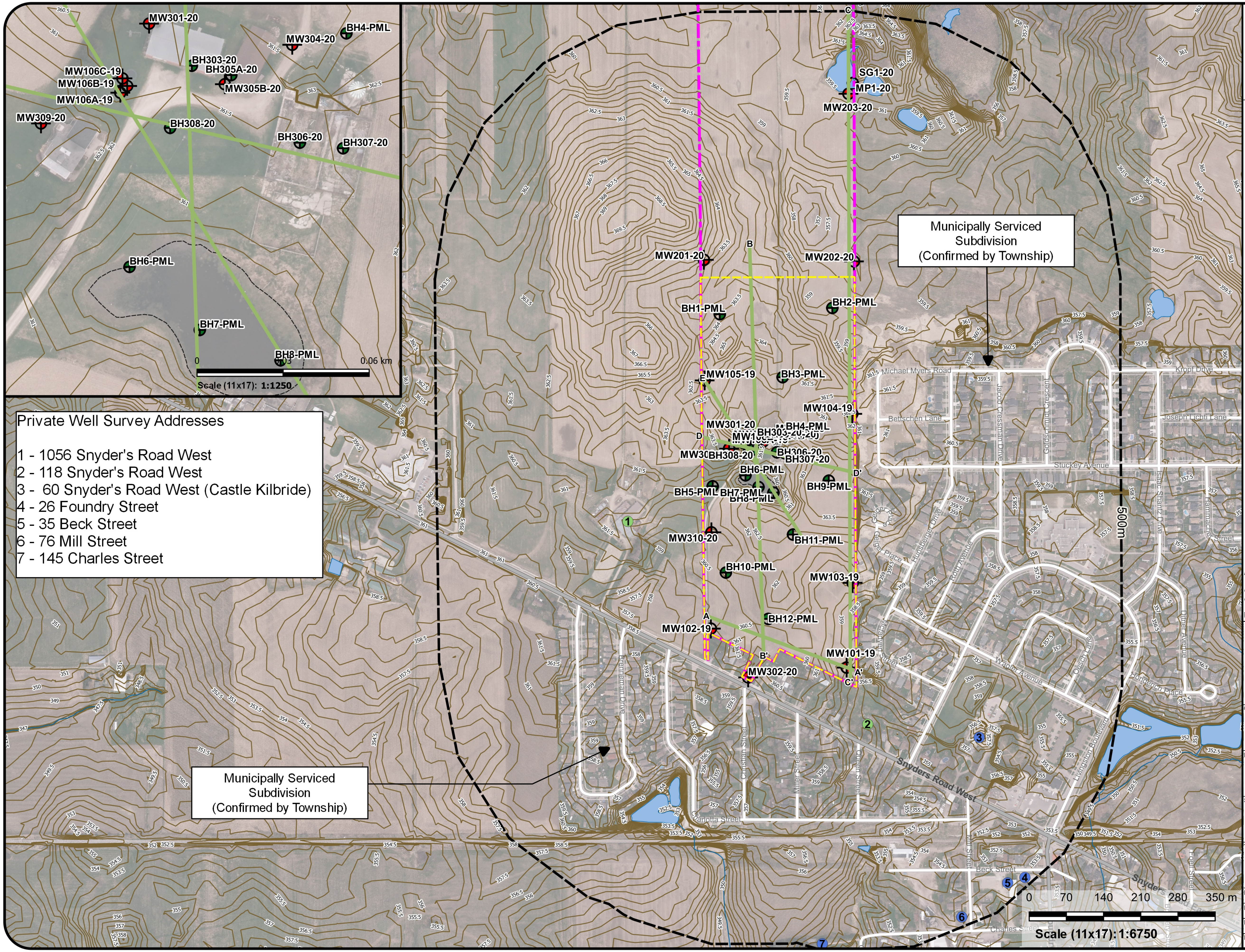

NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)
- Geological Cross-Section

Private Well Survey

- Package Distributed and Not Returned
- Package Distributed and Returned

Investigative Locations

- Monitoring Well (MTE)
- Borehole

Surface Water

- Surface Water Body
- Former Pond (Approximate)
- Watercourse

Ground Surface

- Ground Surface Elevation Contour

Data Sources:

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Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Study Area & Existing Features**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	2
Date	February 2021		

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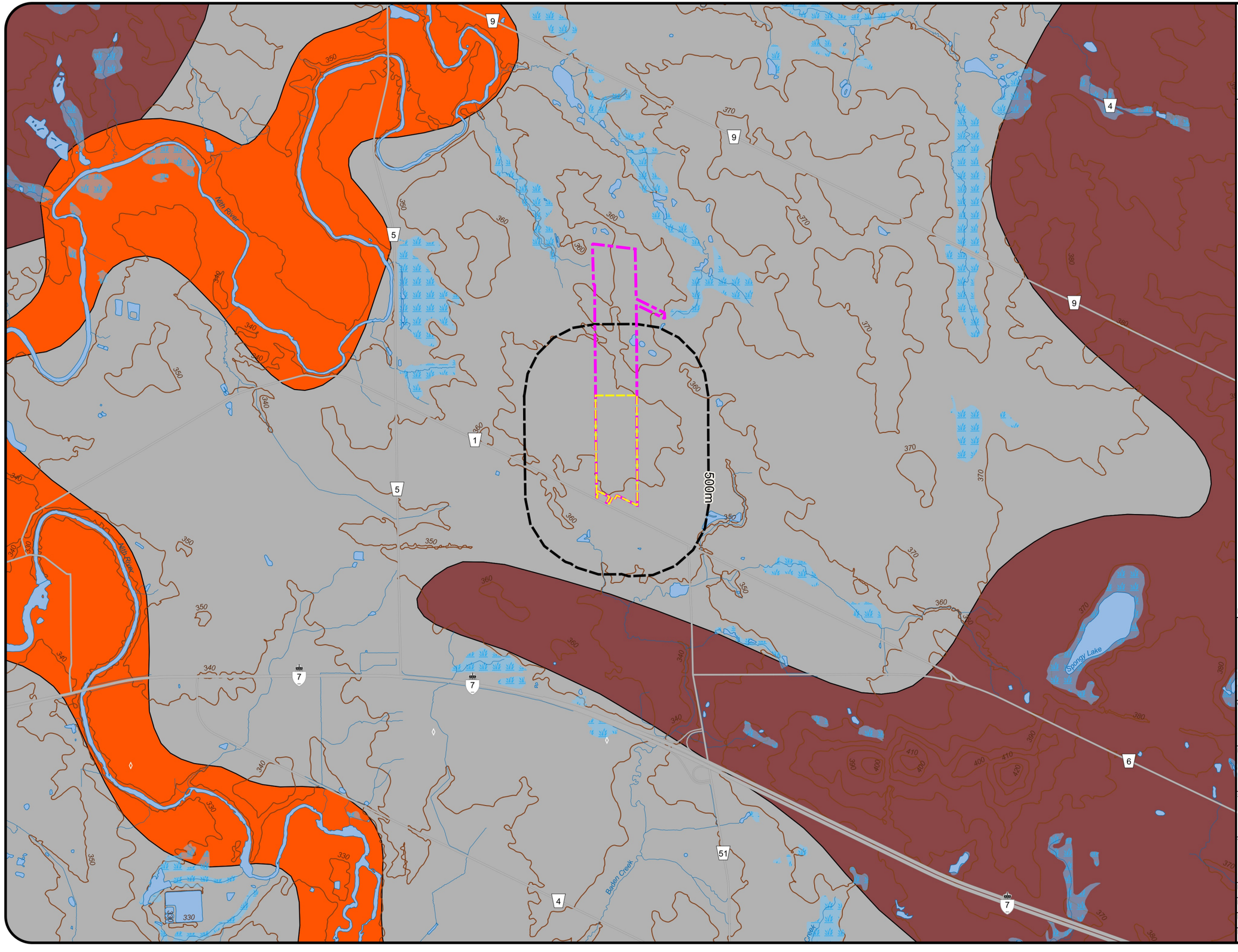

NORTH

N
PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Surface Water

- Surface Water Body
- Former Pond (Approximate)
- Watercourse
- Wetland

Ground Surface

- Ground Surface Elevation Contour

Physiogrpahic Landforms

- 2. Till Moraines
- 3. Spillways
- 4. Kame Moraines
- 5. Till Plains (Undrumlinized)
- 6. Till Plains (Drumlinized)

Data Sources:

Contains information licensed under the Open Government License Ontario.

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

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Scale (11x17): 1:25000

Project CRS: NAD83 / UTM zone 17N

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

Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Physiographic Landforms**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	3
Date	February 2021		

Project No: 40777-800 Q:\40777\800\Hydrogeology\Maps\40777-800 QGIS.qgz

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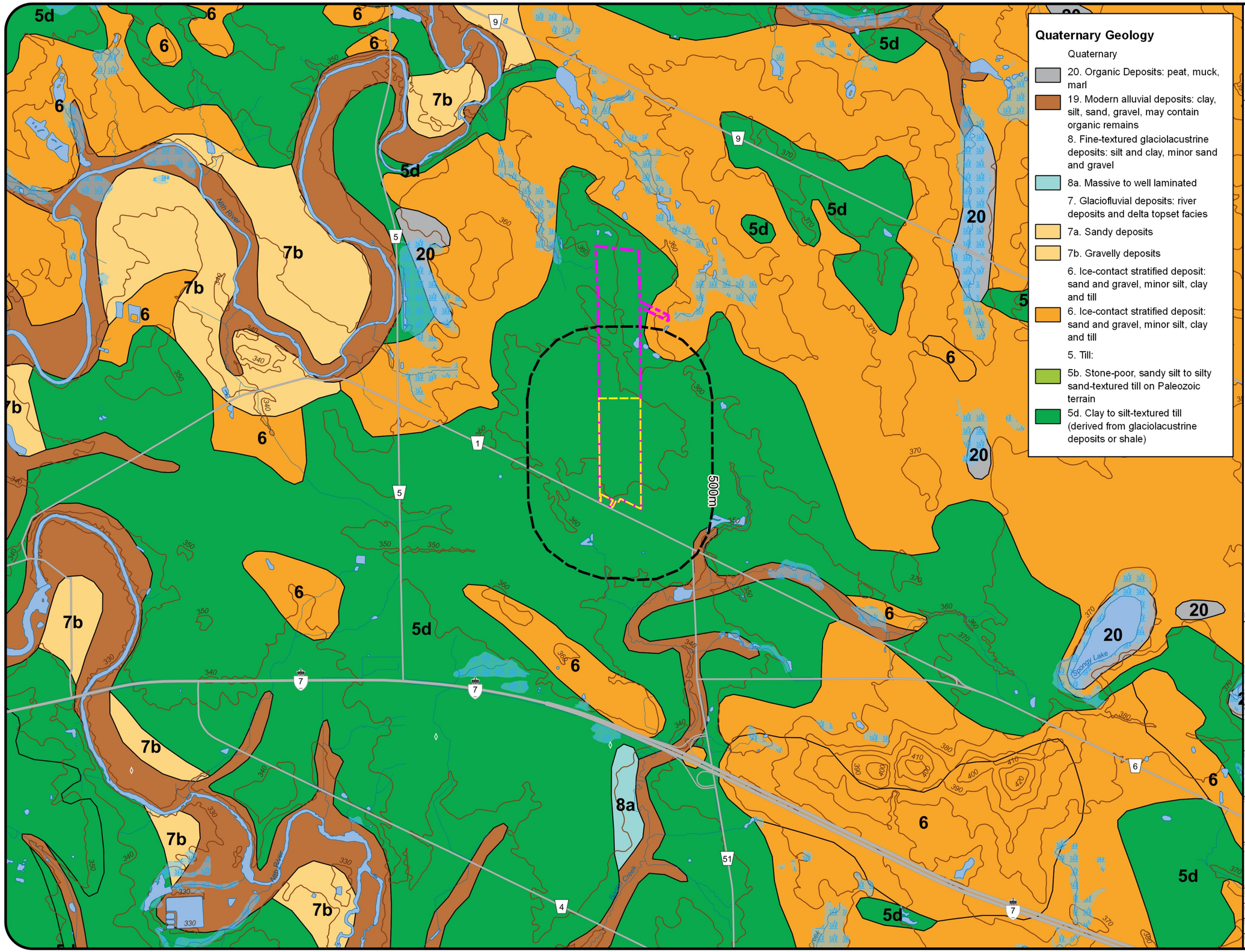

Quaternary Geology

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)

NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Surface Water

- Surface Water Body
- Watercourse
- Wetland

Ground Surface

- Ground Surface Elevation Contour

Data Sources:

Contains information licensed under the Open Government License Ontario.

Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey Miscellaneous Release-128 - Revised.

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Scale (11x17): 1:25000

Project CRS: NAD83 / UTM zone 17N

MTE

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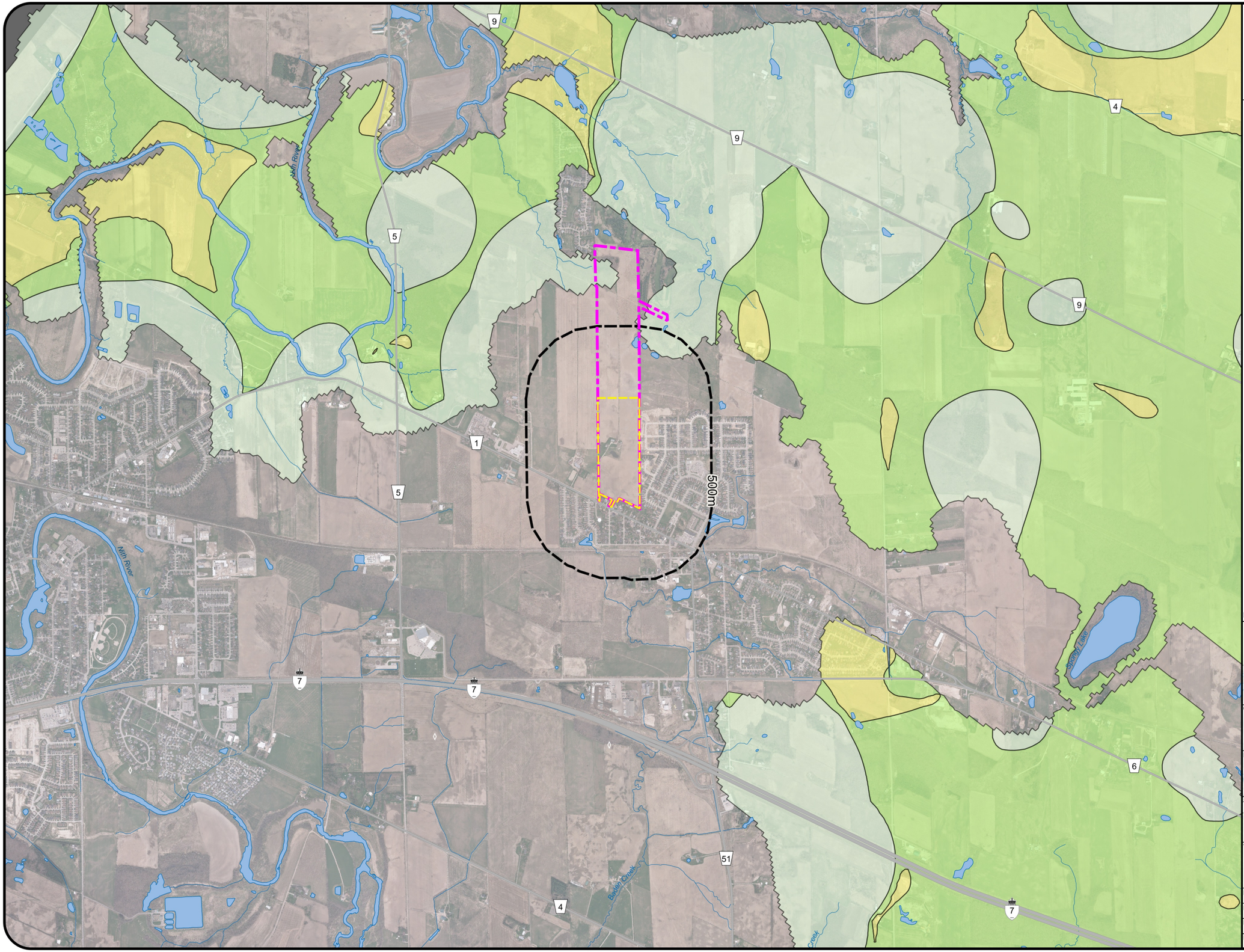
Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Quaternary Geology**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	4
Date	February 2021		



NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Surface Water

- Surface Water Body
- Watercourse

Significant Groundwater Recharge Areas & Vulnerabilities (GRCA)

- SGRA-2
- SGRA-4
- SGRA-6

Data Sources:

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0 200 400 600 800 1000 m

Scale (11x17): 1:25000

Project CRS: NAD83 / UTM zone 17N

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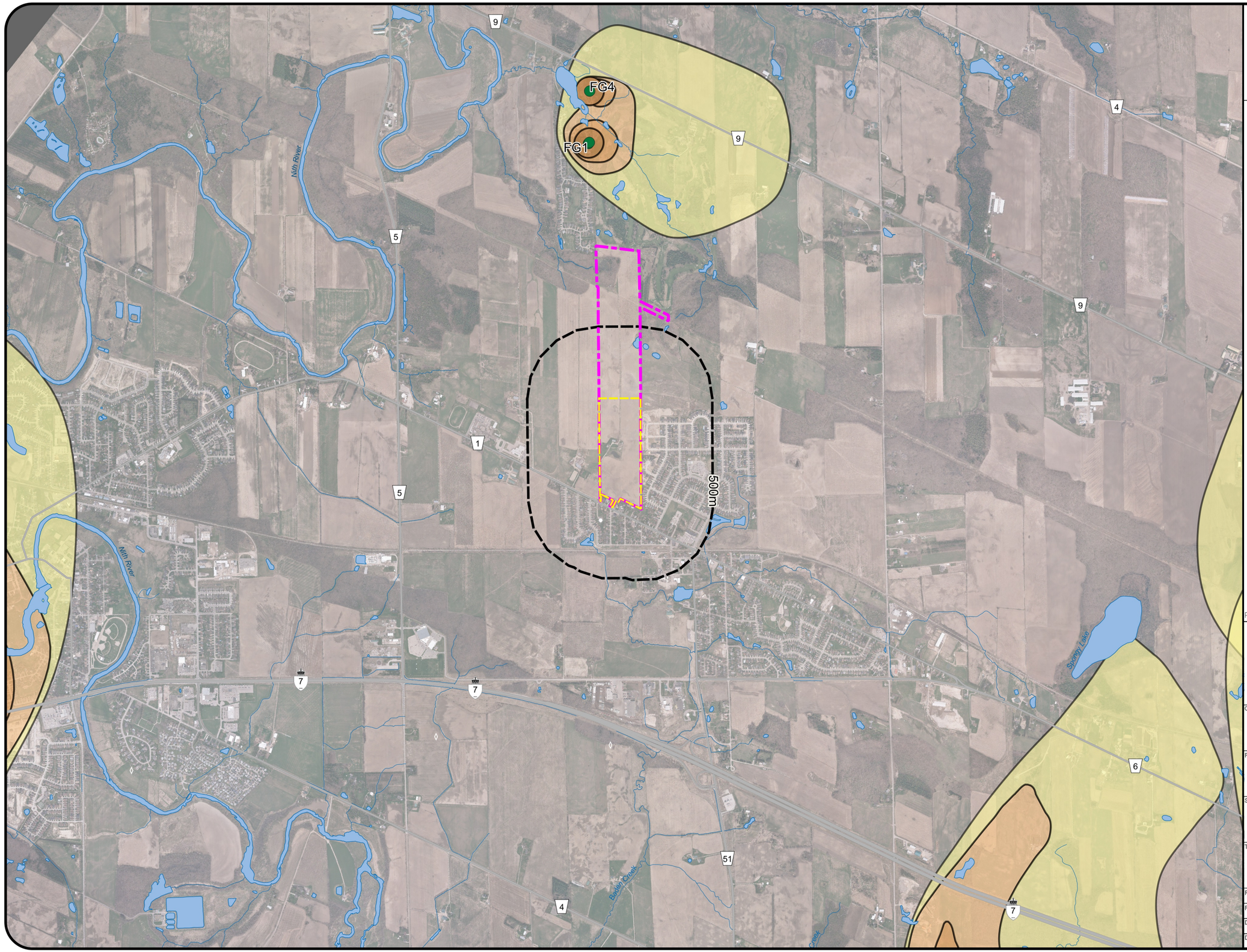
Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Significant Groundwater Recharge Area (SGRA) Vulnerability Mapping**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	5
Date	February 2021		



NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Surface Water

- Surface Water Body
- Watercourse
- Municipal Well (GRCA)

Wellhead Protection Area (GRCA)

- WHPA-A
- WHPA-B
- WHPA-C
- WHPA-D

Data Sources:

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0 200 400 600 800 1000 m

Scale (11x17): 1:25000

Project CRS: NAD83 / UTM zone 17N

MTE
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Ph. (519) 743-6500

Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Wellhead Protection Areas (WHPA) Mapping**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	6
Date	February 2021		

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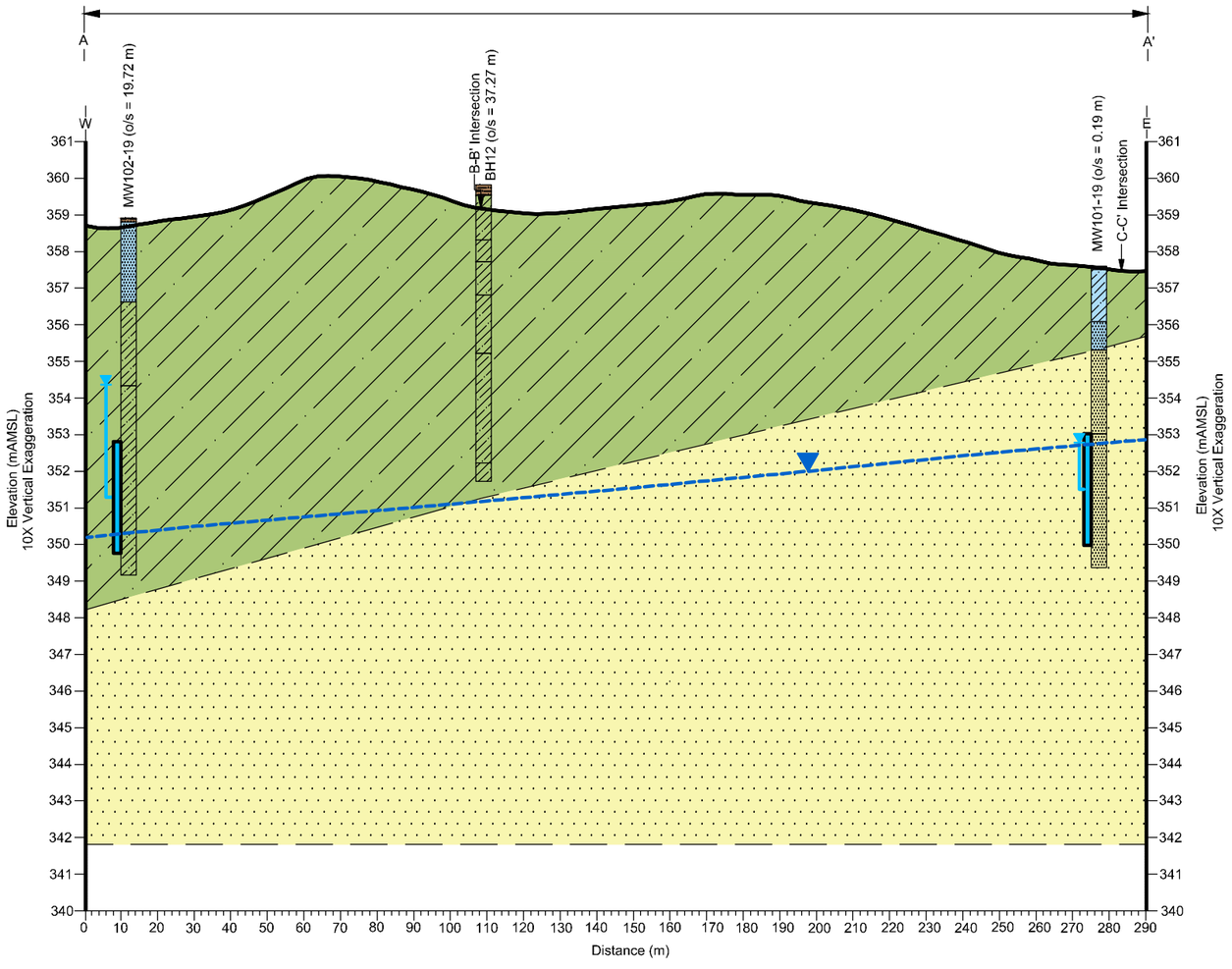


Legend

Ground Surface (Interpolated from Site Topo)

Interpreted Water Table

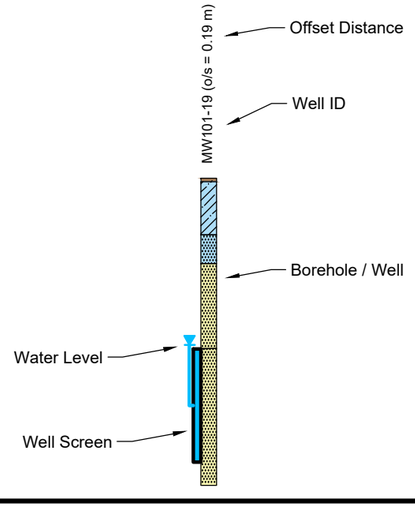
Borehole Lithology

Topsoil, Clayey Silt / Silty Clay, Silt, Sandy Silt, Sand, Clayey Silt Till, Peat, Fill

Interpreted Geology

Topsoil, Clayey Silt Till, Sand, Peat, Fill

Well Detail



Notes:

1. Geological Sequence is based on professional interpretation from sediments encountered during drilling and geological descriptions provided from the MECP Water Well Records Database, borehole logs, and cross-sections reviewed as part of other reports for this Hydrogeological Assessment. Actual geological conditions can vary between tested locations.
2. Water levels collected on June 29, 2020, unless otherwise stated. The interpreted water table is based on water levels collected June 29, 2020.
3. The inferred ground surface and interpreted water table have been projected onto the geological cross-section. Differences between the ground surface and wells presented on the cross-section and water levels and the interpreted water table are a result of offset differences.

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

CLIENT: Snyder's Road (Baden) Developments Inc.

PROJECT: Scoped Hydrogeological Investigation

SITE: 1012 Snyder's Road West Baden, ON

TITLE: Geological Cross-Section A-A'

Reviewed By	ATD		
Prepared By	KLW	Project No.	40777-800
Drawn By	KLW	Figure No.	7
Date	February 2021		

Project: 43070-300 CAD: P:\P\40777\800\40777-800-EV1.DWG
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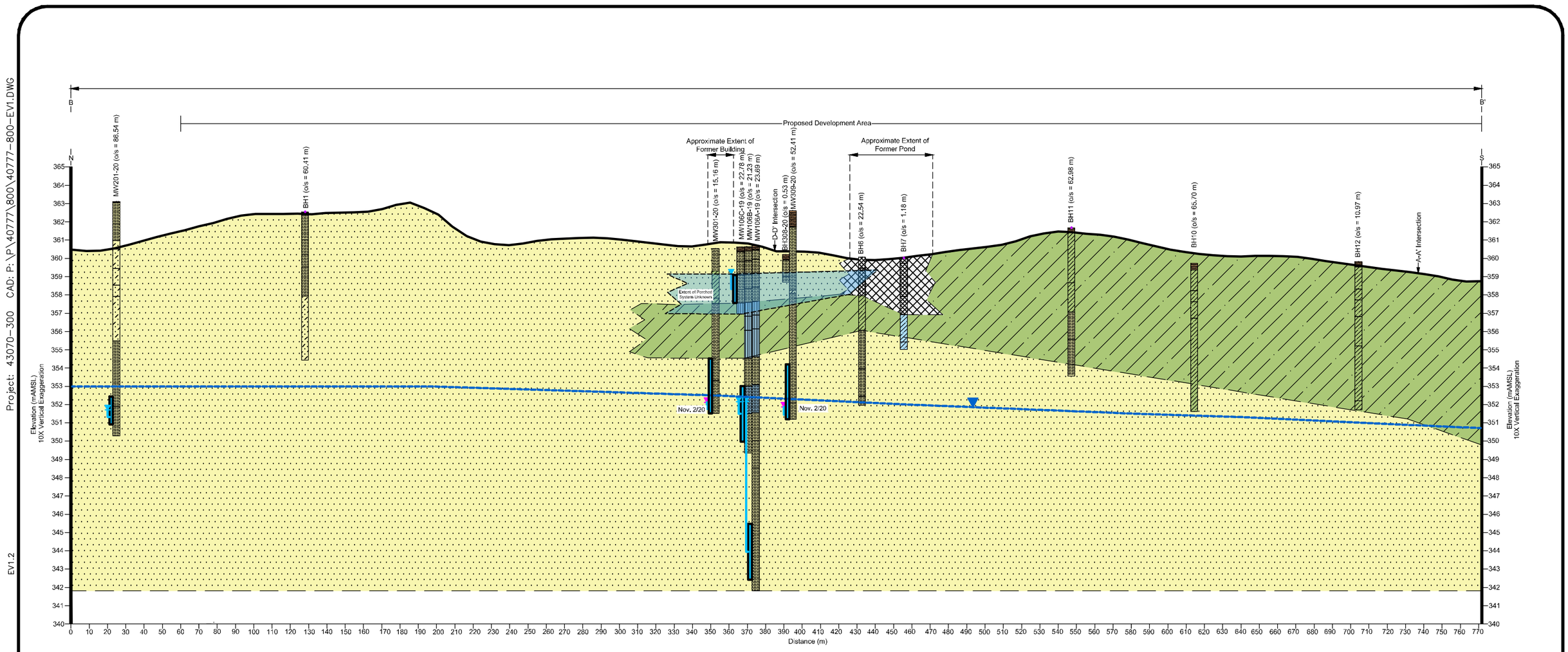


Legend

Ground Surface (Interpolated from Site Topo)

Interpreted Water Table

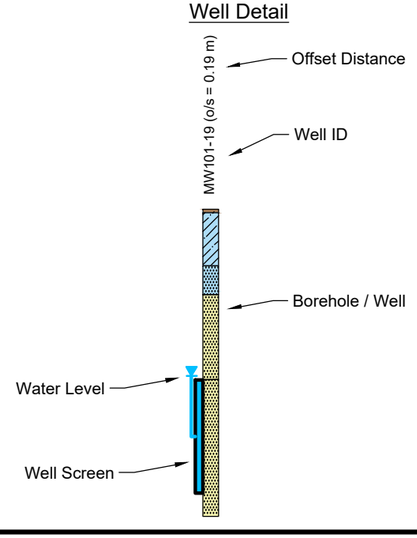
Borehole Lithology

Topsoil, Clayey Silt / Silty Clay, Silt, Sandy Silt, Sand, Clayey Silt Till, Peat, Fill

Interpreted Geology

Topsoil, Clayey Silt Till, Sand, Peat, Fill

Well Detail



Notes:

1. Geological Sequence is based on professional interpretation from sediments encountered during drilling and geological descriptions provided from the MECP Water Well Records Database, borehole logs, and cross-sections reviewed as part of other reports for this Hydrogeological Assessment. Actual geological conditions can vary between tested locations.
2. Water levels collected on June 29, 2020, unless otherwise stated. The interpreted water table is based on water levels collected June 29, 2020.
3. The inferred ground surface and interpreted water table have been projected onto the geological cross-section. Differences between the ground surface and wells presented on the cross-section and water levels and the interpreted water table are a result of offset differences.

MTE
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CLIENT	Snyder's Road (Baden) Developments Inc.
PROJECT	Scoped Hydrogeological Investigation
SITE	1012 Snyder's Road West Baden, ON
TITLE	Geological Cross-Section B-B'
Reviewed By	ATD
Prepared By	KLW
Drawn By	KLW
Date	February 2021
Project No.	40777-800
Figure No.	8

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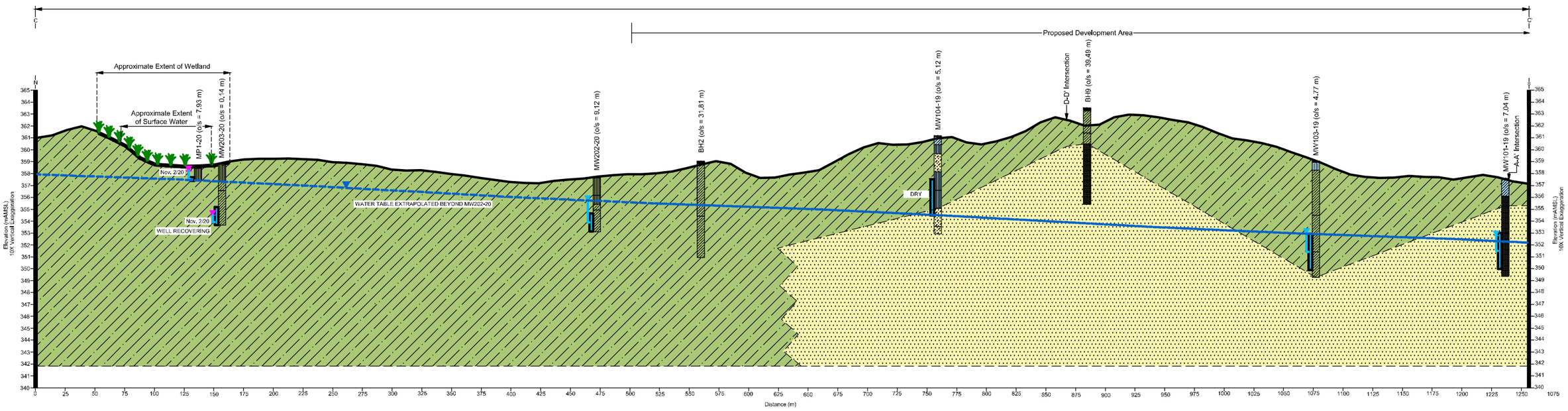


Legend

Ground Surface (Interpolated from Site Topo)

Interpreted Water Table

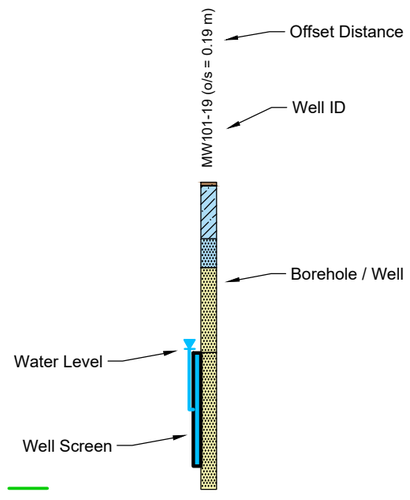
Borehole Lithology

Topsoil, Clayey Silt / Silty Clay, Silt, Sandy Silt, Sand, Clayey Silt Till, Peat, Fill

Interpreted Geology

Topsoil, Clayey Silt Till, Sand, Peat, Fill

Well Detail



Notes:

1. Geological Sequence is based on professional interpretation from sediments encountered during drilling and geological descriptions provided from the MECP Water Well Records Database, borehole logs, and cross-sections reviewed as part of other reports for this Hydrogeological Assessment. Actual geological conditions can vary between tested locations.
2. Water levels collected on June 29, 2020, unless otherwise stated. The interpreted water table is based on water levels collected June 29, 2020.
3. The inferred ground surface and interpreted water table have been projected onto the geological cross-section. Differences between the ground surface and wells presented on the cross-section and water levels and the interpreted water table are a result of offset differences.

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

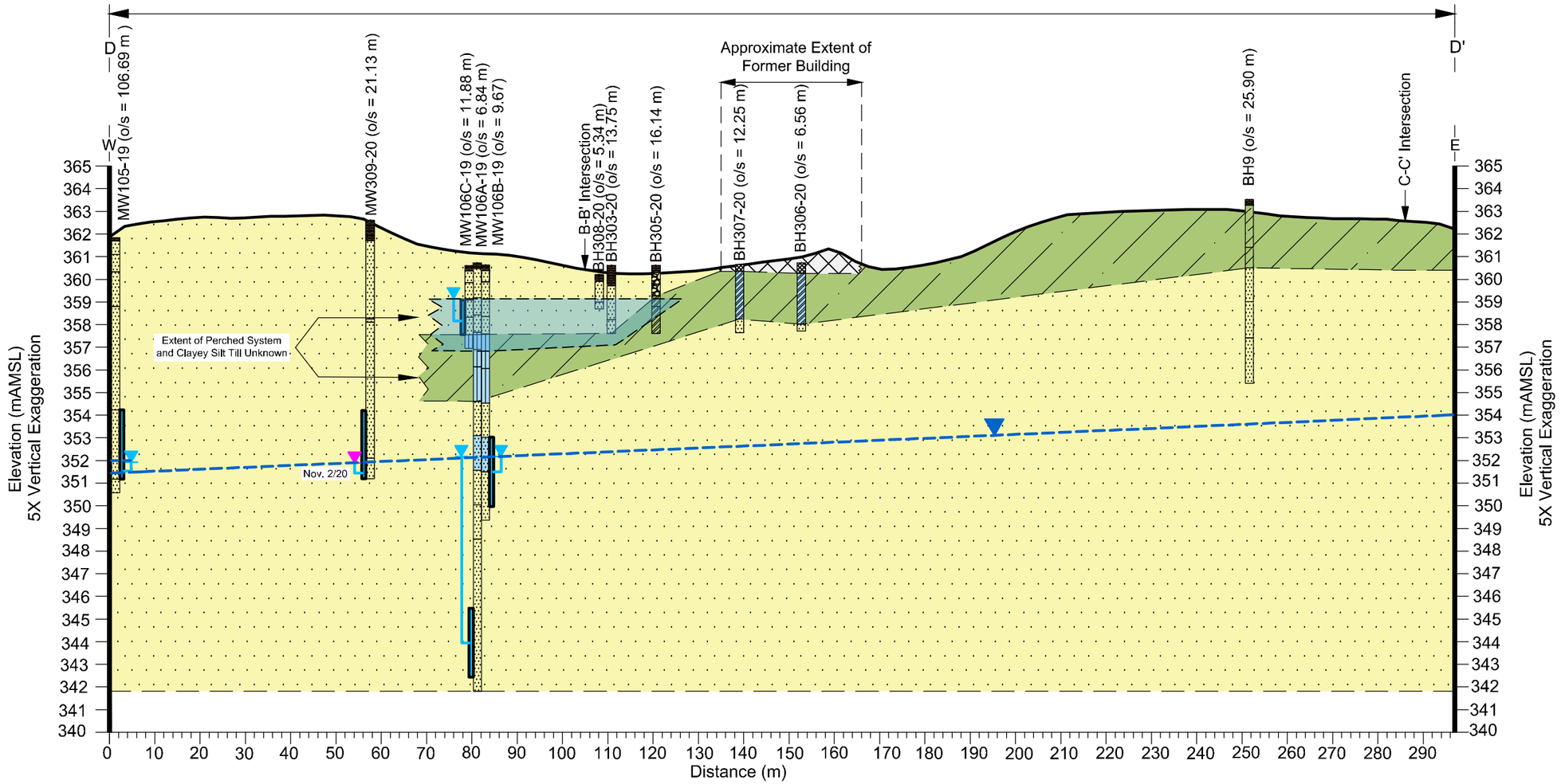
CLIENT: Snyder's Road (Baden) Developments Inc.

PROJECT: Scoped Hydrogeological Investigation

SITE: 1012 Snyder's Road West Baden, ON

TITLE: Geological Cross-Section C-C'

Reviewed By	ATD		
Prepared By	KLW	Project No.	40777-800
Drawn By	KLW	Figure No.	9
Date	February 2021		



Legend

Ground Surface (Interpolated from Site Topo)

Interpreted Water Table

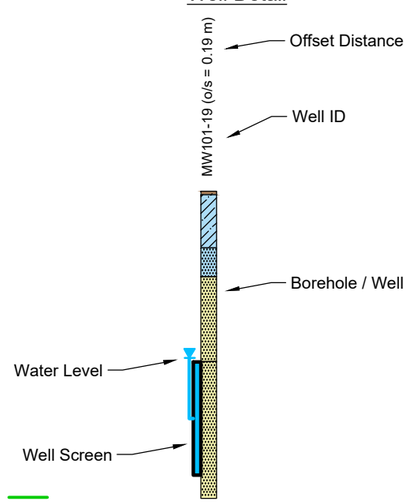
Borehole Lithology

Topsoil, Clayey Silt / Silty Clay, Silt, Sandy Silt, Sand, Clayey Silt Till, Peat, Fill

Interpreted Geology

Topsoil, Clayey Silt Till, Sand, Peat, Fill

Well Detail



Notes:

1. Geological Sequence is based on professional interpretation from sediments encountered during drilling and geological descriptions provided from the MECP Water Well Records Database, borehole logs, and cross-sections reviewed as part of other reports for this Hydrogeological Assessment. Actual geological conditions can vary between tested locations.
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MTE
Engineers, Scientists, Surveyors
Ph. (519) 743-6500

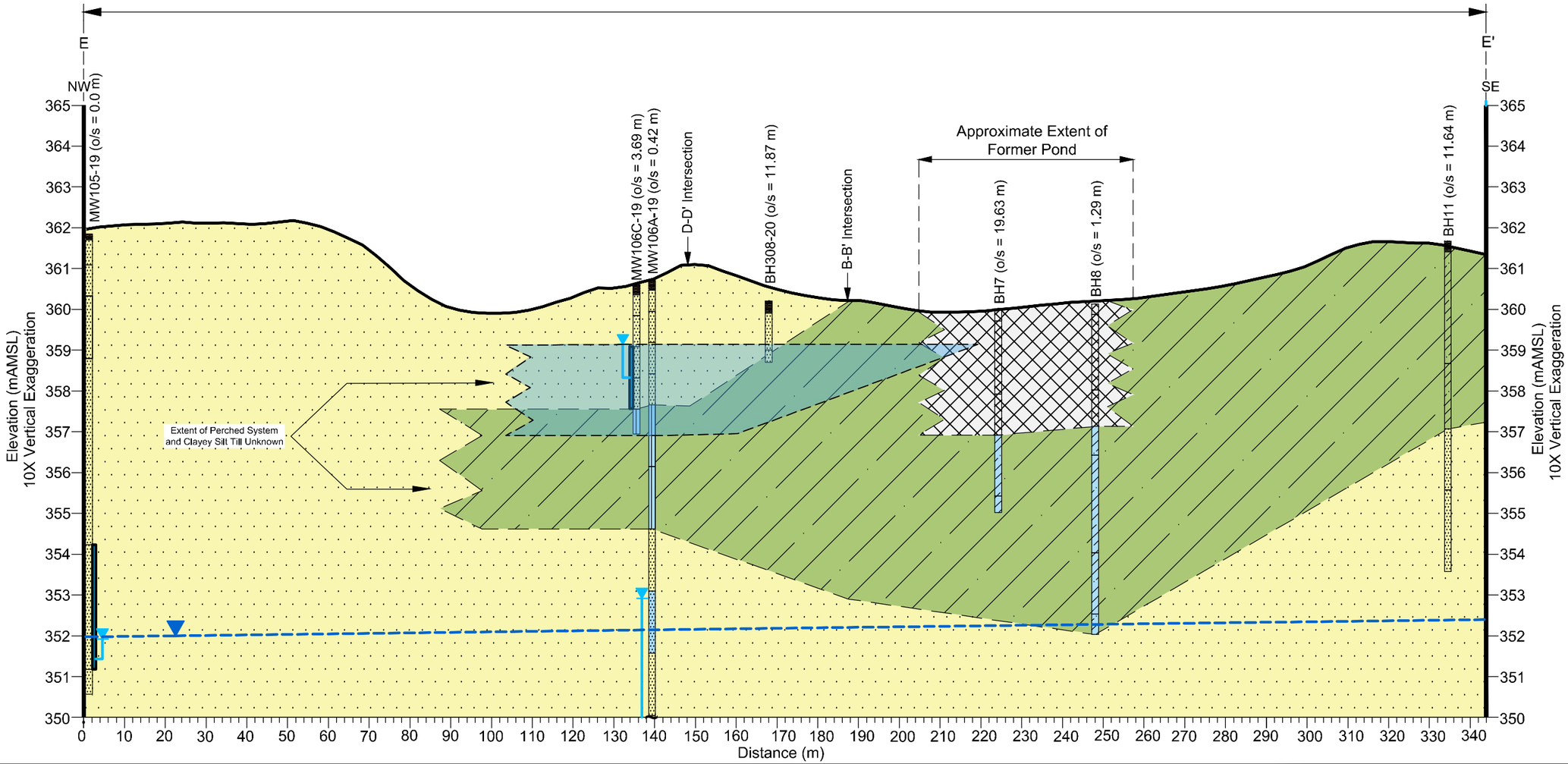
CLIENT: Snyder's Road (Baden) Developments Inc.

PROJECT: Scoped Hydrogeological Investigation

SITE: 1012 Snyder's Road West Baden, ON

TITLE: Geological Cross-Section D-D'

Reviewed By	ATD		
Prepared By	KLW	Project No.	40777-800
Drawn By	KLW	Figure No.	10
Date	February 2021		



Legend

Ground Surface (Interpolated from Site Topo)

Interpreted Water Table

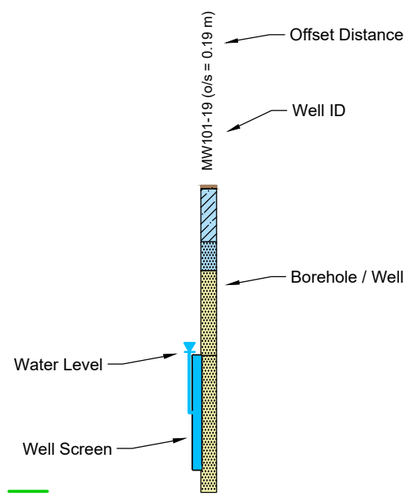
Borehole Lithology

Topsoil, Clayey Silt / Silty Clay, Silt, Sandy Silt, Sand, Clayey Silt Till, Peat, Fill

Interpreted Geology

Topsoil, Clayey Silt Till, Sand, Peat, Fill

Well Detail



Notes:

1. Geological Sequence is based on professional interpretation from sediments encountered during drilling and geological descriptions provided from the MECP Water Well Records Database, borehole logs, and cross-sections reviewed as part of other reports for this Hydrogeological Assessment. Actual geological conditions can vary between tested locations.
2. Water levels collected on June 29, 2020, unless otherwise stated. The interpreted water table is based on water levels collected June 29, 2020.
3. The inferred ground surface and interpreted water table have been projected onto the geological cross-section. Differences between the ground surface and wells presented on the cross-section and water levels and the interpreted water table are a result of offset differences.

MTE
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Ph. (519) 743-6500

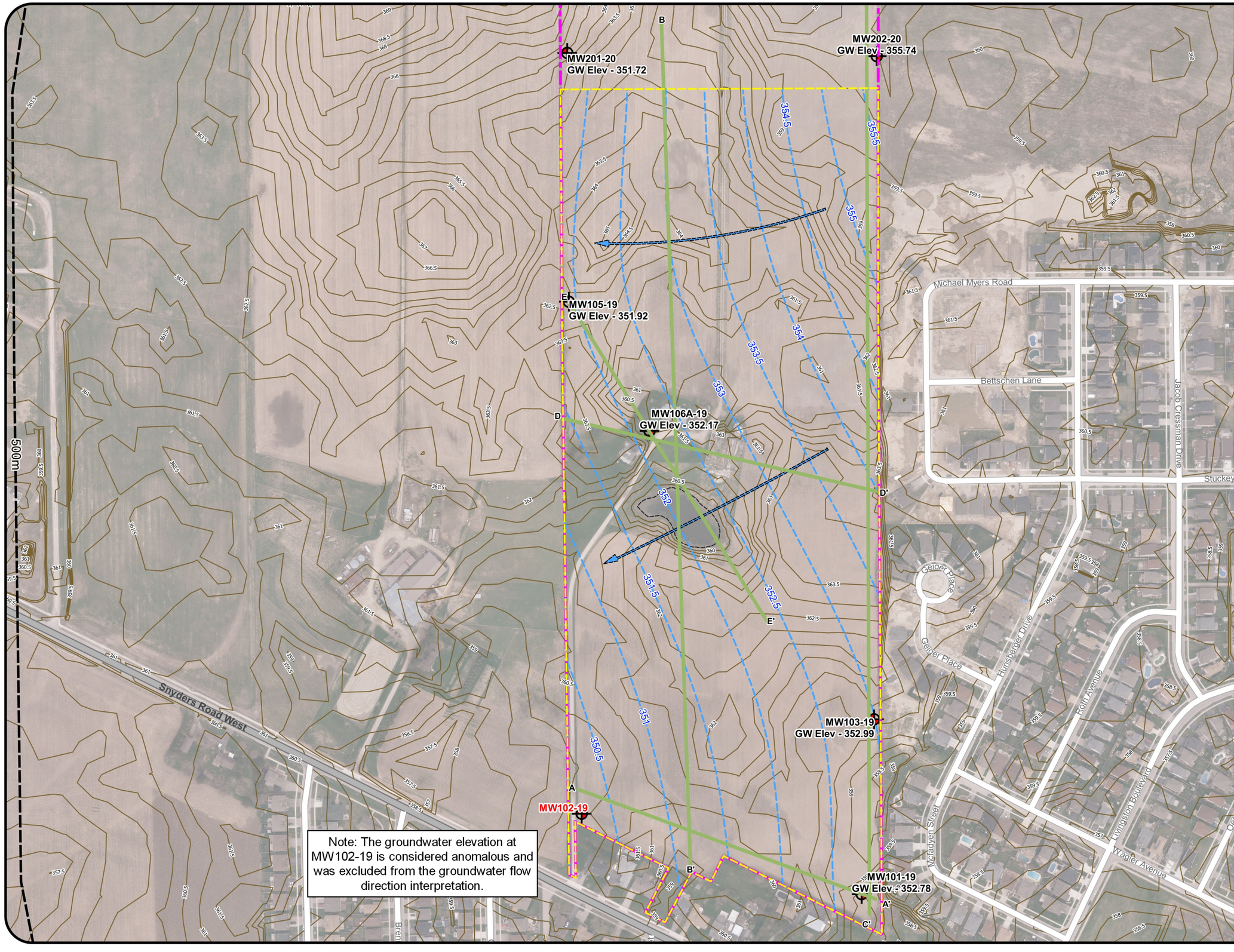
CLIENT: Snyder's Road (Baden) Developments Inc.

PROJECT: Scoped Hydrogeological Investigation

SITE: 1012 Snyder's Road West Baden, ON

TITLE: Geological Cross-Section E-E'

Reviewed By	ATD		
Prepared By	KLW	Project No.	40777-800
Drawn By	KLW	Figure No.	11
Date	February 2021		



Note: The groundwater elevation at MW102-19 is considered anomalous and was excluded from the groundwater flow direction interpretation.

NORTH

N
PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)
- Geological Cross-Section

Surface Water

- Former Pond (Approximate)

Ground Surface

- Ground Surface Elevation Contour

Water Table Flow Interpretation (June 29, 2020)

- Monitoring Well (MTE)
- Water Table Elevation Contour
- Interpreted Water Table Flow Direction

Data Sources:

Contains information licensed under the Open Government License Ontario.

0 30 60 90 120 150 m

Scale (11x17): 1:3250

Project CRS: NAD83 / UTM zone 17N

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

Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Interpreted Local Water Table Flow**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	12
Date	February 2021		

Project No: 40777-800 Q:\40777\800\Hydrogeology\Maps\40777-800 QGIS.qgz

GWR1.9

February 22, 2021 - 11:18 - Plotted By: KVallace

Project No: 40777-800 Q:\40777\800\Hydrogeology\Maps\40777-800 QGIS.qgz

GWR1.13

February 25, 2021 - 15:28 - Plotted By: KWallace

Northern extent of perched system unknown

MW301-20
BH4-PML
MW304-20
BH303-20
BH305A-20
MW106C-19
MW106B-19
MW305B-20
MW106A-19
MW309-20
BH308-20
BH306-20
BH307-20
BH6-PML

0 0.01 0.02 km

Scale (11x17): 1:750

MW201-20
MW202-20
BH1-PML
BH2-PML
MW105-19
BH3-PML
MW104-19
MW301-20
MW304-20
BH4-PML
BH303-20
MW106B-19
BH305A-20
MW309-20
BH308-20
BH307-20
BH306-20
BH6-PML
BH5-PML
BH7-PML
BH8-PML
BH9-PML
MW310-20
BH11-PML
BH10-PML
MW103-19
BH12-PML
MW102-19
MW101-19
MW302-20

Michael Myers Road
Geiger Place
Geiger Place
Hunsberger Dr
McFadyen Street

Snyders Road West

500m

0 30 60 90 120 150 m

Scale (11x17): 1:3250

NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)
- Geological Cross-Section
- Estimated Extent of Perched Groundwater System

Investigative Locations

- Monitoring Well (MTE)
- Borehole

Surface Water

- Former Pond (Approximate)

Ground Surface

- Ground Surface Elevation Contour (Site Topographical Survey)

Data Sources:

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Project CRS: NAD83 / UTM zone 17N

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

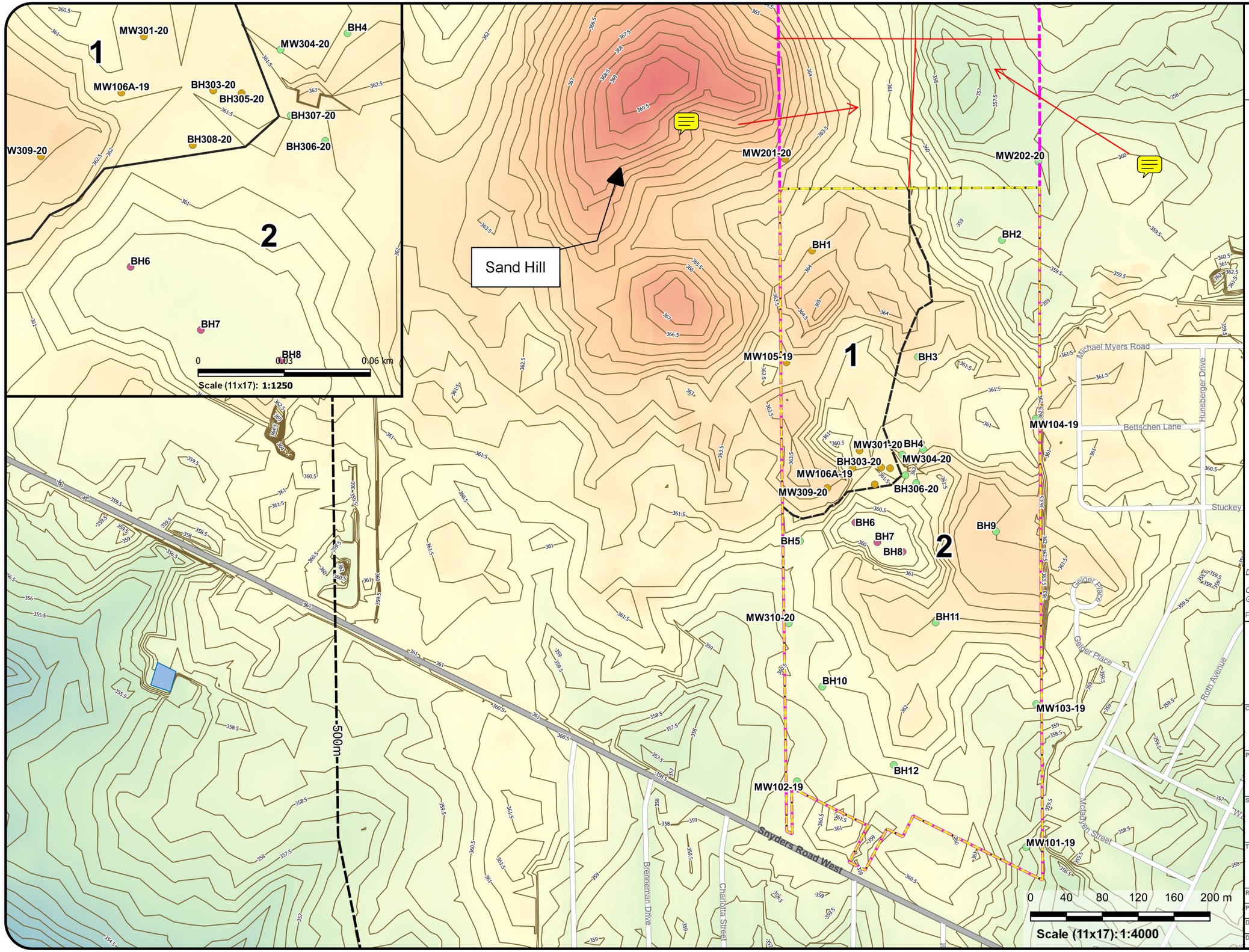
Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Estimated Extent of Perched Groundwater**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	13
Date	February 2021		



NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Ground Surface

- Ground Surface Elevation Contour

Ground Surface Elevation (SWOOP, 2015)

- 350 mamsl
- 355 mamsl
- 360 mamsl
- 365 mamsl
- 370 mamsl

Investigative Location & Unit at Ground Surface

- Sand
- Clayey Silt Till
- Fill then Clayey Silt Till
- Peat then Clayey Silt Till

Catchment Areas

- 1-Sand
- 2-Clayey Silt Till

Data Sources:

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Project CRS: NAD83 / UTM zone 17N

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

Client
Snyder's Road (Baden) Developments Inc.

Project
Hydrogeological Investigation

Site
1012 Snyder's Road West, Baden, ON

Title
Water Balance Catchment Areas

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	14
Date	February 2021		

Note:

THIS IS NOT A GROUNDWATER FLOW MAP.

The composite high groundwater surface is generated by interpolating between the highest groundwater elevation recorded at each monitoring location during the monitoring period.

The composite high surface represents the maximum predicted groundwater elevations to be used as reference for design purposes only.

MW201-20
High GW Elev - 351.75

MW202-20
High GW Elev - 357.17

MW105-19
High GW Elev - 351.96

MW106A-19
High GW Elev - 352.24

MW103-19
High GW Elev - 353.07

MW102-19
High GW Elev - 354.65

MW101-19
High GW Elev - 353.16

351.75
352
352.25
352.5
352.75
353
353.25
353.5
353.75
354
354.25
354.5
354.75
355
355.25
355.5
355.75
356
356.25
356.5
356.75

Michael Myers Road
Bettschen Lane
Stuckey
Geiger Place
Hunsberger Drive
Jacob Cressman Drive
Roth Avenue
Livingston Boulevard
Wagler Avenue
Mcadven Street
Snyders Road West

500m

Data collected to date at MW102-19 indicate the high value recorded at this location may be anomalous, however additional information is needed and data collection is on-going.

Therefore, this value is subject to change and composite high contours in this area should be used with caution.

NORTH

PROJECT NORTH

Legend

- Proposed Development Area
- Subject Lands
- Study Area (500m)

Surface Water

- Former Pond (Approximate)

Investigative Locations

- Monitoring Well (MTE)
- Composite High Groundwater Elevation Contour

Data Sources:

0 30 60 90 120 150 m

Scale (11x17): 1:3250

Project CRS: NAD83 / UTM zone 17N

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

Client: Snyder's Road (Baden) Developments Inc.

Project: Hydrogeological Investigation

Site: 1012 Snyder's Road West, Baden, ON

Title: **Composite High Groundwater Map with Perched Condition Removed**

Reviewed By	ATD		
Prepared By	KLW	Project No	40777-800
Drawn By	KLW	Figure No	15
Date	February 2021		

Project No: 40777-800 Q:\40777\800\Hydrogeology\Maps\40777-800 QGIS.qgz

GWR1.11b

February 22, 2021 - 11:28 - Plotted By: KWallace

Tables

Table 1. Manual Groundwater Measurements

ID	MW101-19		MW102-19		MW103-19		MW104-19		MW105-19		MW106A-19		MW106B-19		MW106C-19		MW201-20		MW202-20		MW203-20		MW301-20		MW302-20		MW304-20		MW305B-20		MW309-20		MW310-20	
TOC Elevation (mAMSL)	358.49		359.79		359.88	360.16	361.96		362.75		361.58		361.45		361.35		364.00		358.56		359.85		361.36		359.48		361.67		361.49		363.55		359.39	
GS Elevation (mAMSL)	357.60		358.91		359.04		361.18		361.85		360.71		360.64		360.61		363.11		357.69		358.84		360.52		358.60		360.67		360.60		362.60		359.50	
Stickup (m)	0.89		0.88		0.84	1.13	0.78		0.91		0.87		0.81		0.74		0.89		0.87		1.01		0.84		0.88		1.00		0.89		0.95		-0.11	
Date	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs	mbtoc	mbgs
13-May-19	5.36	4.47	9.52	8.64	6.74	5.90	7.38	6.59	10.85	9.94	9.43	8.56	9.29	8.48	1.53	0.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6-Sep-19	5.84	4.95	6.02	5.13	7.04	6.20	Dry	-	10.84	9.93	9.47	8.60	9.33	8.52	2.87	2.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26-Nov-19	5.86	4.97	5.51	4.63	7.05	6.21	Dry	-	11.02	10.11	9.63	8.76	9.47	8.66	2.03	1.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27-Feb-20	5.75	4.86	5.31	4.43	6.96	6.12	Dry	-	11.05	10.15	9.55	8.68	9.42	8.61	2.01	1.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19-May-20	5.63	4.74	5.44	4.56	6.87	6.03	Dry	-	10.84	9.93	9.44	8.57	9.30	8.49	1.79	1.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18-Jun-20	nm	-	nm	-	6.84	5.99	Dry	-	nm	-	nm	-	9.27	8.46	nm	-	12.29	11.40	4.07	3.20	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-
29-Jun-20	5.71	4.82	5.42	4.54	6.89	6.05	Dry	-	10.83	9.92	9.41	8.54	9.29	8.48	2.21	1.47	12.29	11.39	2.83	1.95	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-
21-Aug-20	5.89	5.00	7.32	6.44	7.05	6.21	Dry	-	10.87	9.96	9.48	8.61	9.36	8.55	2.60	1.86	12.30	11.41	1.86	0.99	5.83	4.83	-	-	-	-	-	-	-	-	-	-	-	-
19-Oct-20	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	2.20	1.32	5.44	4.43	-	-	-	-	-	-	-	-	-	-	-	-
2-Nov-20	6.04	5.15	6.83	5.94	7.21	6.37	Dry	-	11.05	10.14	9.64	8.77	9.52	8.71	2.68	1.94	12.44	11.54	nm	-	5.35	4.35	9.23	8.39	-	-	Dry	-	-	-	11.67	10.72	-	-
2-Feb-21	5.99	5.10	5.34	4.46	7.19	6.35	Dry	-	11.19	10.29	9.73	8.86	9.60	8.79	1.94	1.20	12.57	11.68	nm	-	3.80	2.80	9.32	8.48	6.63	5.75	Dry	-	1.93	1.04	11.77	10.82	nm	-
5-May-21	5.96	5.07	5.30	4.42	7.20	6.36	Dry	-	11.22	10.32	9.79	8.92	9.66	8.85	1.97	1.23	12.68	11.79	1.81	0.94	2.74	1.74	9.35	8.51	6.70	5.82	Dry	-	1.82	0.93	11.82	10.87	3.18	3.29
3-Aug-21	6.18	5.29	5.68	4.80	7.38	6.54	Dry	-	11.26	10.36	9.87	9.00	9.74	8.93	2.53	1.79	12.73	11.84	2.22	1.35	3.05	2.05	9.44	8.60	6.97	6.09	Dry	-	2.43	1.54	11.91	10.96	3.34	3.45
1-Nov-21	6.05	5.16	5.14	4.26	7.32	6.48	Dry	-	11.26	10.36	9.95	9.08	9.81	9.00	1.79	1.05	12.82	11.93	1.67	0.80	2.91	1.91	9.51	8.67	6.73	5.85	Dry	-	1.44	0.55	11.98	11.03	3.84	3.95
27-Jan-22	6.08	5.19	5.38	4.50	7.31	6.47	Dry	-	11.28	10.38	9.86	8.99	9.72	8.91	2.04	1.30	12.80	11.91	1.95	1.08	2.67	1.67	9.35	8.51	6.78	5.90	Dry	-	2.16	1.27	11.90	10.95	NM	-
8-Apr-22	5.81	4.92	5.26	4.38	7.13	6.29	Dry	-	10.90	9.99	9.76	8.89	9.62	8.81	1.73	0.99	12.69	11.80	1.69	0.82	2.60	1.60	9.05	8.21	6.42	5.54	Dry	-	1.25	0.36	11.79	10.84	2.79	2.90
7-Jul-22	6.09	5.20	5.63	4.75	7.26	6.42	Dry	-	11.18	10.28	9.71	8.84	9.62	8.81	2.61	1.87	12.62	11.73	2.68	1.81	2.85	1.85	9.20	8.36	6.93	6.05	Dry	-	2.42	1.53	11.79	10.84	3.61	3.72
27-Oct-22	6.39	5.50	6.83	5.95	7.67	6.83	7.41	6.63	11.27	10.37	9.97	9.10	9.85	9.04	3.20	2.46	12.79	11.90	4.76	3.89	4.84	3.84	9.51	8.67	7.23	6.35	Dry	-	3.06	2.17	12.00	11.05	N/M	-
10-Jan-23	6.27	5.38	5.84	4.96	7.54	6.70	7.43	6.65	11.28	10.38	10.08	9.21	9.93	9.12	1.81	1.07	12.89	12.00	2.07	1.20	5.38	4.38	6.27	5.43	6.92	6.04	Dry	-	1.61	0.72	12.11	11.16	N/M	-
11-Apr-23	5.88	4.99	5.37	4.49	7.30	6.46	Dry	-	11.28	10.38	9.97	9.10	9.84	9.03	1.54	0.80	12.92	12.03	1.91	1.04	4.19	3.19	9.35	8.51	6.49	5.61	Dry	-	1.35	0.46	12.00	11.05	2.93	3.04
21-Jul-23	6.04	5.15	5.42	4.54	7.43	6.31	Dry	-	11.29	10.39	9.87	9.00	9.74	8.93	1.40	0.66	12.75	11.86	1.69	0.82	3.24	2.24	9.34	8.50	6.82	5.94	DRY	-	1.36	0.47	11.90	10.95	N/M	-
10-Aug-23	nm	-	nm	-	7.47	6.35	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	nm	-	2.93	3.04

Notes:
TOC - Top of Casing
GS - Ground Surface
mAMSL - metres above mean sea level
mbtoc - metres below top of casing
mbgs - metres below ground surface

Table 2. Groundwater Elevations

ID	MW101-19	MW102-19	MW103-19	MW104-19	MW105-19	MW106A-19	MW106B-19	MW106C-19	MW201-20	MW202-20	MW203-20	MW301-20	MW302-20	MW304-20	MW305B-20	MW309-20	MW310-20
TOC Elevation (mAMSL)	358.49	359.79	359.88 360.16	361.96	362.75	361.58	361.45	361.35	364.00	358.56	359.85	361.36	359.48	361.67	361.49	363.55	359.39
GS Elevation (mAMSL)	357.60	358.91	359.04	361.18	361.85	360.71	360.64	360.61	363.11	357.69	358.84	360.52	358.60	360.67	360.60	362.60	359.50
Stickup (m)	0.89	0.88	0.84	0.78	0.91	0.87	0.81	0.74	0.89	0.87	1.01	0.84	0.88	1.00	0.89	0.95	-0.11
13-May-19	353.13	350.27	353.14	354.59	351.90	352.15	352.16	359.82	-	-	-	-	-	-	-	-	-
6-Sep-19	352.65	353.77	352.84	-	351.92	352.11	352.12	358.48	-	-	-	-	-	-	-	-	-
26-Nov-19	352.63	354.28	352.83	-	351.74	351.96	351.98	359.32	-	-	-	-	-	-	-	-	-
27-Feb-20	352.74	354.48	352.92	-	351.70	352.03	352.03	359.34	-	-	-	-	-	-	-	-	-
19-May-20	352.86	354.35	353.01	-	351.91	352.14	352.15	359.56	-	-	-	-	-	-	-	-	-
18-Jun-20	-	-	353.04	-	-	-	352.18	-	351.71	354.49	-	-	-	-	-	-	-
29-Jun-20	352.78	354.37	352.99	-	351.92	352.17	352.16	359.14	351.72	355.74	-	-	-	-	-	-	-
21-Aug-20	352.60	352.47	352.83	-	351.88	352.10	352.09	358.75	351.70	356.70	354.02	-	-	-	-	-	-
19-Oct-20	-	-	-	-	-	-	-	-	-	356.37	354.41	-	-	-	-	-	-
2-Nov-20	352.45	352.96	352.67	-	351.71	351.94	351.93	358.67	351.57	-	354.50	352.13	-	-	-	351.88	-
2-Feb-21	352.50	354.45	352.69	-	351.56	351.85	351.85	359.41	351.43	-	356.05	352.04	352.85	-	359.56	351.78	-
5-May-21	352.53	354.49	352.68	-	351.53	351.79	351.79	359.38	351.32	356.75	357.11	352.01	352.78	-	359.67	351.73	356.21
3-Aug-21	352.31	354.11	352.50	-	351.49	351.71	351.71	358.82	351.27	356.34	356.80	351.92	352.51	-	359.06	351.64	356.05
1-Nov-21	352.44	354.65	352.56	-	351.49	351.63	351.64	359.56	351.18	356.89	356.94	351.85	352.75	-	360.05	351.57	355.55
27-Jan-22	352.41	354.41	352.57	-	351.47	351.72	351.73	359.31	351.20	356.61	357.18	352.01	352.70	-	359.33	351.65	-
8-Apr-22	352.68	354.53	352.75	-	351.85	351.82	351.83	359.62	351.31	356.87	357.25	352.31	353.06	-	360.24	351.76	356.60
7-Jul-22	352.40	354.16	352.62	-	351.57	351.87	351.83	358.74	351.38	355.88	357.00	352.16	352.55	-	359.07	351.76	355.78
27-Oct-22	352.10	352.96	352.21	354.55	351.48	351.61	351.60	358.15	351.21	353.80	355.01	351.85	352.25	-	358.43	351.55	-
10-Jan-23	352.22	353.95	352.34	354.53	351.47	351.50	351.52	359.54	351.11	356.49	354.47	355.09	352.56	-	359.88	351.44	-
11-Apr-23	352.61	354.42	352.58	-	351.47	351.61	351.61	359.81	351.08	356.65	355.66	352.01	352.99	-	360.14	351.55	356.46
21-Jul-23	352.45	354.37	352.73	-	351.46	351.71	351.71	359.95	351.25	356.87	356.61	352.02	352.66	-	360.13	351.65	-
10-Aug-23	-	-	352.69	-	-	-	-	-	-	-	-	-	-	-	-	-	356.46

Notes:
TOC - Top of Casing
GS - Ground Surface
mAMSL - metres above mean sea level

Table 3. Groundwater Chemistry Summary

Parameter	Units	Lowest Detection Limit	MW202-20	MW102-19	MW106A-19	MW106C-19
			16-Jul-20			
			L2475516-1	L2475516-2	L2475516-3	L2475516-4
Physical Tests						
Colour, Apparent	CU	2	26	24.5	7.7	96.4
Conductivity	umhos/cm	3	856	934	694	600
Hardness (as CaCO3)	mg/L	0.5	414	451	311	207
pH	pH units	0.1	7.7	7.5	7.79	7.52
Total Dissolved Solids	mg/L	20	574	608	462	418
Turbidity	NTU	0.1	189	1190	35.1	567
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	mg/L	10	340	428	266	264
Ammonia, Total (as N)	mg/L	0.01	0.128	0.021	0.049	7.7
Chloride (Cl)	mg/L	0.5	3.45	23.7	18.1	10.1
Fluoride (F)	mg/L	0.02	0.392	0.324	0.156	0.255
Nitrate (as N)	mg/L	0.02	0.126	0.06	<0.020	6.76
Nitrite (as N)	mg/L	0.01	0.025	<0.010	<0.010	2.73
Orthophosphate-Dissolved (as P)	mg/L	0.003	0.0053	<0.0030	<0.0030	0.279
Sulfate (SO4)	mg/L	0.3	144	88.5	80.5	19.2
Dissolved Metals						
Aluminum (Al)-Dissolved	mg/L	0.005	<0.0050	0.0788	<0.0050	0.0116
Antimony (Sb)-Dissolved	mg/L	0.0001	0.00019	0.00014	<0.00010	0.00015
Arsenic (As)-Dissolved	mg/L	0.0001	0.00039	0.00074	0.0042	0.00238
Barium (Ba)-Dissolved	mg/L	0.0001	0.207	0.215	0.118	0.0455
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved	mg/L	0.01	0.045	0.029	0.021	0.047
Cadmium (Cd)-Dissolved	mg/L	0.000005	0.0000115	0.0000098	<0.0000050	0.0000398
Calcium (Ca)-Dissolved	mg/L	0.05	93.1	94.8	80	69.6
Chromium (Cr)-Dissolved	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.0001	0.00028	0.00024	0.00024	0.00098
Copper (Cu)-Dissolved	mg/L	0.0002	0.0032	0.00197	<0.00020	0.0459
Iron (Fe)-Dissolved	mg/L	0.01	<0.010	0.07	0.333	0.017
Lead (Pb)-Dissolved	mg/L	0.00005	<0.000050	0.000116	<0.000050	<0.000050
Magnesium (Mg)-Dissolved	mg/L	0.005	44	52	27	8.11
Manganese (Mn)-Dissolved	mg/L	0.0005	0.056	0.0343	0.0793	0.37
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.00186	0.00339	0.00779	0.00125
Nickel (Ni)-Dissolved	mg/L	0.0005	0.00181	0.00069	0.00404	0.00222
Phosphorus (P)-Dissolved	mg/L	0.05	<0.050	<0.050	<0.050	0.381
Potassium (K)-Dissolved	mg/L	0.05	3.86	3.95	2.86	18.5
Selenium (Se)-Dissolved	mg/L	0.00005	0.00124	0.000256	<0.000050	0.000281
Silicon (Si)-Dissolved	mg/L	0.05	7.12	7.39	8.13	4.35
Silver (Ag)-Dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	0.05	24.4	29.2	18.8	4.55
Strontium (Sr)-Dissolved	mg/L	0.001	0.902	0.441	0.44	0.128
Thallium (Tl)-Dissolved	mg/L	0.00001	0.000024	0.000016	<0.000010	0.000016
Tin (Sn)-Dissolved	mg/L	0.0001	0.0003	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.0003	<0.00030	0.00272	<0.00030	<0.00050
Tungsten (W)-Dissolved	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010
Uranium (U)-Dissolved	mg/L	0.00001	0.00693	0.00729	0.00216	0.000307
Vanadium (V)-Dissolved	mg/L	0.0005	<0.00050	0.00152	0.00051	0.00149
Zinc (Zn)-Dissolved	mg/L	0.001	0.0025	0.0022	<0.0010	0.0015
Zirconium (Zr)-Dissolved	mg/L	0.0003	<0.00030	<0.00030	<0.00030	<0.00030

Table 4. Surface Water Measurements

Date	Location	MP1-20	
		MP (IN)	SG (OUT)
	TOC Elevation (mamsl)	359.56	360.04
	GS Elevation (mamsl)	358.52	
		mbtoc	**mamsl**
29-Jun-20	Inside Level (IL) (m)	1.59	357.97
	Outside Level (OL) (m)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
21-Aug-20	Inside Level (IL)	1.34	358.22
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
2-Nov-20	Inside Level (IL)	1.33	358.23
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
2-Feb-21	Inside Level (IL)	1.3	358.26
	Outside Level (OL)	NM	-
	Vertical Hydraulic Gradient (m/m)	-	
5-May-21	Inside Level (IL)	0.88	358.68
	Outside Level (OL)	1.42	358.62
	Vertical Hydraulic Gradient (m/m)	-	
4-Aug-21	Inside Level (IL)	0.98	358.58
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
1-Nov-21	Inside Level (IL)	1.1	358.46
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
27-Jan-22	Inside Level (IL)	FROZEN	-
	Outside Level (OL)	FROZEN	-
	Vertical Hydraulic Gradient (m/m)	-	
8-Apr-22	Inside Level (IL)	0.83	358.73
	Outside Level (OL)	1.36	358.68
	Vertical Hydraulic Gradient (m/m)	-	
7-Jul-22	Inside Level (IL)	0.94	358.62
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
27-Oct-22	Inside Level (IL)	1.5	358.06
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
24-Nov-22	Inside Level (IL)	1.61	357.95
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
10-Jan-23	Inside Level (IL)	1.45	358.11
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	

Table 4. Surface Water Measurements

11-Apr-23	Inside Level (IL)	0.89	358.67
	Outside Level (OL)	1.42	358.62
	Vertical Hydraulic Gradient (m/m)	-	
21-Jul-23	Inside Level (IL)	0.85	358.71
	Outside Level (OL)	dry	-
	Vertical Hydraulic Gradient (m/m)	-	

Notes:

-reference point for inside level is MP TOC

-reference point for outside lievel is SG TOC

nm = not measured

mAMSL = meters above mean sea level

mbtoc = meters below top of casing

Appendix A

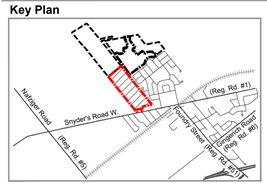
Draft Plan of Subdivision (MHBC, August 11, 2023)

CONSOLIDATED DRAFT PLANS OF SUBDIVISION

Legal Description

PART OF LOTS 14-16, CONCESSION NORTH OF SNYDER'S ROAD
TOWNSHIP OF WILMOT
REGION OF WATERLOO

Key Plan



30T-21601
30T-22602
Additional Lands Owned by Applicants

SCALE: NTS

Area Schedule - Snyder's Road (Baden) GP Inc. **30T-21601**

Description	Stage 1 Lot/ Block	Stage 1 Units* (min/max)	Stage 1 Area (ha)	Stage 2 Block	Stage 2 Units* (min/max)	Stage 2 Area (ha)
Residential	1-24	87-107	3.27			
Multiple Residential	25	72-108	1.30			
Park	26		0.70			
School				1	166-202	2.12
Stormwater Management Facility	27		1.10			
Trail	28,29		0.23			
Consolidation (Residential)	30		0.01			
0.3m Reserves	31-35		0.01			
Roads			2.72			
Sub-Total	**35**	**159-215**	**9.34**	**1**	**166-202**	**2.12**

Description	Stage 3 Block	Stage 3 Units* (min/max)	Stage 3 Area (ha)	Stage 4 Block	Stage 4 Units* (min/max)	Stage 4 Area (ha)
Residential	1-26	127-152	4.38	1-13	117-157	4.57
Multiple Residential	27	39-59	1.22			
Trail	28,29		0.15	14,15		0.07
Walkway	30		0.02			
Future Development				16-18	3	0.28
0.3m Reserves	31-33		0.01	19-21		0.01
Roads			2.33			2.04
Sub-Total	**33**	**166-211**	**8.11**	**21**	**120-160**	**6.97**

Description	Total Blocks	Total Units* (min/max)	Total Area (ha)
Residential	63	331-416	12.22
Multiple Residential	2	111-167	2.52
Park	1		0.70
School	1	166-202	2.12
Stormwater Management Facility	1		1.10
Trail	6		0.45
Consolidation (Residential)	1		0.01
Walkway	1		0.02
Future Development	3	3	0.28
0.3m Reserves	11		0.03
Roads			7.09
Total	**90**	**611-788**	**26.54**

Area Schedule - Snyder's Road (Baden) GP Inc. **30T-22602**

Description*	Blocks	Units (min/max)	% of Unit Total	Area (ha)
Residential (Singles)**	1-18	164-199	55-53	7.196
Multiple Residential (Townhomes)***	19,20	136-176	45-47	3.860
Stormwater Management Facility	21			2.414
Trail	22,23			0.112
Trail/Drainage Corridor	24			0.259
Drainage Corridor	25			0.321
Walkway	26			0.039
0.3m Reserves	27-32			0.006
Roads				3.766
Total	**32**	**300-375**	**100%**	**17.973**

*Blocks shown on Draft Plan are 'Residential' unless otherwise specified.
** For minimum unit yield 13.11m (43 ft) wide lots are assumed and for maximum unit yield, 10.973m (36 ft) wide lots are assumed.
*** For the Multiple Residential block the number of units assumes Concept Plans (Townhomes).

Minimum Total Number of Units
(Snyder's Road (Baden) GP Inc. & Activa Holdings Inc.): 911

Maximum Total Number of Units
(Snyder's Road (Baden) GP Inc. & Activa Holdings Inc.): 1,163
(not including accessory or secondary dwelling units)

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 August 11, 2023
File No. 1985A/8784BB
Plan Scale 1:1,500 (30x36)
Drawn By DGS
Checked By PC/PB

Project Baden Properties

Applicant

north

File Name **DRAFT PLAN OF SUBDIVISION**

Scale Bar 0 10 25 50 75 100 125 150m

K:\1985A-Snyders Road (Baden) Developments Inc-1012 Snyders Road-Baden\DP\Snyders Road Baden GP Inc and Activa Consolidated Plan August11 2023.dwg

Appendix B

Borehole Logs, Monitoring Well Installation Details & PML Geotechnical Report

ID Number: MW101-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/3/2019

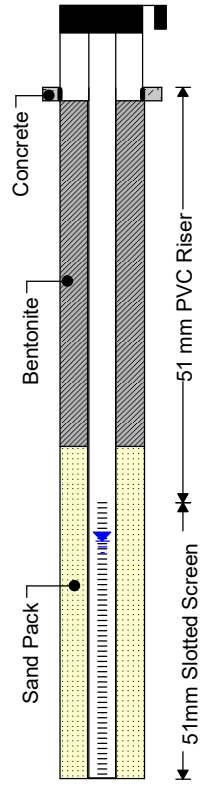
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
0 / 0	Ground Surface	357.6					
	TOPSOIL dark brown, silty, clayey, moist	0.0	1	SS	30	8	23
	CLAYEY SILT brown, trace sand, moist		2	SS	75	9	27
		356.1					
6 / 2	**SANDY SILT** brown, trace clay, trace gravel, moist	1.5	3	SS	100	12	20
		355.3					
8 /	**SAND** brown, trace silt, moist	2.3	4	SS	75	17	16
10 /			5	SS	85	32	9
12 / 4							
14 /	saturated	353.0					
16 /		4.6	6	SS	70	39	19
18 /							
20 / 6			7	SS	90	28	19
22 /							
24 /							
26 / 8			8	SS	75	6	24
		349.4					
28 /	Drilling Terminated	8.2					
30 /							
32 / 10							
34 /							
36 /							
38 /							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW102-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/3/2019

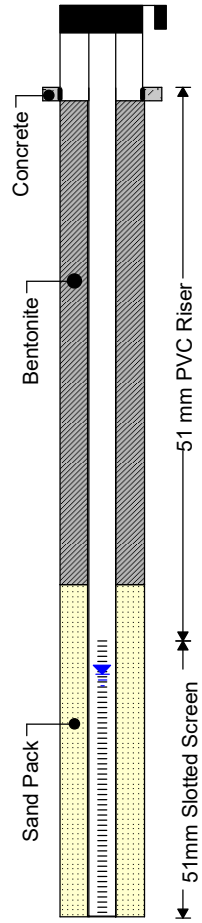
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	358.9 / 0.0					
0 / 0	**TOPSOIL** dark brown, silty, sandy, some clay, moist		1	ss	70	6	30
2	**SANDY SILT** brown, some clay, moist		2	ss	50	12	21
4			3	ss	100	15	23
6 / 2		356.6 / 2.3					
8	**CLAYEY SILT TILL** brown, trace sand, trace gravel, moist		4	ss	90	10	24
10			5	ss	100	11	23
12 / 4							
14	grey below 4.6m	354.3 / 4.6	6	ss	100	14	21
16							
18							
20 / 6			7	ss	100	12	18
22							
24							
26 / 8			8	ss	100	16	16
28							
30							
32 / 10		349.1 / 9.8	9	ss	100	16	14
34	Drilling Terminated						
36							
38							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW103-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

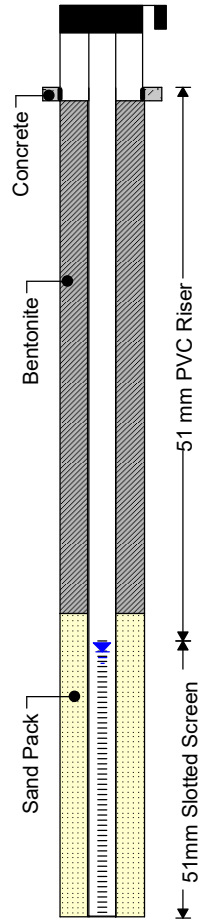
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	359.0 / 0.0					
0 / 0	**TOPSOIL** dark brown,clayey silt, moist	0.0	1	ss	75	7	30
2 /	**SILTY CLAY** brown, some sand, moist	358.3 / 0.8	2	ss	85	18	19
4 /	**CLAYEY SILT TILL** brown, some sand, trace gravel, moist		3	ss	100	20	21
6 / 2			4	ss	100	13	21
8 /			5	ss	90	12	21
10 /		354.5 / 4.6	6	ss	100	12	16
12 / 4	**SANDY SILT TILL** grey, some clay, trace gravel, moist	352.9 / 6.1	7	ss	100	11	17
14 /	**CLAYEY SILT TILL** grey, some sand, trace gravel, moist	351.4 / 7.6	8	ss	90	5	18
16 /	wet below 7.6m						
18 / 6							
20 /							
22 /							
24 /							
26 / 8			9	ss	85	6	20
28 /		349.3 / 9.8					
30 /							
32 / 10	Drilling Terminated						
34 /							
36 /							
38 /							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW104-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

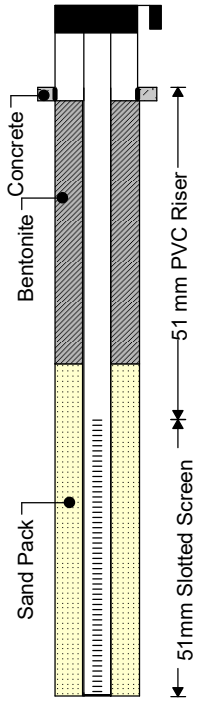
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	361.2					
0 / 0	**TOPSOIL** dark brown, clayey silt, moist	0.0	1	ss	75	6	27
2	**CLAYEY SILT** brown, clayey, trace to some sand, moist	360.4 / 0.8	2	ss	100	19	14
4	**SILT** sandy, trace clay	359.6 / 1.5	3	ss	90	19	13
6 / 2	**SILTY SAND** brown, trace gravel, moist		4	ss	75	24	14
10		358.1					
12 / 4	**SILT** brown, some sand, trace clay, trace gravel, damp	3.0	5	ss	50	23	15
14		356.6					
16	grey, clayey, wet	4.6	6	ss	95	19	20
18		355.1					
20 / 6	**SILTY SAND** brown, saturated	6.1	7	ss	85	22	24
24		353.5					
26 / 8	trace silt, moist	7.6 / 352.9	8	ss	80	21	6
28	Drilling Terminated	8.2					
32 / 10							
34							
36							
38							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Well dry August 21, 2020.

ID Number: MW105-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

Drilling Contractor: Aardvark Drilling Inc.

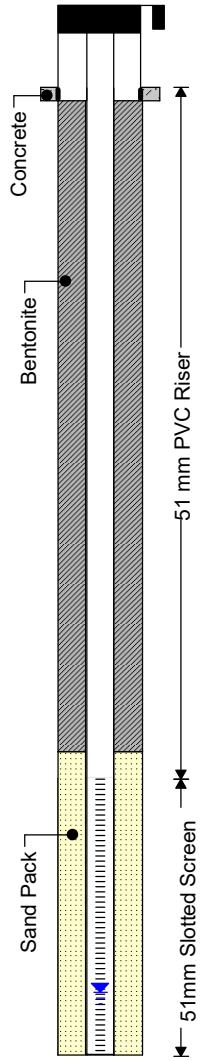
Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	361.8					
0 / 0	**TOPSOIL** dark brown, silty sand, moist	0.0	1	SS	70	3	21
		361.1					
2	**SAND** brown, some silt, moist	0.8	2	SS	65	5	24
4	silty, trace clay	360.3					
6 / 2	some silt, saturated	1.5	3	SS	80	3	26
8			4	SS	70	2	17
10		358.8					
	trace silt, moist	3.0	5	SS	70	10	
12 / 4							
14			6	SS	100	36	6
16							
18							
20 / 6			7	SS	95	39	3
22							
24		354.2					
	wet	7.6	8	SS	85	33	20
26 / 8							
28							
30			9	SS	90	32	18
32							
34 / 10		351.2					
	saturated	10.7	10	SS	85	20	20
36		350.6					
38	Drilling Terminated	11.3					

Well Completion Details



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW106A-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 4/29/2019

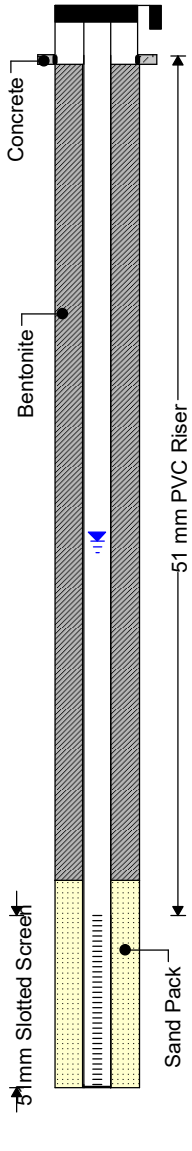
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	360.7					
0 / 0	**TOPSOIL** dark brown, silty sand, moist	0.0 / 359.9	1	SS	90	5	14
2	**SAND** brown, some silt, trace gravel, moist	0.8 / 359.2	2	SS	60	2	20
4	trace silt, moist	1.5 / 358.4	3	SS	50	7	19
6 / 2	wet	2.3 / 357.6	4	SS	60	12	20
8	saturated						
10	**SILT** brown, trace sand, varying degrees of clay content, saturated	3.0 / 356.9	5	SS	75	14	20
12 / 4	trace gravel, moist	3.8 / 356.1	6	SS	75	11	20
14	grey	4.6 / 354.6	7	SS	100	12	24
16							
18							
20 / 6	**SAND** brown fine-grained sand, trace silt, moist	6.1 / 353.1	8	SS	50	32	13
22							
24							
26 / 8	**SANDY SILT** brown, trace clay, moist	7.6 / 351.6	9	SS	100	26	25
28							
30							
32 / 10	**SAND** brown, trace silt, saturated	9.1 / 350.0	10	SS	75	41	19
34							
36	coarse-grained sand, saturated	10.7 / 348.5	11	SS	90	13	16
38							
40 / 12	medium-grained sand	12.2	12	SS	65	32	19
42							
44							
46 / 14			13	SS	75	37	17
48							
50			14	SS	65	48	22
52 / 16							
54							
56			15	SS	65	42	18
58							
60 / 18			16	SS	50	48	16
62	Drilling Terminated	341.8 / 18.9					



Field Technician: TXG

Drafted by: TXG

Reviewed by:

Notes:
Water level measured August 21, 2020.

ID Number: MW106B-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

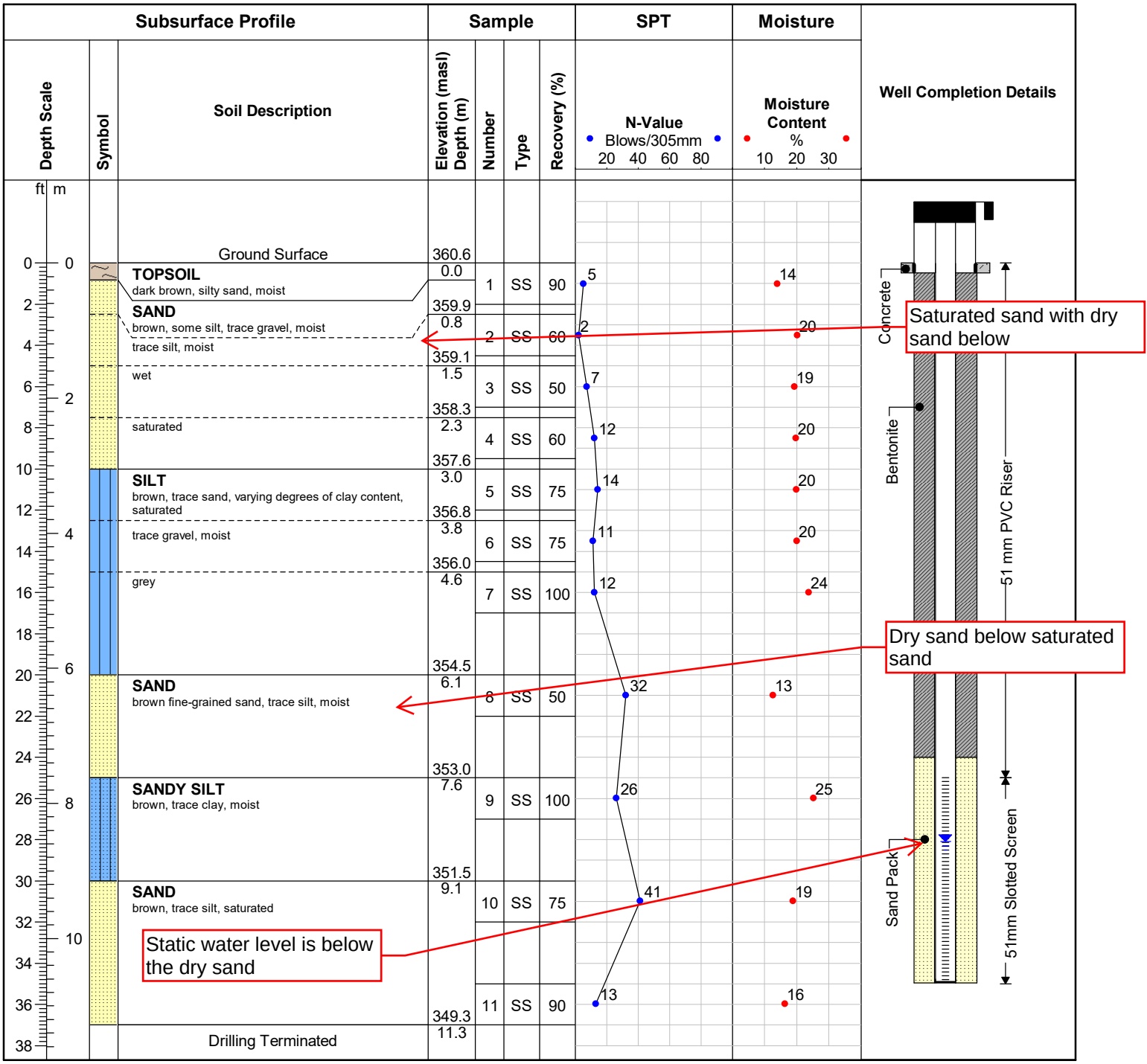
Date Completed: 4/26/2019

Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured August 21, 2020.

ID Number: MW106C-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 4/26/2019

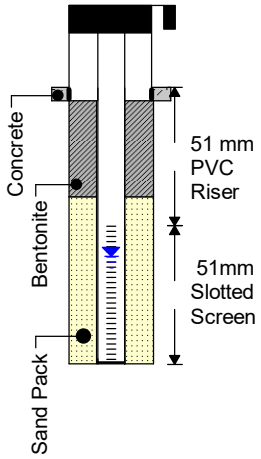
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Subsurface Profile			Sample				SPT	Moisture	Well Completion Details
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value Blows/305mm (20 40 60 80)	Moisture Content % (10 20 30)	
ft / m		Ground Surface	360.6						
0 / 0		**TOPSOIL** dark brown, silty sand, moist	0.0	1	SS	90	5	14	
			359.8						
2		**SAND** brown, some silt, trace gravel, moist	0.8	2	SS	60	2	20	
4		trace silt, moist	359.1						
6 / 2		wet	1.5	3	SS	50	7	19	
8		saturated	358.3						
			2.3	4	SS	60	12	20	
10			357.5						
		SILT brown, trace sand, varying degrees of clay content, saturated	3.0	5	SS	75	14	20	
12 / 4			356.9						
14		Drilling Terminated	3.7						
16									
18									
20 / 6									
22									
24									
26 / 8									
28									
30									
32 / 10									
34									
36									
38									



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured August 21, 2020.

ID Number: MW201-20

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 6/10/2020

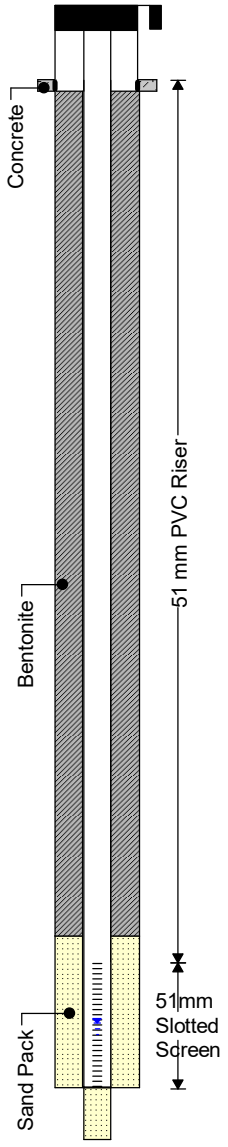
Drilling Contractor: London Soil Test Ltd.

Drill Rig: D-50 Turbo

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	363.1					
0 / 0	**TOPSOIL** dark brown silt topsoil, moist	0.0	1	ss	79	3	13
2 /	**SAND** dark brown fine-grained sand, silty, trace gravel, moist	361.8	2	ss	83	5	3
4 /	light brown, trace to some silt, dry to moist	1.2					
6 / 2		360.9	3	ss	100	18	7
8 /	brown, silty wet seam at 2.6m (7.6cm)	2.1	4	ss	96	11	7
10 /			5	ss	100	18	7
12 / 4	light brown to brown, moist	359.4 3.7	6	ss	92	20	
14 /		358.5					
16 /	wet to saturated between 4.6-5.2m	4.6 357.9	7	ss	75	16	22
18 /		5.2	8	ss	92	21	
20 / 6			9	ss	100	15	5
22 /							
24 /		355.4					
26 / 8	dark brown, fine to medium-grained, trace to some silt, moist	7.6	10	ss	100	29	6
28 /							
30 /			11	ss	83	22	7
32 / 10							
34 /							
36 /	saturated	351.9 11.2	12	ss	88	31	6
38 /							
40 / 12	Drilling Terminated	350.3 12.8	13	ss	100	23	20
42 /							



Field Technician: KLW

Drafted by: KLW

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW202-20

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 6/10/2020

Drilling Contractor: London Soil Test Ltd.

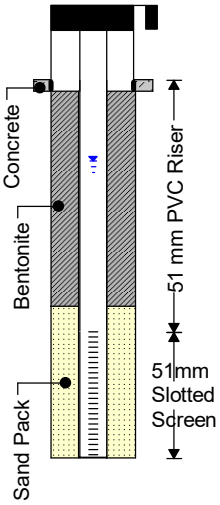
Drill Rig: D-50 Turbo

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
ft / m		Ground Surface	357.7					
		TOPSOIL brown silt topsoil, moist	0.0	1	ss	100	6	29
		SILT TILL brown silt till, some clay to clayey, minor gravel, mottled		2	ss	100	9	19
		trace to some gravel	356.2 1.5	3	ss	85	16	19
		brownish-grey, clayey, moist to wet	355.4 2.3	4	ss	100	7	25
		very moist to wet		5	ss	100	4	23
				6	ss	100	7	23
		Drilling Terminated	353.1 4.6					

Well Completion Details



Field Technician: KLW

Drafted by: KLW

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MW203-20

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 6/10/2020

Drilling Contractor: London Soil Test Ltd.

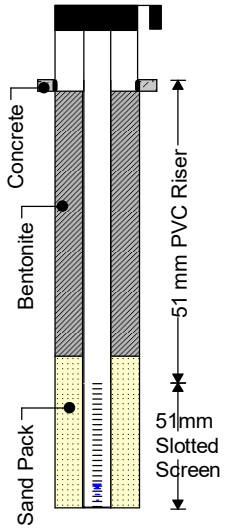
Drill Rig: D-50 Turbo

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	SPT N-Value (Blows/305mm)	Moisture Content (%)
		Ground Surface	358.8					
		TOPSOIL brown silt topsoil, moist	0.0	1	ss	100	18	18
		SILT TILL brown silt till, some clay to clayey, trace gravel, mottled		2	ss	88	25	18
			357.3					
		greyish-brown, clayey, trace to some gravel	1.5	3	ss	100	28	17
			356.5					
		grey, trace gravel	2.3	4	ss	100	17	22
				5	ss	100	15	22
				6	ss	100	14	18
			353.6	7	ss	100	17	16
		Drilling Terminated	5.2					

Moisture Content (%): 10 20 30



Field Technician: KLW

Drafted by: KLW

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.

ID Number: MP1-20

Project: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

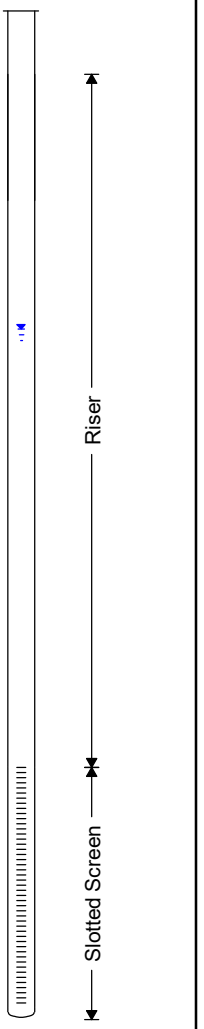
Date: 6/18/2020

Construction Materials: Stainless Steel

Installation Method: Drive Point

Subsurface Profile

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Soil Sample Lab Analysis	Piezometer
0	0		Ground Surface	359.6		
			PEAT dark brownish-black muck/peat, saturated	0.0 359.5		
			SILT TILL brown silt till, some clay to clayey	0.1		
2						
			Excavation Terminated	358.5 1.1		
4						



Field Technician: KLW

Drafted by: KLW

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Water level measured August 21, 2020.
Lithology below 0.3 mbgs inferred from MW203-20.

ID Number: BH303-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/19/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace PID (ppm)	Headspace Hydrocarbon (ppm)	Well Completion Details
			Ground Surface	360.6							
0	0		**TOPSOIL** Dark brown topsoil with trace organics, moist.	0.0							
2				359.6	1	DP	100	See Notes	0		
4			**SAND** Medium brown coarse sand moist.	0.9							Bentonite
6	2										
8			Sand turns grey and is saturated.	358.1 / 2.4	2	DP	100				
10				357.5					0		
12	4		Drilling Terminated	3.0							
14											
16											
18											
20	6										

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

Sheet: 1 of 1

No odour or staining unless otherwise noted.
Soil sample lab analysis at 1-2': Metals, As, Sb, Se, OCPs, PCBs,

ID Number: BH305-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
			Ground Surface	360.6						
0	0		**TOPSOIL** Dark brown silty topsoil with trace organics, moist.	0.0 / 360.3						
			SAND AND GRAVEL Medium brown sand and gravel, dry.	0.3	1	DP	100	PHCs F1-F4, BTEX	0	
4			**CLAY TILL** Dark grey clay till, moist.	359.2 / 1.4						Bentonite
6	2		Slight hydrocarbon-like odour noted, clay till becomes wet to saturated.	358.7 / 1.8	2	DP	100	PHCs F1-F4, BTEX	0 10	
10			Drilling Terminated	357.5 / 3.0						
12	4									
16										
18										
20	6									

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: BH306-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
0 ft / 0 m		Ground Surface	360.7						
0		**FILL** Sandy topsoil mixed with gravel fill, concrete, and demolition debris.	0.0 / 360.3				See Notes, pH	0	
2		**CLAY** Medium brown clay, moist.	0.5	1	DP	100	See Notes	0	
4									Bentonite
6 / 2				2	DP	100			
8			358.0						
		SAND Medium brown fine sand, moist.	2.7 / 357.7					0	
10		Drilling Terminated	3.0						
12 / 4									
14									
16									
18									
20 / 6									

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

No odour or staining unless otherwise noted.

Soil sample lab analysis for 0.5-1.5' & 2-3': Metals, As, Sb, Se, PAHs, PHCs F1-F4, BTEX

ID Number: BH307-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
0 ft / 0 m		Ground Surface	360.7						
0		**FILL** Silty topsoil mixed with gravel fill and demolition debris, trace organics.	0.0 / 360.4				See notes	0	
0.3		**CLAY** Medium brown clay, moist.		1	DP	100			
2 ft / 2 m									
4									
6				2	DP	100			
2			358.3						
8		**SAND** Medium brown fine sand, moist.	2.4						
			357.7				pH	0	
10		Drilling Terminated	3.0						
12 ft / 4 m									
14									
16									
18									
20 ft / 6 m									

Bentonite

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

Sheet: 1 of 1

No odour or staining unless otherwise noted.
Soil analysis at 0-1': Metals, As, Sb, Se, PHCs F1-F4, PAHs, VOCs, pH

ID Number: BH308-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Subsurface Profile			Sample					Headspace	
Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
0 ft / 0 m		Ground Surface	360.2						
		TOPSOIL Dark brown topsoil with trace organics, moist.	0.0 / 359.9						
		SAND Medium brown coarse sand, moist.	0.3	1	DP	100	PCBs, PHCs F1-F4, BTEX	0	
4 ft		Sand becomes wet.	359.0 / 1.2					0	
		Drilling Terminated	358.7 / 1.5						Bentonite
20 ft / 6 m									

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW301-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
0 ft / 0 m		Ground Surface	360.5						
0		**SAND** Medium brown sand with trace gravel, moist.	0.0	1	DP	75	Metals, As, Sb, Se, OCPs, PCBs, PAHs, PHCs F1-F4, VOCs	6	
4		**CLAYEY SILT TILL** Brown clayey silt till, moist.	359.2 1.2	2	DP	100			
8		Till becomes wet.	357.7 2.7						
10		**SAND** Medium brown fine sand, dry.	357.4 3.0	3	DP	95			
14				4	DP	95		0	
20									Concrete; Bentonite; 32mm PVC Riser

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW301-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

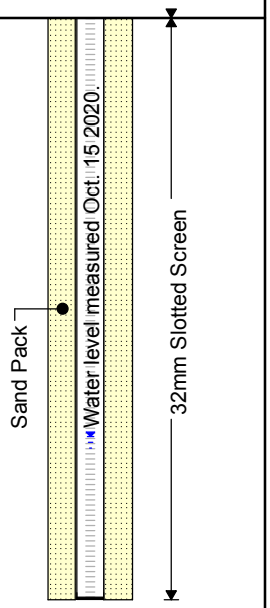
Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Subsurface Profile			Sample					Headspace	Well Completion Details
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400	
22				5	DP	100			
24		Sand becomes wet.	353.1 7.3				PHCs F1-F4, VOCs	0	
26	8			6	DP	100			
28									
30		Drilling Terminated	351.3 9.1						
32	10								
34									
36									
38									
40	12								



Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

No odour or staining unless otherwise noted.

ID Number: MW304-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

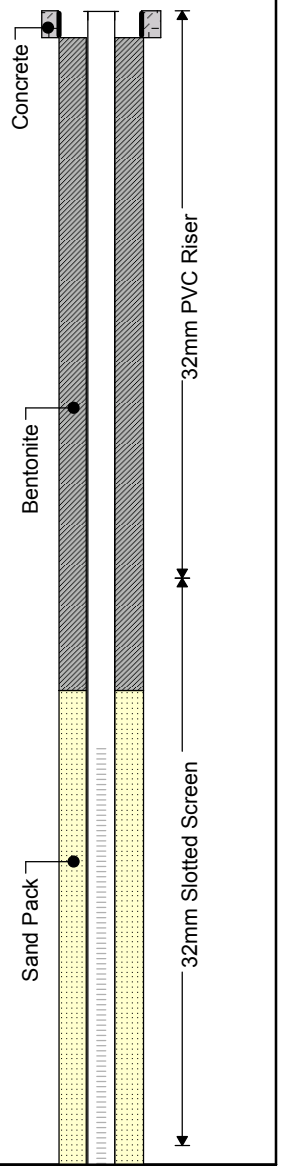
Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace PID (ppm)	Headspace Hydrocarbon (ppm)
			Ground Surface	360.7						
0	0		**TOPSOIL** Dark brown silty topsoil with trace organics, moist.	0.0						
			CLAYEY SILT TILL Medium brown clayey silt till, moist.		1	DP	75	PHCs F1-F4, BTEX	0	
2										
4					2	DP	100			
6	2									
8			**SAND** Medium brown fine sand, moist.	358.3 / 2.4						
10					3	DP	100			
12										
14	4							PHCs F1-F4, VOCs, PAHs	0	
			Sand becomes slightly silty, wet.	356.2 / 4.6						
16					4	DP	75			
18										
			Medium brown coarse sand, moist.	355.0 / 5.8						
20	6									



Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW304-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Subsurface Profile			Sample					Headspace	
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400	Well Completion Details
22				5	DP	100			Water level measured Oct. 15, 2020.
24									Cave
			353.1						
		Drilling Terminated	7.6						
26									
	8								
28									
30									
32									
	10								
34									
36									
38									
	12								
40									

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

No odour or staining unless otherwise noted.

ID Number: MW309-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/19/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push, Hollow Stem Auger

Protective Cover: Monument

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
		Ground Surface	362.6						
0		**TOPSOIL** Dark brown silty topsoil with trace organics, most.	0.0						
2			361.7	1	DP	50	PHCs F1-F4, BTEX, PAHs	0	
		SAND Medium brown coarse sand, dry.	0.9						
4								0	
6				2	DP	90			
10				3	DP	100			
12									
14			358.2						
		SILTY SAND Medium brown silty sand lens, wet.	4.4						
16		**SAND** Medium brown coarse sand, dry.		4	DP	100			
18									
20									

Well Completion Details: Concrete; Bentonite; 32mm PVC Riser

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW309-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/19/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push, Hollow Stem Auger

Protective Cover: Monument

Subsurface Profile			Sample					Headspace	Well Completion Details
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400	
22				5	DP	100		0	
24									
26	8								
28									
30				6	HSA	75			
32									
34	10								
36		Sand becomes saturated.	351.9 10.7	7	HSA	75	PHCs F1-F4, BTEX, PAHs	0	
38		Drilling Terminated	351.0 11.6						
40	12								

Sand Pack

Water level measured Oct. 19, 2020.

32mm Slotted Screen

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

MTE

No odour or staining unless otherwise noted.

ID Number: MW310-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/19/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

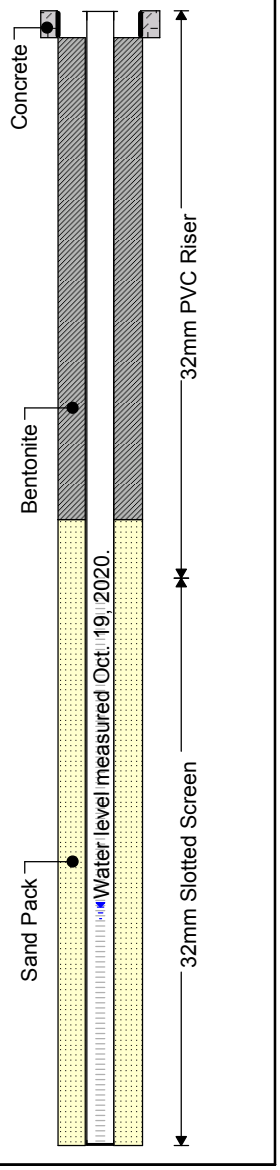
Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Flushmount

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace PID (ppm)	Headspace Hydrocarbon (ppm)
0	0		Ground Surface	359.5						
			TOPSOIL Dark brown silty topsoil with trace organics and some gravel, damp.	0.0						
					1	DP	100		0	
				358.5						
			CLAYEY SILT TILL Medium brown silty clay till, some trace gravel, damp.	1.1						
									0	
					2	DP	100			
			Till becomes slightly darker brown, moist.	356.8						
				2.7						
					3	DP	100			
				354.7						
			Till turns grey, wet.	4.9						
					4	DP	100	PHC F1-F4, BTEX	0	
				353.4						
				6.1						

Well Completion Details



Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: BH305A-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 10/15/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: None

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	Soil Sample Lab Analysis	Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400)	Well Completion Details
0 ft / 0 m		Ground Surface	360.6						
		TOPSOIL Dark brown silty topsoil with trace organics, moist.	0.0 / 360.3						
		SAND AND GRAVEL Medium brown sand and gravel, dry.	0.3	1	DP	100	PHCs F1-F4, BTEX	0	
4		**CLAY TILL** Dark grey clay till, moist.	359.2 / 1.4						
6 / 2		Slight hydrocarbon-like odour noted, clay till becomes wet to saturated.	358.7 / 1.8	2	DP	100	PHCs F1-F4, BTEX	0	
10 / 4		Drilling Terminated	357.5 / 3.0						Bentonite
20 / 6									

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW302-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 11/9/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

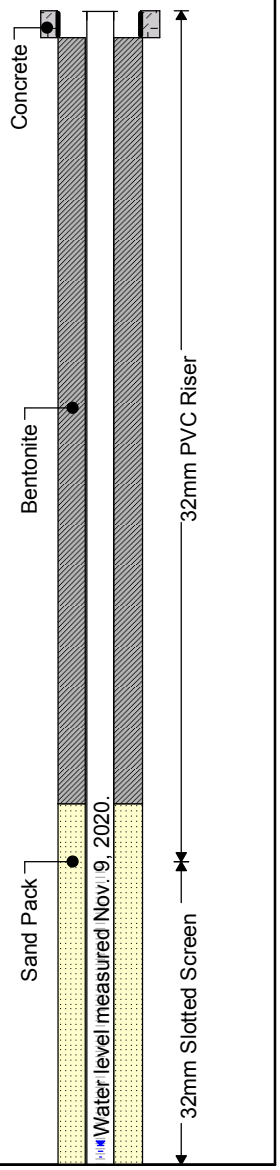
Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace PID (ppm)	Headspace Hydrocarbon (ppm)
			Ground Surface	358.6						
0	0		**TOPSOIL** Dark brown silty topsoil with trace organics and some gravel, damp.	0.0 / 358.3 / 0.3					0	0
2			**SILTY CLAY TILL** Medium brown silty clay till, some trace gravel, damp.		1	DP	100			
4										
6	2				2	DP	100			
8										
10										
12	4				3	DP	100			
14										
16										
18					4	DP	100			
20	6		Till becomes grey, slightly wet.	352.7 / 5.9						

Well Completion Details



Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW302-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 11/9/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Subsurface Profile			Sample					Headspace	Well Completion Details
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400	
22				5	DP	100	Metals, As, Sb, Se, PHC F1-F4, VOCs	0	
24			351.0						
		Drilling Terminated	7.6						
26	8								
28									
30									
32									
34	10								
36									
38									
40	12								

Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

ID Number: MW305B-20

Project: Phase II ESA

Project No: 40777-200

Client: Snyders Road (Baden) Developments Inc.

Site Location: 1012 Snyders Road West, Baden, ON

Drill Date: 11/9/2020

Drilling Contractor: Direct Environmental Drilling Ltd.

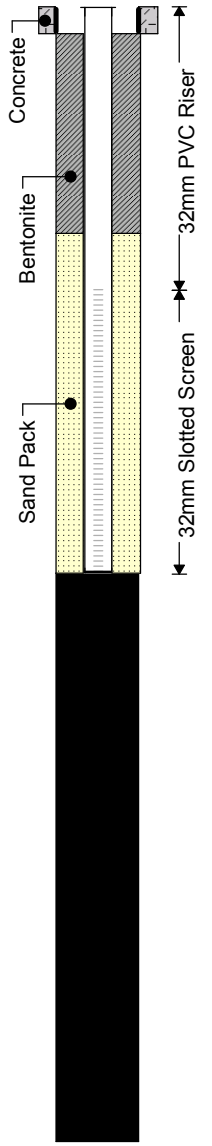
Drill Rig: Geoprobe

Drill Method: Direct Push

Protective Cover: Monument

Depth (ft)	Depth (m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	Soil Sample Lab Analysis	Headspace PID (ppm)	Headspace Hydrocarbon (ppm)
			Ground Surface	360.6						
0	0		**TOPSOIL** Dark brown silty topsoil with trace organics and some gravel, damp.	0.0 / 360.3					0	
2			**SAND AND GRAVEL** Medium brown sand and gravel, moist.	0.3	1	DP	50			
4				359.2						
6	2		**SILTY CLAY TILL** Medium brown silty clay till, moist.	1.4				PHCs F1-F4, BTEX	0	
8			Till becomes grey, wet.	358.4 / 2.1	2	DP	75			
10			Till becomes brown-grey, damp.	357.5 / 3.0	3	DP	90			
12	4									
14										
16					4	DP	90			
18			**SAND** Grey coarse sand, wet.	355.1 / 5.5						
20	6			354.5 / 6.1						

Well Completion Details



Field Technician: JMS

Drafted by: JMS

Reviewed by: RMR

No odour or staining unless otherwise noted.

Sheet: 1 of 1

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
1012 SNYDER'S ROAD WEST
BADEN, ONTARIO

for

SNYDER'S ROAD (BADEN) DEVELOPMENTS INC.
c/o MTE CONSULTANTS INC.

PETO MacCALLUM LTD.
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Distribution:
1 cc: Snyder's Road (Baden) Developments Inc. (+email)
2 cc: MTE Consultants Inc. (+email)
1 cc: PML Kitchener

PML Ref.: 20KF006
Report: 1
August 5, 2020

Peto MacCallum Ltd.
CONSULTING ENGINEERS

August 5, 2020

PML Ref.: 20KF006
Report: 1

Snyder's Road (Baden) Developments Inc.
c/o Mr. Alex Cressman, E.I.T.
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9

Dear Mr. Cressman

Geotechnical Investigation
Proposed Residential Subdivision
1012 Snyder's Road West
Baden , Ontario

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation recently completed at the above noted project site. Authorization to proceed with this assignment was provided by Mr. Gougoulias of Snyder's Road (Baden) Developments Inc. in an email dated February 3, 2020, with a signed engineering services agreement to be returned.

Project Description

The project involves the proposed development of an approximately 20.7 ha, rectangular parcel of land that is located on the north side of Snyder's Road West in Baden, Ontario. It is understood that development plans currently include approximately 10.34 ha of single-detached dwellings, 0.77 ha of multiple residential units, a school and a stormwater facility that will be located near the western property limit. The development will also include the construction of six new roads, and will be serviced with watermains, storm sewers and sanitary sewers, which are expected to be at a maximum of 3 to 4 m depth.

The purpose of the geotechnical investigation was to explore the subsurface soil and ground water conditions at the site. Based on the findings, we have prepared an engineering report with geotechnical recommendations pertaining to design and construction of the proposed works.

It is noted that a hydrogeological investigation was previously completed by MTE Consultants Inc. (MTE) in 2019. Reference is made to their Project No: 40777-800 for details. Borehole and monitoring well data from their investigation has been utilized during the geotechnical investigation; the MTE borehole / monitoring well logs are presented in Appendix A for ease of reference.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are for preliminary design purposes only. Any changes in plans will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and / or investigation. When the project design is complete, the general recommendations given in this report should be reviewed to ensure their applicability.

Investigation Procedure

Fieldwork

The fieldwork for the current geotechnical investigation was completed between February 20 and February 24, 2020. Boreholes were drilled at twelve locations (BH1 to BH12) as shown on the appended Borehole Location Plan, Drawing 1. In addition, four dynamic cone penetration tests (DCPT) were conducted at locations where the previous MTE boreholes revealed soft / loose subgrade conditions.

The boreholes and dynamic cones were advanced using a CME 55 track mounted drill rig equipped with an automatic hammer and continuous flight hollow stem augers. The drilling equipment was supplied and operated by specialist contractors working under subcontract to PML. The fieldwork was supervised throughout by a member of PML's engineering staff who directed the drilling and sampling operation, prepared the stratigraphic logs, monitored ground water conditions, and processed the recovered samples.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard penetration tests (SPT) were carried out during sampling operations of the boreholes using conventional split spoon equipment.

Ground water observations were made in the boreholes during and upon completion of drilling. The boreholes were backfilled and compacted in accordance with O.Reg.903 upon completion of drilling.

The borehole locations were established in the field by PML in order to supplement the borehole information previously obtained by MTE. The borehole locations and geodetic elevations were surveyed with a Sokkia GCX3 Real Time Kinematic receiver connected to the Global Navigation Satellite System.

Laboratory Testing

All soil samples collected during the investigation were returned to PML's laboratory for detailed visual examination and testing. The geotechnical testing program included natural moisture content determinations on all recovered split spoon samples. In addition, four particle size distribution analyses were completed on samples of the major subgrade soil types encountered.

Summarized Findings

The site is a 20.7 ha, rectangular shaped piece of land that is currently vacant, and was formerly occupied as agricultural land with associated buildings now demolished. In general, the site is relatively flat with gentle rolling hills. Geodetic elevations between 363.0 and 359.0 indicate that the surface topography slopes very slightly to the south; however, local hills and depressions were observed throughout the site.

Subsurface Conditions

Reference is made to the appended Log of Borehole sheets for details of the fieldwork including soil descriptions, inferred stratigraphy, standard penetration test (SPT) N values, ground water observations and laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth / elevation demarcations on the borehole logs must be viewed as "transitional" zones, and cannot be construed as exact geologic boundaries between layers.

In general, the subsurface conditions encountered at the borehole locations consisted of surficial topsoil overlying native clayey silt and / or sand deposits. Deep layers of fill and organics were contacted within a former pond area near the former site structures (BH6 to BH8). The findings were generally similar to MTE's findings, where discontinuous cohesive and cohesionless deposits were contacted.

Topsoil / Topsoil Fill

Between 140 and 360 mm of surficial clayey silt topsoil / topsoil fill (average topsoil depth of 265 mm) was typically contacted in the PML boreholes, with a local maximum depth of 600 mm contacted in BH6 (near the former pond). The topsoil was typically moist, or frozen with trace sand and trace gravel.

Fill

Underlying the topsoil, fill was contacted in BH6, BH7 and BH8, extending to depths of between 2.1 and 3.1 m below grade. Fill was not contacted elsewhere at the site, or in the MTE boreholes; however, it is noted that some debris piles were observed near the former structures. The fill material contacted was placed to fill a pond that was located near the former structures, and was typically comprised of dark brown to brown, or mottled brown and grey clayey silt. Organics and roots were observed within the fill contacted in BH7.

Within the fill, SPT N values typically between 0 (weight of hammer) to 7 blows per 0.3 m penetration of the split spoon sampler indicate that minimal compactive effort was used to place the fill soils. The moisture content of the fill deposit was typically observed to be about plastic limit (APL), with moisture contents typically in the range of 21 to 30%. Higher moisture contents of 32 to 61% within the fill deposit in BH7 are indicative of the presence of organic materials.

Native Clayey Silt / Clayey Silt Till

A major deposit of clayey silt / clayey silt till was contacted in 11 of the PML boreholes (other than BH1). Where contacted, the deposit was immediately underlying the surficial topsoil and fill deposits, extending to the borehole termination depths of 5.0 to 8.1 m below grade (Elevation

350.93 to 355.02 m) in seven of the boreholes, and extended to depths of 2.4 to 4.6 m (Elevation 356.06 to 360.51 m) in the other four boreholes. The layer was typically described as brown, becoming grey with depth, with trace sand and trace gravel observed. Wet sand seams and occasional silt lenses were observed throughout the deposit.

The clayey silt deposit was typically stiff to very stiff, based on SPT N values typically between 7 and 38 blows per 0.3 m penetration of the split spoon sampler. However, the deposit was observed to be very soft to soft under the fill in the boreholes located in the former pond area. Pocket penetrometer readings indicated that the estimated undrained shear strength of the deposit was between 50 and 225 kPa.

Moisture contents in the range of 10 to 27% were indicative of typically drier than plastic limit (DTPL) to APL conditions in the cohesive soils. Moisture contents of up to 33% under the fill are indicative of wetter conditions under the former pond. As noted, frequent water bearing sand seams or layered sand deposits were observed throughout the deposit.

Reference is given to the appended Figures 1 and 2 attached for the results of particle size distribution analyses conducted on representative samples of the native clayey silt soils contacted in the boreholes. Based on the results, the soil classification was generally consistent with those observed during the fieldwork as included in the appended Log of Borehole sheets.

Native Cohesionless Soil Deposits

Underlying the topsoil in BH1, and underlying the clayey silt in BH5, BH6, BH9 and BH11, a layer of cohesionless sand / silty sand was contacted, extending to the borehole termination depths of 8.1 m below grade (Elevation 351.94 to 355.41 m) in all five boreholes. The layer typically included trace to some silt, other than in BH1 below 4.6 m depth, where it was described as silty sand. Occasional silt / clayey silt seems were observed within the deposit.

The cohesionless sands were generally compact to very dense based on SPT N values typically between 10 and 74 blows per 0.3 m penetration of the split spoon sampler. However, isolated very loose to loose zones were observed in BH1, BH5 and BH6.

The deposit was typically observed to be moist to wet, as confirmed by moisture contents in the range of 2 to 22%. It is noted that higher moisture contents are likely indicative of the presence of silty seams in the deposit.

Reference is given to the appended Figures 3 to 4 attached for the results of particle size distribution analyses conducted on representative samples of the native sand soils contacted in the boreholes. Based on the results, the soil classification was generally consistent with those observed during the fieldwork as included in the appended Log of Borehole sheets.

Ground Water Conditions

Ground water observations carried out during and upon completion of drilling are fully summarized on the appended Log of Borehole Sheets.

Ground water was contacted during, or after drilling in five of the boreholes, with contact observed between 4.4 and 7.7 m, corresponding to elevations of between 351.83 and 360.06 (metric, geodetic). In general, the ground water was observed in the layered sands that were contacted in the clayey silt deposits, and likely exist in a perched condition. The long-term stabilized ground water level is likely below the explored borehole depths.

It is noted that MTE installed monitoring wells in all of their boreholes (with nested wells installed in BH106). Ground water measurements taken in the monitoring wells on May 13, 2019 revealed ground water depths typically between 4.5 and 9.9 m below grade, corresponding to Elevation 350.3 to 354.6 m.

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns.

Discussion and Recommendations

The project involves the proposed development of an approximately 20.7 ha, rectangular parcel of land that is located on the north side of Snyder's Road West in Baden, Ontario. It is understood that development plans currently include approximately 10.34 ha of single-detached dwellings, 0.77 ha of multiple residential units, a school and a stormwater facility that will be located near the

western property limit. The development will also include the construction of six new roads, and will be serviced with watermains, storm sewers and sanitary sewers, which are expected to be at a maximum of 3 to 4 m depth.

It is noted that at the time of this report, the proposed development details were preliminary only. Once the design details for the proposed development are finalized, the recommendations in this report should be revisited to confirm that they remain applicable.

In general, the subsurface conditions encountered at the borehole locations consist of surficial topsoil overlying native clayey silt / clayey silt till and / or sand. Ground water was occasionally contacted at variable depths, and is likely in a perched condition where contacted.

Site Grading

As noted, the site is relatively flat, with typical site grades ranging from Elevation 359.0 to 363.0 across the site. Due to the presence of gently rolling hills, some earthworks including cut and fills, will likely be required to facilitate the development.

Based on the subsurface soil and ground water conditions encountered in the boreholes, construction of a residential subdivision is generally considered feasible. However, the insitu fill contacted in BH6, BH7 and BH8 would not be considered suitable for the support of building foundations, floor slabs, pavements, or other settlement sensitive structures. In this regard, the insitu fill should be completely subexcavated from beneath any settlement sensitive structures or pavements and replaced with well compacted suitable engineered fill materials.

Following the stripping / removal of the surficial topsoil / topsoil fill, and subexcavation of the remaining insitu fill, where applicable, and any other deleterious material, and approval of the subgrade, the grades may then be raised where required. Surficial topsoil fill thicknesses across the site were typically between 140 and 360 mm thick, with a local maximum of 600 mm contacted in BH6. In calculating the approximate quantities of topsoil fill to be stripped, we recommend that the topsoil thickness on the individual borehole logs be increased by 50 mm to account for variations and some stripping of the underlying soils.

Prior to any fill placement, the exposed subgrade should be proofrolled with a heavy vibratory compactor under the full-time supervision of qualified geotechnical personnel. Any soft spots encountered during the proofrolling process should be subexcavated to the level of competent soils and backfilled with lean concrete or approved engineered fill.

Fill used to raise grades should comprise either on-site native inorganic cut soils (if available) or approved imported material. All engineered fill materials should be pre-approved by the geotechnical consultant prior to placement. Engineered fill material should be placed in maximum 300 mm thick lifts and compacted to at least 98% standard Proctor maximum dry density (SPMDD) below footings and 95% SPMDD below floors and pavements.

Further details pertaining to design, approvals, and construction and inspection requirements for engineered fill are presented in Appendix B of this report.

It is noted that materials generated from grade cuts will generally consist of insitu clayey silt materials, which will be reusable on a selective basis. The clayey silt soils contacted are frost susceptible and highly susceptible to moisture content variations, and compaction to 98% SPMDD may be difficult to achieve. However, these soils, should be acceptable for use as engineered fill where compaction to 95% SPMDD is specified providing that some drying of the clay soils can be accommodated. The sandy soils contacted in BH1 are expected to generally be reusable.

House Construction

Foundations

For preliminary design purposes, conventional strip/spread footings founded at least 0.30 m into the competent (compact to dense) native sand, firm to stiff native clayey silt, or on engineered structural fill placed on the competent soils and compacted to 98% SPMDD, may be designed for a net bearing resistance of 150 kPa at the serviceability limit state (SLS) and a factored bearing resistance of 225 kPa at the ultimate limit state (ULS).

Footings at shallower depths may be designed for a reduced net bearing resistance of 75 kPa at the SLS and 110 kPa at the ULS if footings are placed on the very loose to loose or very soft to soft soils, at the below depths.

Alternatively, consideration could be given to supporting structures on helical piers advanced into the competent soil substrata. Further commentary could be provided, if required.

The minimum founding depths for each option at each borehole location are presented in the following table:

BOREHOLE LOCATION	MINIMUM FOUNDING DEPTH (m) / ELEVATION	
	75 kPa SLS 110 kPa ULS	150 kPa SLS 225 kPa ULS
1	0.5 / 362.0	3.0 / 359.5
2	--	0.5 / 358.5
3	--	0.5 / 361.8
4	0.5 / 360.8	1.1 / 360.2
5	0.5 / 359.5	3.3 / 356.7
6	2.4 / 357.7	6.4 / 353.7
7	3.4 / 356.6	4.1 / 355.9
8	--	6.4 / 353.7
9	--	0.5 / 363.0
10	--	1.1 / 358.6
11	--	1.1 / 360.6
12	--	1.1 / 358.7
MTE 101-19	0.5 / 357.1	1.8 / 355.8
MTE 102-19	--	1.1 / 357.8
MTE 103-19	--	1.1 / 357.9
MTE 104-19	--	1.1 / 360.1
MTE 105-19	0.5 / 361.3	3.3 / 358.5
MTE 106-19	0.5 / 360.2	2.6 / 358.1

Where required, the footings may be supported on engineered structural fill, placed in accordance with the site grading recommendation above, and the general recommendations for engineered fill construction provided in Appendix B. Prior to placement of engineered fill, all existing deleterious soils and existing basements / foundations must be removed and the soils should be subexcavated to the level of competent native soils as described above. For engineered fill supporting footing loads, compaction to a minimum 98% of the materials SPMDD, should be specified as per recommendations outlined in the preceding 'Site Grading' section of this report and in Appendix B.

Total settlements of footings founded on the approved engineered fill or native deposits, designed as outlined above, are not expected to exceed 25 mm, with differential settlements between footings being no more than 75% of this value.

All exterior footings should be provided with a minimum 1.2 m of earth cover or the thermal insulation equivalent to provide adequate insulation against potential frost damage. A 25 mm thick layer of polystyrene insulation is thermally equivalent to 600 mm of soil cover.

Full time inspection of any structural fill placement by PML personnel is recommended to approve subgrade conditions, fill materials and to verify that the specified compaction levels are being achieved. Prior to concrete placement, all founding surfaces should be examined by PML personnel to check the competency of the founding surfaces.

For earthquake design, a site Class D seismic response classification may be assumed for the site, in accordance with the Ontario Building Code.

Basement / Slab-on-Grade Floors

Slab-on-grade floor construction is considered feasible on competent native deposits or approved structural fill compacted to 95%, provided the site grading recommendations above are followed.

Preparation of the floor slab subgrade should include stripping of the topsoil, and other deleterious material, followed by proofrolling of the exposed subgrade with a heavy roller to ensure uniform

adequate support. Excessively loose, soft or compressible materials revealed during the proofrolling operations should be subexcavated and replaced with well compacted, approved material.

Fill placed under the floor slab to achieve finished subgrade levels or as foundation excavation backfill should comprise approved inorganic material having a moisture content within 3% of the optimum value, placed in maximum 200 mm thick lifts, and compacted to at least 95% of SPMDD.

A minimum 150 mm thick layer of well compacted clear stone (or equivalent) is recommended directly beneath the slab-on-grade. A polyethylene vapour barrier should be placed at the surface of the stone if a moisture sensitive finish is to be placed on the floor.

For slab-on-grade (basementless) structures, exterior grades should be maintained at least 150 mm below the finished floor slab-on-grade level and sloped to promote drainage away from the building.

Foundation Drainage and Earth Pressure Parameters

Foundation drainage measures should be provided for units with basements.

A "free draining" granular material, or an equivalent, approved drainage board product must be provided for the basement walls, in accordance with the Ontario Building Code. In general, the on-site native soils will not be suitable for use as basement wall backfill, unless a drainage board product is provided. Backfilling should not take place until the ground floor has been constructed, in order to provide lateral support for the wall.

In conjunction with the granular material, a weeping tile system should be installed to minimize the build-up of hydrostatic pressure behind the wall. The weeping tile should be surrounded by a properly designed graded granular filter or wrapped with approved geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free sump or outlet.

The following earth pressure design parameters may be assumed for calculation of backfill materials compacted to 95% SPMDD.

PARAMETER	OPS GRANULAR B
Angle of Internal Friction (degrees)	32
Unit Weight (kN/m^3)	21
Coefficient of Active Earth Pressure (K_a)	0.30
Coefficient of Earth Pressure At Rest (K_o)	0.47
Coefficient of Passive Earth Pressure (K_p)	3.23

Note: Earth pressure coefficients assume Rankin analysis (wall friction ignored, non-sloping backfill)

Excavations

It is assumed that excavation for footings and service trenches will typically extend through the surficial topsoil and native soils (clayey silt and sand), which are classified as Type 3 materials as defined in the Occupational Health and Safety Act (OHSA). Subject to inspection and providing adequate ground water control is achieved, excavations within Type 3 soils that are to be entered by workers should be inclined from the base of the excavation at one horizontal to one vertical (1H:1V) or flatter.

It is noted that the very loose / very soft material in BH6, BH7 and BH8 would be classified as a Type 4 material. In this regard, subject to inspection and providing adequate ground water control is achieved, excavations within Type 4 soils that are to be entered by workers should be inclined from the base of the excavation at three horizontal to one vertical (3H:1V) or flatter.

Workers should not enter an unprotected excavation if there is evidence of ongoing ground water seepage in the banks.

Dewatering

Ground water was contacted during, or after drilling in five of the geotechnical boreholes, with contact observed between 4.4 and 7.7 m, corresponding to elevations of between 351.83 and 360.06 (metric, geodetic). Ground water was also contacted in the MTE monitoring wells, and ground water measurements taken on May 13, 2019 revealed ground water depths of between 4.5 and 9.9 m below grade, corresponding to Elevation 350.3 to 354.6 m. Much of the ground water is expected to be perched in wet or saturated sand seems within the clayey soils.

The extent of ground water control will depend on the depth of excavation below the ground water level. Shallow excavations extending less than 1.0 m below the ground water level can be dewatered using conventional sump pumping techniques. Deeper excavations, extending more than 1.0 m below the ground water level may require extensive ground water control measures.

The actual dewatering methods should be established at the contractor's discretion within the context of a performance specification for the project. Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure a stable and safe excavation and to facilitate construction. The design of the dewatering system should be specified to maintain and control ground water at least 0.50 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It should be noted that under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, and in compliance with the Ministry of Environment, Conservation and Parks (MECP) policy and Permit to Take Water (PTTW) Manual (April 2005), an application should be filed to the MECP for the subject project construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/s. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/s) and 400,000 L/day (or about 4.6 L/s), dewatering activities need to be registered on the Environmental Activity and Sector Registry (EASR). The need for an EASR or a PTTW will depend on excavation depths, but it is not considered likely based on the preliminary assumptions. Reference is made to MTE's hydrogeological report for more information.

At the time of tendering, test pits should be excavated on site to allow prospective contractors to judge the ground water conditions and to determine the appropriate control methods required closer to the time of construction. Ground water conditions are subject to seasonal variations. In this regard, a later summer construction schedule would be preferable.

Pipe Bedding and Backfilling

In general, no bearing problems are anticipated for pipes founded in the native mineral soils encountered at the site, or on structural fill. Localized areas of very loose / soft or otherwise deleterious soils should be anticipated under the proposed roadways, and in these areas it will be necessary to subexcavate the deleterious soils and place additional bedding material below the pipe.

On stable subgrade, a minimum 150 mm thick bedding course of Granular A material compacted to 95% SPMDD is recommended beneath the pipes. The Granular A material should extend around the pipe to at least 300 mm above the pipe obvert or as set out by Ontario Provincial Standards (OPS), or the local authority. Material containing stones larger than 50 mm size should not be used in the bedding or cover layers.

Foundation backfill and backfill below pavements, floor slabs (interior backfill) and other settlement sensitive features, should be similarly compacted to 95% SPMDD. Backfill should be placed in 300 mm maximum lifts. Material that is too wet for compaction to a minimum of 95% SPMDD should be allocated for use in landscaped / non settlement sensitive locations, and compacted to at least 90% SPMDD.

It is noted that the on-site soils are predominantly silty and as such, are frost susceptible and should not be used at locations where frost heave movement could have adverse effects, such as at exterior doors and the like. In addition, it is noted that the clayey silt materials will tend to retain a voided structure when placed as fill. It will be particularly important to ensure that sufficient compaction is applied to break down all lumps / clods within the fill matrix to achieve a non-voided condition. Significant post-construction settlement could otherwise result.

Fill placed against structures should be brought up simultaneously on all sides of the structure to minimize the potential for movement and/or damage during construction. Furthermore, the use of heavy equipment adjacent to structures should be prohibited.

Should construction extend to the winter months, care must be taken to ensure that frozen material is not used as backfill.

The trenching and backfilling operations should be carried out in a manner which minimizes the length of trench left open yet accommodates efficient pipe laying and compaction activities.

Pavement Construction

Based on the anticipated traffic patterns, frost susceptibility, and strength of the expected subgrade soils, the following pavement component thicknesses are considered suitable for local residential / parking lots and minor collector traffic categories, provided all fills with organics or otherwise deleterious soils are removed.

PAVEMENT COMPONENT	**THICKNESS (mm)**	
	Residential Collector Streets	**Local Residential Streets or Parking Lots**
Asphalt	100	80
Granular A Base	150	150
Granular B Subbase	450	350

The flexible pavement designs provided above consider that construction will be carried out during the drier time of the year and the subgrade is stable, as determined by proofrolling inspected by PML personnel. If the subgrade is wet and unstable, additional granular subbase will be required.

The pavement materials should conform to current OPS specifications. The Granular A base and Granular B subbase courses should be placed in thin lifts and compacted to a minimum of

100% SPMDD, and asphalt should be placed to a minimum of 92% of the material's maximum relative density (MRD). Reference is made to OPS Specification 310, as revised.

During construction, testing should be conducted to confirm the gradation and compactibility characteristics of the granular base and subbase materials and the mix design properties of the asphalt.

Proofrolling procedures and the placement and compaction of all the fill and granular materials and asphalt for the pavement construction and backfilling at the site should be inspected on a continuous basis by PML technicians.

Longitudinal pavement subdrains should be provided to prevent water accumulation on the pavement subgrade surface. The subgrade should be graded so that water is directed to the subdrains. Subdrains should be discharged into the catch basins. The subdrains may consist of filter wrapped, 100 mm diameter perforated plastic pipe, set within the subbase layer at the subgrade surface.

Soil Permeability

For preliminary planning purposes, soil infiltration rates for storm water management (SWM) were determined for the major near surface soil units and are as follows:

SOIL TYPE	ESTIMATED COEFFICIENT OF PERMEABILITY (cm/sec)	STORM WATER INFILTRATION RATE (mm/hr)
Sand	1×10^{-3}	30
Clayey Silt	$< 1 \times 10^{-6}$	< 1

Any SWM ponds or infiltration galleries should be inspected by PML personnel during construction to verify the presence of a suitable subgrade. In general, the slopes of any storm water

management ponds should be constructed at 5H:1V or shallower and be provided with vegetation cover to minimize the potential for erosion and sloughing of the side slopes.

Ancillary Considerations

It is recommended that the design drawings be submitted to PML for general geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and preliminary recommendations provided in this report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary. Geotechnical review during construction should be ongoing to confirm that the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modifications to the original recommendations.

All soil samples obtained during this investigation will be stored at PML's laboratory for three months, after which time they will be discarded unless prior arrangements are made.

Closure

This assignment is subject to the Statement of Limitations that is included in Appendix C and must be read in conjunction with this report.

We trust this report has been completed within our terms of reference, and is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

Ken Hanes, P.Eng.
Project Engineer
Geotechnical and Geoenvironmental Services

Scott Jeffrey, P.Eng., $LEED_{GA}$
Associate
Regional Manager, Geotechnical Services

KH:kh

Enclosures:
Figures 1 to 4 – Particle Size Distribution Charts
List of Abbreviations
Log of Boreholes 1 to 12
Drawing 1 – Borehole Location Plan
Appendix A – MTE Consultants Inc. Borehole and Monitoring Well Logs
Appendix B – Engineered Fill
Appendix C – Statement of Limitations

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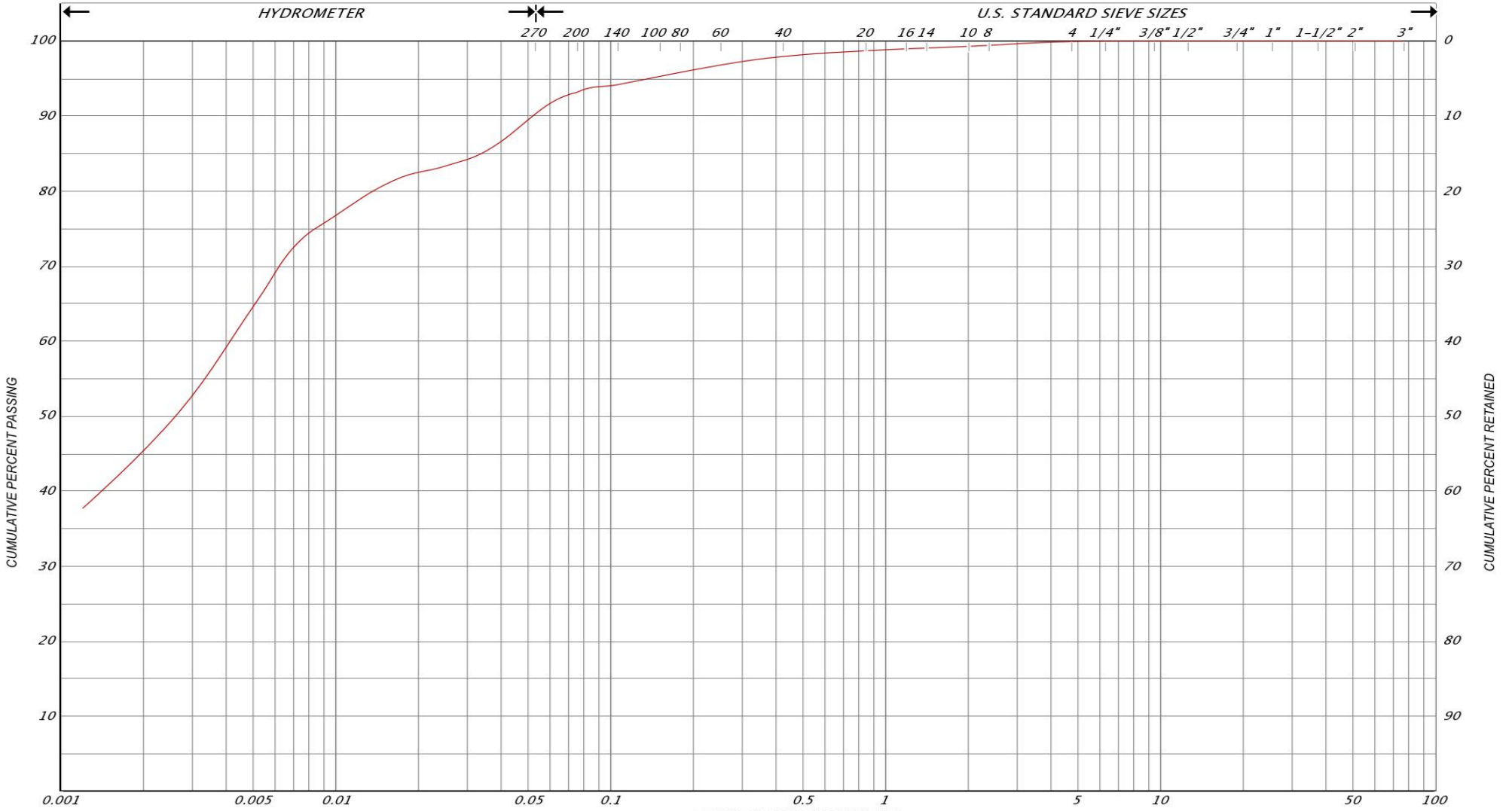
PROJECT NO.20KF006
FIGURE NO. 1

PARTICLE SIZE DISTRIBUTION CHART



REMARKS: Borehole 10, Sample SS3, Depth 1.5 to 2.0 m

CLAYEY SILT, TRACE SAND, TRACE GRAVEL

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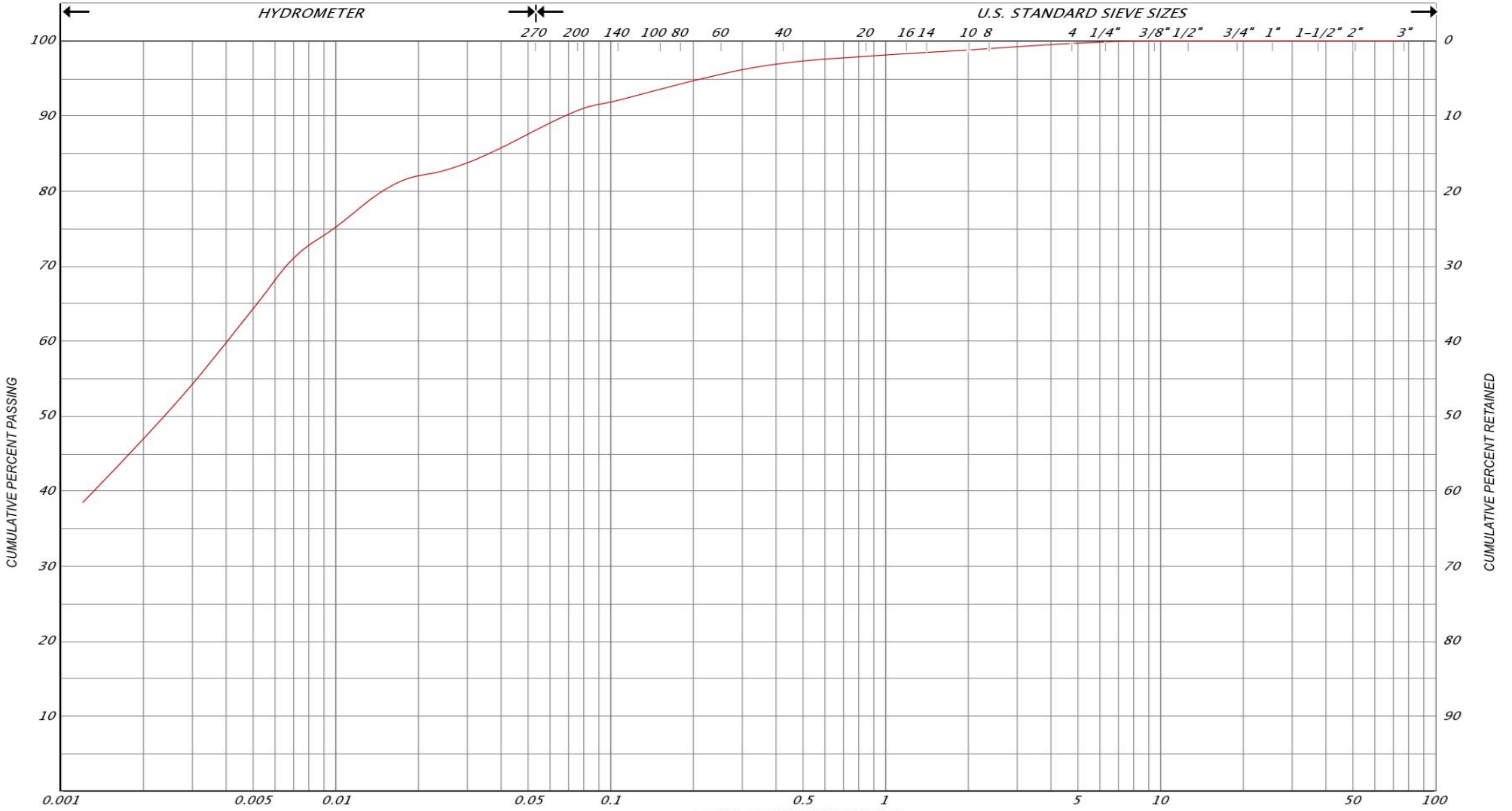
PROJECT NO.20KF006
FIGURE NO. 2

PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY				FINE	MEDIUM	COARSE	GRAVEL			COBBLES	UNIFIED
				SAND							
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL			COBBLES	M.I.T
	SILT			SAND							
CLAY	SILT			V.FINE	FINE	MED.	COARSE	GRAVEL			US BUREAU
				SAND							

REMARKS: Borehole 12, Sample SS3, Depth 1.5 to 2.0 m

CLAYEY SILT, TRACE SAND, TRACE GRAVEL

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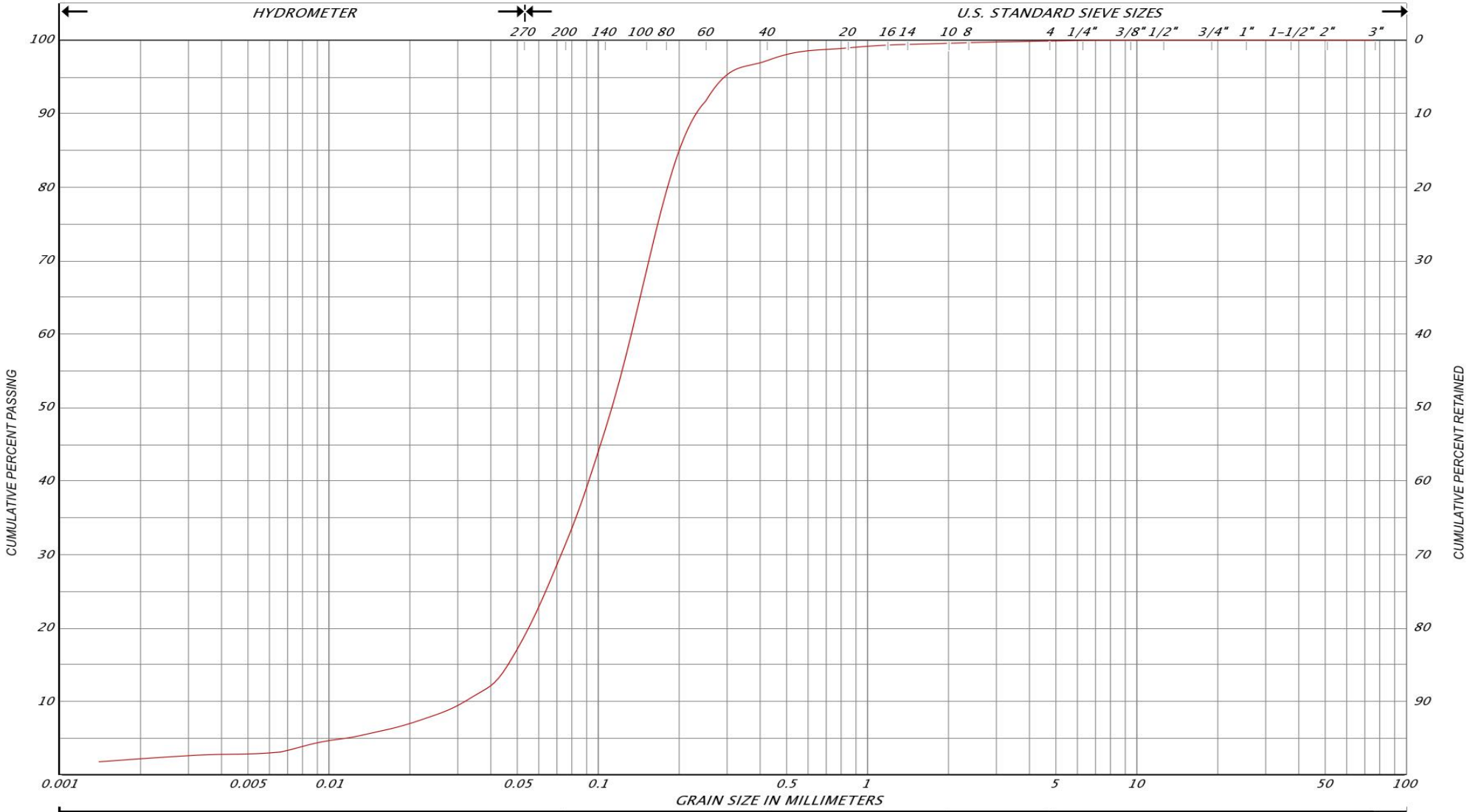
PROJECT NO.20KF006
FIGURE NO. 3

PARTICLE SIZE DISTRIBUTION CHART



REMARKS: Borehole 1, Sample SS3, Depth 1.5 to 2.0 m

SAND, SOME SILT, TRACE GRAVEL

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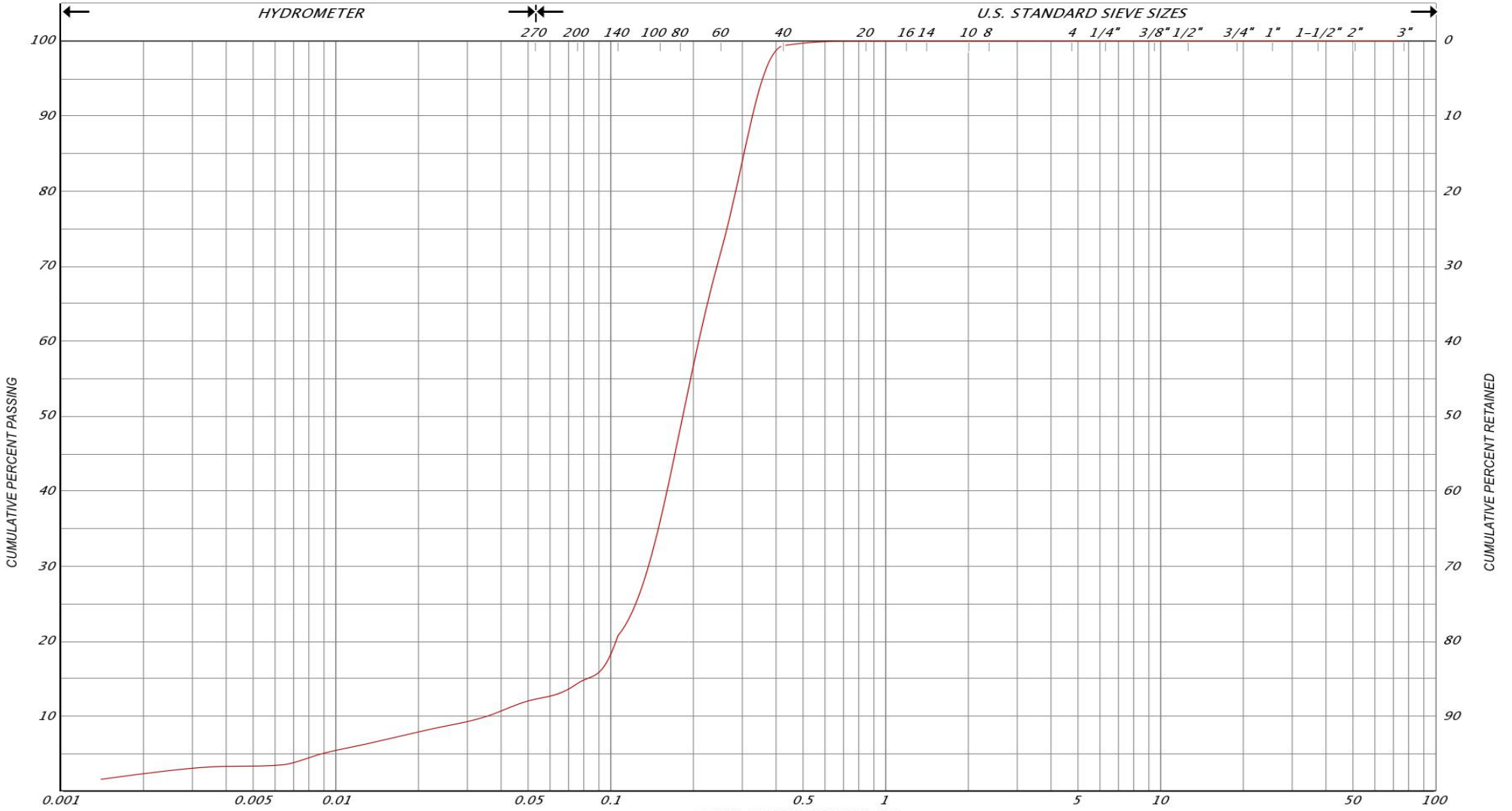
PROJECT NO.20KF006
FIGURE NO. 4

PARTICLE SIZE DISTRIBUTION CHART



REMARKS: Borehole 5, Sample SS5, Depth 3.05 to 3.5 m

SAND, SOME SILT

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. - Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample	USS	Undisturbed Shear Strength
PH	Sample Advanced Hydraulically	RSS	Remoulded Shear Strength
PM	Sample Advanced Manually		

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE NO. 1

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 20, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 362.53				
0.0	362.38	TOPSOIL: Dark brown silty sand, trace gravel, moist		1	SS	6
		SAND: Loose brown sand, some silt, moist		2	SS	9
1.5	361.0	becoming compact		3	SS	12
2.3	360.2	becoming very loose, occasional silt layers		4	SS	3
3.0	359.5	becoming loose		5	SS	7
4.6	357.9	SILTY SAND: Compact brown silty sand, moist		6	SS	10
				7	SS	16
				8	SS	20
8.1	354.4	BOREHOLE TERMINATED AT 8.1 m				

ELEVATION SCALE: 362, 361, 360, 359, 358, 357, 356, 355

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
No free water

NOTES

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LOG OF BOREHOLE NO. 2

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 20, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 359.03					
0.18	358.85	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	11	
		CLAYEY SILT TILL: Very stiff brown clayey silt, trace sand, DTPL		2	SS	24	358
				3	SS	24	357
				4	SS	25	356
4.6	354.4	becoming stiff, grey, occasional wet silt seams, APL		5	SS	14	355
				6	SS	13	354
8.1	350.9	BOREHOLE TERMINATED AT 8.1 m		7	SS	14	353
							352
							351

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
Free water at 7.2 m

NOTES

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LOG OF BOREHOLE NO. 3

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 20, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 362.32					362
0.14 / 362.18	TOPSOIL: Dark brown clayey silt, trace sand, trace gravel, frozen		1	SS	12	
	CLAYEY SILT TILL: Very stiff brown clayey silt, trace sand, DTPL		2	SS	21	361
1.5 / 360.8	occasional wet sand seams		3	SS	29	
			4	SS	26	360
			5	SS	26	359
4.6 / 357.7	becoming grey, APL		6	SS	23	358
						357
6.1 / 356.2	becoming stiff		7	SS	14	356
						355
7.6 / 354.7	becoming very stiff		8	SS	18	
8.1 / 354.2	BOREHOLE TERMINATED AT 8.1 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
Open
Free water at 7.6 m

NOTES

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LOG OF BOREHOLE NO. 4

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 21, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 361.34					
0.0	361.34						361
0.20	361.14	TOPSOIL: Dark brown clayey silt, trace sand, trace gravel, frozen		1	SS	8	
		CLAYEY SILT TILL: Very stiff brown clayey silt, trace sand, trace gravel, DTPL, occasional silt partings		2	SS	23	360
2.0				3	SS	20	
2.3	359.0	becoming hard, occasional wet sand seams		4	SS	38	359
3.0	358.3	becoming very stiff, layered with wet sand		5	SS	29	358
3.8	357.5	becoming hard		6	SS	32	357
4.6	356.7	becoming very stiff, grey, DTPL, no sand seams		7	SS	22	
5.0							356
6.0				8	SS	18	355
7.0							354
7.6	353.7	becoming stiff, APL, occasional sand seams		9	SS	12	
8.1	353.2	BOREHOLE TERMINATED AT 8.1 m					
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

Sampler wet at 3.0 m

Upon completion of augering
Open
Free water at 7.7 m

NOTES

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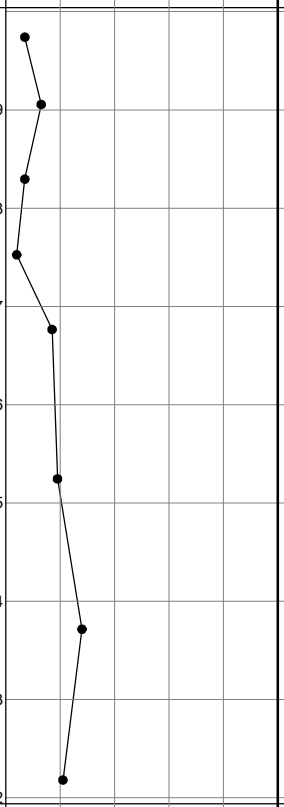
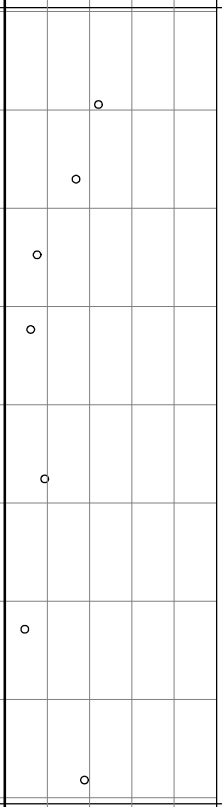
LOG OF BOREHOLE NO. 5

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 24, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 360.04				
0.0	360.04					
0.24	359.80	TOPSOIL: Dark brown clayey silt, trace gravel, frozen		1	SS	7
1.0		CLAYEY SILT: Stiff brown clayey silt, trace to some sand, APL, occasional sand layers		2	SS	13
1.5	358.5	becoming firm		3	SS	7
2.0						
2.4	357.6	SAND: Compact brown sand, trace to some silt, moist, occasional clayey silt lenses		4	SS	4
3.0				5	SS	17
4.0						
5.0				6	SS	19
6.0						
7.0				7	SS	28
8.0						
8.1	351.9	BOREHOLE TERMINATED AT 8.1 m		8	SS	21
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						





UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS	GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	Upon completion of augering Open No free water	

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 21, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	360.06	SURFACE ELEVATION 360.06			
0.0	360.06	FILL: Dark brown clayey silt topsoil, trace gravel, frozen	1	SS	1
0.60	359.46	becoming brown clayey silt, some sand, APL	2	SS	7
1.0			3	SS	6
2.0	2.1				
	358.0	CLAYEY SILT TILL: Stiff grey clayey silt, trace sand, DTPL	4	SS	13
3.0			5	SS	19
4.0	4.0				
	356.1	SAND: Very loose brown sand, trace silt, moist, occasional silt layers	6	SS	3
5.0			7	SS	1
6.0	6.1				
	354.0	becoming dense	8	SS	33
7.0	7.6				
	352.5	becoming wet	9	SS	31
8.0	8.1				
	352.0	BOREHOLE TERMINATED AT 8.1 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

51

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

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 7

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 21, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres) / ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 360.02					
0.30 / 359.72	FILL: Dark brown clayey silt topsoil, trace gravel, frozen		1	SS	1	
	becoming brown and grey mottled clayey silt, trace sand, APL		2	SS	2	359
			3	SS	4	
2.1 / 357.9	becoming dark brown, some sand, trace organics, roots		4	SS	0	358
3.1 / 356.9	CLAYEY SILT: Stiff grey clayey silt, some sand, APL		5	SS	3	357
			6	SS	13	356
4.6 / 355.4	becoming very stiff, DTPL		7	SS	22	
5.0 / 355.0	BOREHOLE TERMINATED AT 5.0 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

61

UNIT WEIGHT kN/m³

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

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 8

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 21, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	360.13	SURFACE ELEVATION 360.13					
0.0							
0.25	359.88	FILL: Dark brown clayey silt topsoil, trace gravel, frozen		1	SS	1	
		becoming dark brown to brown clayey silt, trace sand, APL		2	SS	3	
1.0							
				3	SS	3	
2.0							
2.1	358.0	becoming mottled brown and grey		4	SS	7	
3.0							
	357.1	CLAYEY SILT: Stiff brown to grey clayey silt, trace sand, APL		5	SS	10	
3.7	356.4	becoming very soft		6	SS	0	
4.0							
				7	SS	0	
5.0							
6.1	354.0	becoming stiff, grey		8	SS	9	
7.0							
7.6	352.5	becoming very stiff, DTPL		9	SS	24	
8.0							
8.1	352.0	BOREHOLE TERMINATED AT 8.1 m					Upon completion of augering Wet cave at 4.4 m
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

ELEVATION SCALE: 360, 359, 358, 357, 356, 355, 354, 353

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

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 9

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 24, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 363.51				
0.0	363.51					
	0.25	TOPSOIL: Dark brown clayey silt, trace sand, moist		1	SS	7
	363.26	CLAYEY SILT TILL: Stiff brown clayey silt, trace sand, DTPL				
1.0				2	SS	8
				3	SS	8
2.0	2.1					
	361.4	becoming very stiff, numerous sand layers		4	SS	20
3.0	3.0					
	360.5	SAND: Dense brown sand, some silt, moist, numerous silt layers		5	SS	37
4.0						
	4.5					
	359.0	becoming compact		6	SS	29
5.0						
6.0	6.1					
	357.4	becoming dense		7	SS	36
7.0						
				8	SS	46
8.0	8.1					
	355.4	BOREHOLE TERMINATED AT 8.1 m				
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

ELEVATION SCALE: 363, 362, 361, 360, 359, 358, 357, 356

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
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 10

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 24, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 359.73				
0.0		TOPSOIL: Dark brown clayey silt, trace sand, trace gravel, frozen		1	SS	6
0.36	359.37	CLAYEY SILT TILL: Stiff brown clayey silt, trace sand, trace gravel, APL		2	SS	13
1.0						
1.5	358.2	becoming very stiff, DTPL		3	SS	17
2.0						
2.1	357.6	becoming stiff		4	SS	13
3.0						
3.0	356.7	becoming grey, APL		5	SS	12
4.0						
5.0				6	SS	15
6.0				7	SS	14
7.0						
8.0				8	SS	13
8.1	351.6	BOREHOLE TERMINATED AT 8.1 m				
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

ELEVATION SCALE: 359, 358, 357, 356, 355, 354, 353, 352

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
No free water

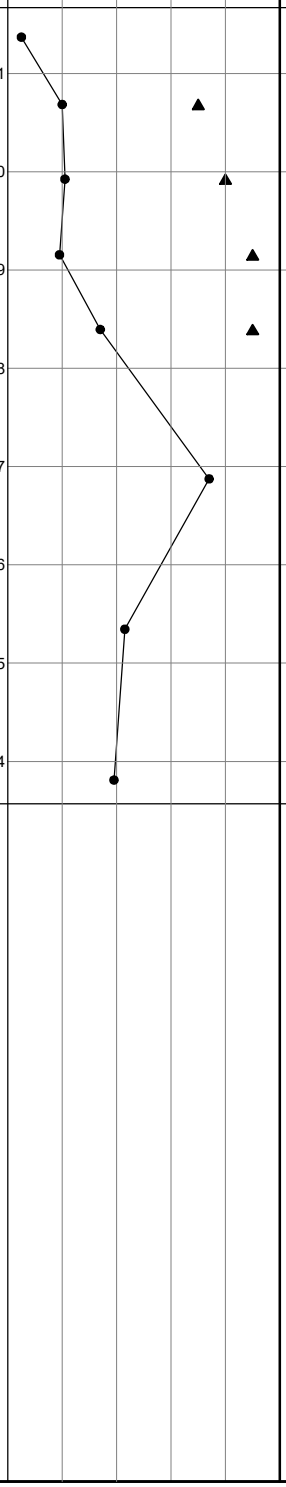
NOTES

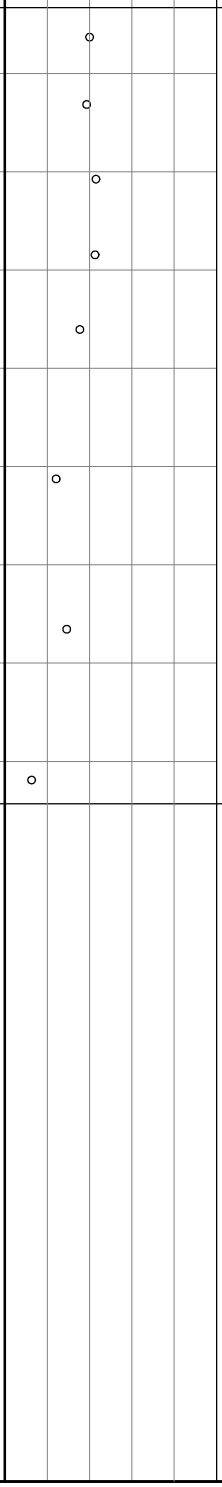
Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 11

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 24, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 361.67				
0.0	361.67					
0.26	361.41	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	5
		CLAYEY SILT TILL: Very stiff brown clayey silt, trace sand, trace gravel, DTPL		2	SS	20
1.0						
				3	SS	21
2.0						
				4	SS	19
3.0	358.7	becoming hard		5	SS	34
4.0						
4.6	357.1	SAND: Very dense brown sand, trace silt, wet, numerous silt layers, moist		6	SS	74
5.0						
6.0						
6.1	355.6	becoming dense		7	SS	43
7.0						
8.0				8	SS	39
8.1	353.6	BOREHOLE TERMINATED AT 8.1 m				
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						





UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 12

PROJECT Proposed Subdivision
PML REF. 20KF006
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING DATE February 25, 2020
ENGINEER K. Hanes
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres) / ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 359.82			
0.28 / 359.54	TOPSOIL: Dark brown clayey silt, trace sand, frozen	1	SS	3
	CLAYEY SILT TILL: Stiff brown clayey silt, trace sand, DTPL	2	SS	13
1.5 / 358.3	becoming very stiff	3	SS	16
2.1 / 357.7	becoming grey, occasional sand seams	4	SS	19
3.0 / 356.8	becoming stiff	5	SS	12
4.6 / 355.2	becoming very stiff	6	SS	18
		7	SS	27
7.6 / 352.2	becoming stiff, APL	8	SS	13
8.1 / 351.7	BOREHOLE TERMINATED AT 8.1 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
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. DC 101-19

PROJECT Proposed Subdivision
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING METHOD Dynamic Cone Penetration Test
BORING DATE February 24, 2020
PML REF. 20KF006
ENGINEER K. Hanes
TECHNICIAN D. Brice

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT; WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
0.0 / 357.21	SURFACE ELEVATION 357.21					357	50 100 150 200; 20 40 60 80	w_P w w_L; 10 20 30 40		
1.0						356				
2.0										
3.0										
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0										
12.0										
13.0										
14.0										
15.0										

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. DC 103-19

PROJECT Proposed Subdivision
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING METHOD Dynamic Cone Penetration Test
BORING DATE February 24, 2020
PML REF. 20KF006
ENGINEER K. Hanes
TECHNICIAN D. Brice

SOIL PROFILE			SAMPLES				SHEAR STRENGTH (kPa)			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	+ FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q 50 100 150 200 DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● 20 40 60 80	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L WATER CONTENT (%) 10 20 30 40	kN/m³	GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
SURFACE ELEVATION 359.02						358 357 356				

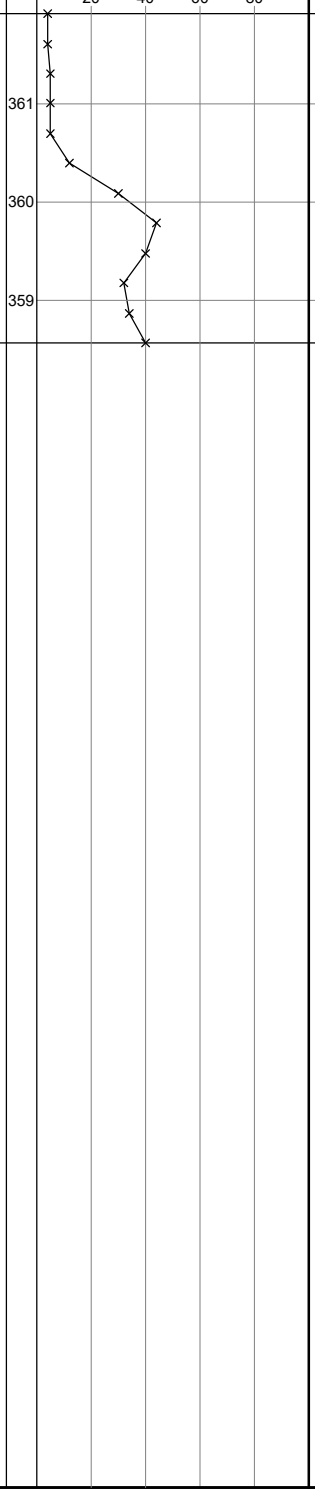
NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. DC 105-19

PROJECT Proposed Subdivision
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING METHOD Dynamic Cone Penetration Test
BORING DATE February 20, 2020
PML REF. 20KF006
ENGINEER K. Hanes
TECHNICIAN D. Brice

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT; WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 361.92									



0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. DC 106-19

PROJECT Proposed Subdivision
LOCATION 1012 Snyder's Road West, Baden, Ontario
BORING METHOD Dynamic Cone Penetration Test
BORING DATE February 20, 2020
PML REF. 20KF006
ENGINEER K. Hanes
TECHNICIAN D. Brice

SOIL PROFILE			SAMPLES				SHEAR STRENGTH (kPa)			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	+ FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ● Q 50 100 150 200 DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● 20 40 60 80	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L WATER CONTENT (%) 10 20 30 40	kN/m³	GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
SURFACE ELEVATION 360.68						360 359 358 357				

NOTES

BH 1
EL. 362.53

BH 2
EL. 359.03

BH 3
EL. 362.32

BH 4
EL. 361.34

BH 5
EL. 360.04

BH 6
EL. 360.06

BH 7
EL. 360.02

BH 8
EL. 360.13

BH 9
EL. 363.51

BH 10
EL. 359.73

BH 11
EL. 361.67

BH 12
EL. 359.82

MTE 101-19
EL. 357.209

MTE 102-19
EL. 358.977

MTE 103-19
EL. 359.021

MTE 104-19
EL. 361.257

MTE 105-19
EL. 361.918

MTE 106-19
EL. 360.682

MTE 107-19
EL. 360.760

Agricultural

Residential

Baden Public School

Sir Adam Beck Public School

Baden Urban Area Boundary

Countryside Line

STREET ONE

STREET TWO

STREET THREE

STREET FOUR

STREET FIVE

STREET SIX

JACOB CRESSMAN DRIVE

STUCKEY AVENUE

MICHAEL MYERS ROAD

BETTSCHEN LANE

HUNSBERGER DRIVE

GEIGER PLACE

LIVINGSTON BOULEVARD

WAGLER AVENUE

MCADAM-EADVEN STREET

SNYDER'S ROAD WEST (Reg. Rd. #1)

QUEEN STREET

CHRISTIANSTAIN STREET

MILLER STREET

CHARLOTTA STREET

BRENNEMAN DRIVE

ELEV. = 347.919m

ELEV. = 347.919m

SCALE 0 m 40 m 80 m 120 m 160 m 200 m

KEY PLAN

LEGEND:

- BOREHOLE
- PREVIOUS INVESTIGATION BOREHOLE (BY OTHERS MTE REF: 40777-800)

REFERENCE:

BOREHOLE LOCATION PLAN REPRODUCED FROM DRAWING SUPPLIED BY MTE.

NOTES:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

THE BOREHOLE LOCATIONS AND GEODETIC ELEVATIONS WERE SURVEYED WITH A SOKKIA GCX3 REAL TIME KINEMATIC RECEIVER CONNECTED TO THE GLOBAL NAVIGATION SATELLITE SYSTEM.

SNYDER'S ROAD (BADEN) DEVELOPMENTS INC.
c/o
MTE CONSULTANTS INC.

PROPOSED SUBDIVISION
1012 SNYDER'S ROAD WEST
BADEN, ONTARIO

BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	D. BRICE	DATE	SCALE	PML REF.	DWG. NO.
CHECKED	K. HANES	AUGUST 2020	AS SHOWN	20KF006	1
APPROVED	S. JEFFREY				

APPENDIX A

MTE CONSULTANTS INC BOREHOLE AND MONITORING WELL LOGS

ID Number: MW101-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/3/2019

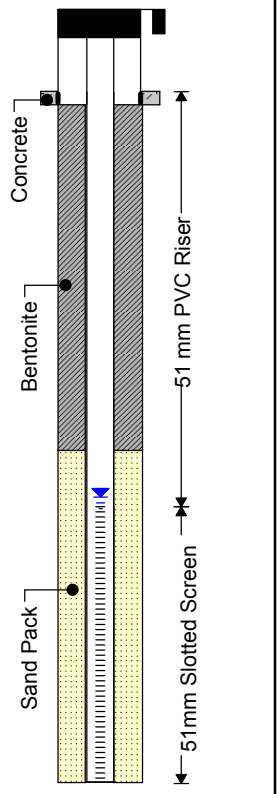
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	357.6					
0 / 0	**TOPSOIL** dark brown, silty, clayey, moist	0.0	1	SS	30	8	23
2	**CLAYEY SILT** brown, trace sand, moist	356.1	2	SS	75	9	27
6 / 2	**SANDY SILT** brown, trace clay, trace gravel, moist	1.5 / 355.3	3	SS	100	12	20
8	**SAND** brown, trace silt, moist	2.3	4	SS	75	17	16
10			5	SS	85	32	9
12 / 4		353.0					
14	saturated	4.6	6	SS	70	39	19
16							
18							
20 / 6			7	SS	90	28	19
22							
24							
26 / 8		349.4	8	SS	75	6	24
28	Drilling Terminated	8.2					
30							
32 / 10							
34							
36							
38							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Approximately 50L of water added at 7.6m.
Water level measured May 13, 2019.

ID Number: MW102-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/3/2019

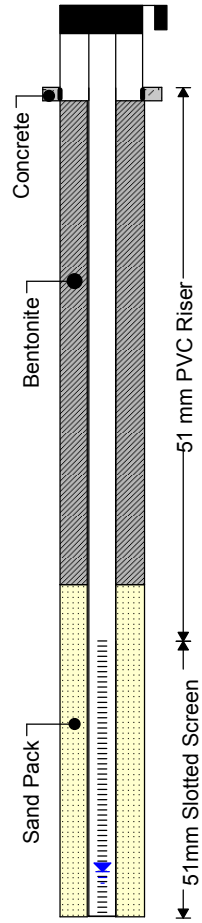
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
0 / 0	Ground Surface	358.9 / 0.0					
	TOPSOIL dark brown, silty, sandy, some clay, moist		1	ss	70	6	30
	SANDY SILT brown, some clay, moist		2	ss	50	12	21
6 / 2		356.6 / 2.3	3	ss	100	15	23
	CLAYEY SILT TILL brown, trace sand, trace gravel, moist		4	ss	90	10	24
			5	ss	100	11	23
	grey below 4.6m	354.3 / 4.6	6	ss	100	14	21
20 / 6			7	ss	100	12	18
26 / 8			8	ss	100	16	16
		349.1 / 9.8	9	ss	100	16	14
32 / 10	Drilling Terminated						



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

MTE

Sheet: 1 of 1

Notes:
Water level measured May 13, 2019.

ID Number: MW103-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

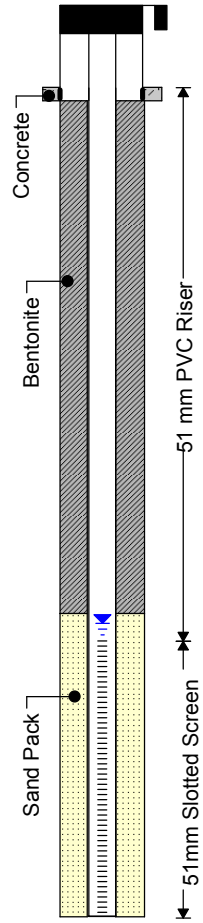
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)	Well Completion Details
0 / 0		Ground Surface	359.0						
		TOPSOIL dark brown,clayey silt, moist	0.0	1	ss	75	7	30	
		SILTY CLAY brown, some sand, moist	358.3 / 0.8	2	ss	85	18	19	
		CLAYEY SILT TILL brown, some sand, trace gravel, moist		3	ss	100	20	21	
				4	ss	100	13	21	
				5	ss	90	12	21	
4			354.5						
		SANDY SILT TILL grey, some clay, trace gravel, moist	4.6	6	ss	100	12	16	
			352.9						
6		**CLAYEY SILT TILL** grey, some sand, trace gravel, moist	6.1	7	ss	100	11	17	
			351.4						
		wet below 7.6m	7.6	8	ss	90	5	18	
				9	ss	85	6	20	
10		Drilling Terminated	349.3 / 9.8						



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

MTE

Sheet: 1 of 1

Notes:
Water level measured May 13, 2019.

ID Number: MW104-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

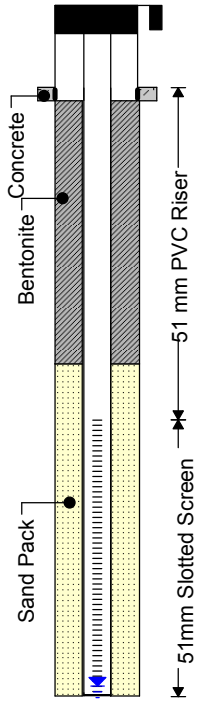
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME75 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	361.2					
0 / 0	**TOPSOIL** dark brown, clayey silt, moist	0.0	1	ss	75	6	27
2	**CLAYEY SILT** brown, clayey, trace to some sand, moist	360.4 0.8	2	ss	100	19	14
4	**SILT** sandy, trace clay	359.6 1.5	3	ss	90	19	13
6 / 2	**SILTY SAND** brown, trace gravel, moist		4	ss	75	24	14
10		358.1 3.0	5	ss	50	23	15
12 / 4	**SILT** brown, some sand, trace clay, trace gravel, damp						
14		356.6 4.6	6	ss	95	19	20
16	grey, clayey, wet						
18		355.1 6.1	7	ss	85	22	24
20 / 6	**SILTY SAND** brown, saturated						
22		353.5 7.6	8	ss	80	21	6
24	trace silt, moist	352.9 8.2					
26 / 8	Drilling Terminated						
28							
30							
32 / 10							
34							
36							
38							



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

MTE

Sheet: 1 of 1

Notes:
Water level measured May 13, 2019.

ID Number: MW105-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 5/2/2019

Drilling Contractor: Aardvark Drilling Inc.

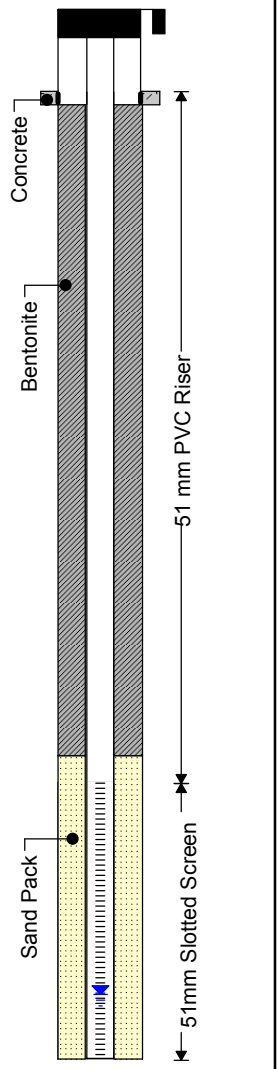
Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
	Ground Surface	361.8					
0 / 0	**TOPSOIL** dark brown, silty sand, moist	0.0	1	SS	70	3	21
		361.1					
2	**SAND** brown, some silt, moist	0.8	2	SS	65	5	24
4	silty, trace clay	360.3					
6 / 2	some silt, saturated	1.5	3	SS	80	3	26
8			4	SS	70	2	17
		358.8					
10	trace silt, moist	3.0	5	SS	70	10	
12 / 4							
14							
16			6	SS	100	36	6
18							
20 / 6			7	SS	95	39	3
22							
24		354.2					
26 / 8	wet	7.6	8	SS	85	33	20
28							
30			9	SS	90	32	18
32 / 10							
34		351.2					
36	saturated	10.7	10	SS	85	20	20
		350.6					
38	Drilling Terminated	11.3					

Well Completion Details



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

MTE

Sheet: 1 of 1

Notes:
Water level measured May 13, 2019.

ID Number: MW106A-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 4/29/2019

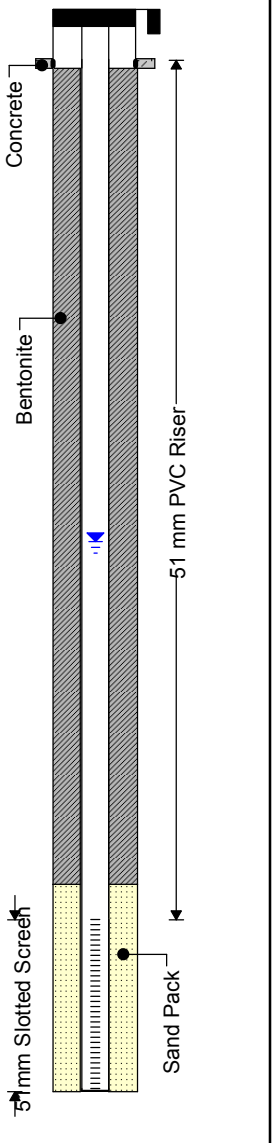
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
		Ground Surface	360.7					
		TOPSOIL dark brown, silty sand, moist	0.0 / 359.9	1	SS	90	5	14
		SAND brown, some silt, trace gravel, moist	0.8 / 359.2	2	SS	60	2	20
		trace silt, moist	1.5 / 358.4	3	SS	50	7	19
		wet	2.3 / 357.6	4	SS	60	12	20
		saturated	3.0 / 356.9	5	SS	75	14	20
		SILT brown, trace sand, varying degrees of clay content, saturated	3.8 / 356.1	6	SS	75	11	20
		trace gravel, moist	4.6	7	SS	100	12	24
		grey	354.6					
		SAND brown fine-grained sand, trace silt, moist	6.1 / 353.1	8	SS	50	32	13
		SANDY SILT brown, trace clay, moist	7.6 / 351.6	9	SS	100	26	25
		SAND brown, trace silt, saturated	9.1 / 350.0	10	SS	75	41	19
		coarse-grained sand, saturated	10.7 / 348.5	11	SS	90	13	16
		medium-grained sand	12.2	12	SS	65	32	19
				13	SS	75	37	17
				14	SS	65	48	22
				15	SS	65	42	18
			341.8	16	SS	50	48	16
		Drilling Terminated	18.9					



Field Technician: TXG

Drafted by: TXG

Reviewed by:

Sheet: 1 of 1

Notes:
Drilling mud used, borehole was flushed with clean water prior to monitoring well install.
Water level measured May 13, 2019.

ID Number: MW106B-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 4/26/2019

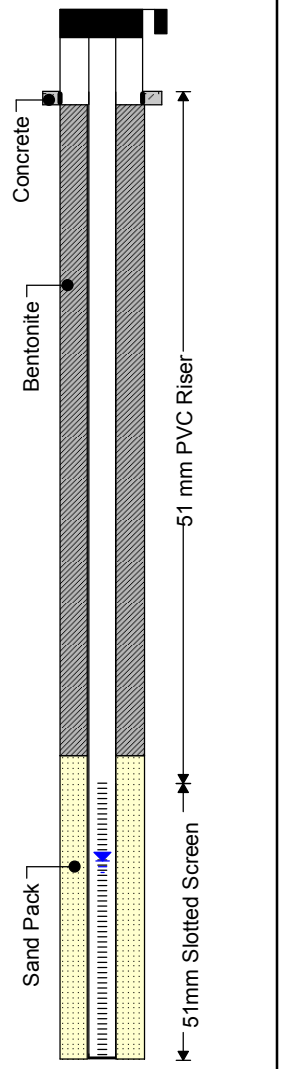
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

Depth Scale (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Recovery (%)	N-Value (Blows/305mm)	Moisture Content (%)
		Ground Surface	360.6					
		TOPSOIL dark brown, silty sand, moist	0.0	1	SS	90	5	14
		SAND brown, some silt, trace gravel, moist	359.9 0.8	2	SS	60	2	20
		trace silt, moist	359.1					
		wet	1.5	3	SS	50	7	19
		saturated	358.3 2.3	4	SS	60	12	20
		SILT brown, trace sand, varying degrees of clay content, saturated	357.6 3.0	5	SS	75	14	20
		trace gravel, moist	356.8 3.8	6	SS	75	11	20
		grey	356.0 4.6	7	SS	100	12	24
		SAND brown fine-grained sand, trace silt, moist	354.5 6.1	8	SS	50	32	13
		SANDY SILT brown, trace clay, moist	353.0 7.6	9	SS	100	26	25
		SAND brown, trace silt, saturated	351.5 9.1	10	SS	75	41	19
			349.3	11	SS	90	13	16
		Drilling Terminated	11.3					



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

Sheet: 1 of 1

Notes:
Sand heave at 10.7m. Approximately 150L of water added to clean out borehole.
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured May 13, 2019.

ID Number: MW106C-19

Project Name: 1012 Snyder's Rd. W. Development Hydrogeology Study

Project No: 40777-800

Client: Nideva Properties Inc.

Site Location: 1012 Snyder's Rd. W., Baden, ON

Date Completed: 4/26/2019

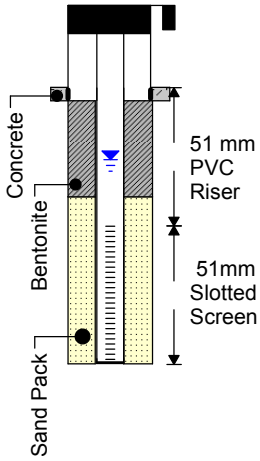
Drilling Contractor: Aardvark Drilling Inc.

Drill Rig: CME 850 Track

Drill Method: Hollow Stem Auger

Protective Cover: Monument

SUBSURFACE PROFILE			SAMPLE				SPT	MOISTURE	
Depth Scale	Symbol	Soil Description	Elevation (masl) / Depth (m)	Number	Type	Recovery (%)	N-Value • Blows/305mm • 20 40 60 80	Moisture Content % 10 20 30	Well Completion Details
ft / m		Ground Surface	360.6						
0 / 0		**TOPSOIL** dark brown, silty sand, moist	0.0	1	SS	90	5	14	
			359.8						
2		**SAND** brown, some silt, trace gravel, moist	0.8	2	SS	60	2	20	
4		trace silt, moist	359.1						
6 / 2		wet	1.5	3	SS	50	7	19	
8		saturated	358.3						
			2.3	4	SS	60	12	20	
10		**SILT** brown, trace sand, varying degrees of clay content, saturated	357.5						
			3.0	5	SS	75	14	20	
12 / 4			356.9						
		Drilling Terminated	3.7						
14									
16									
18									
20 / 6									
22									
24									
26 / 8									
28									
30									
32 / 10									
34									
36									
38									



Field Technician: TXG

Drafted by: TXG

Reviewed by: ATD

MTE

Sheet: 1 of 1

Notes:
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured May 13, 2019.

APPENDIX B

ENGINEERED FILL

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and
- extend downward and outward at a slope no greater than 45° to meet the subgrade

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces for all buildings and residential dwellings or any part thereof (including but not limited to footings and floor slabs) on structural fill or native soils must be inspected and approved by PML engineering personnel prior to placement of the base/subbase granular material and/or concrete. The purpose of the inspection is to ensure the subgrade soils are capable of supporting the building/house foundation and floor slab loads and to confirm the building/house envelope does not extend beyond the limits of any structural fill pads.

8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze/thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and/or spreading of fill has not been carried out at the site.

10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and/or site specified.

Iron bars should be placed at the corner/intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only nonfrozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.

APPENDIX C

STATEMENT OF LIMITATIONS

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

STATEMENT OF LIMITATIONS

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence any action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

Appendix C

Particle Size Distribution Curves & Hydraulic Conductivity Analysis

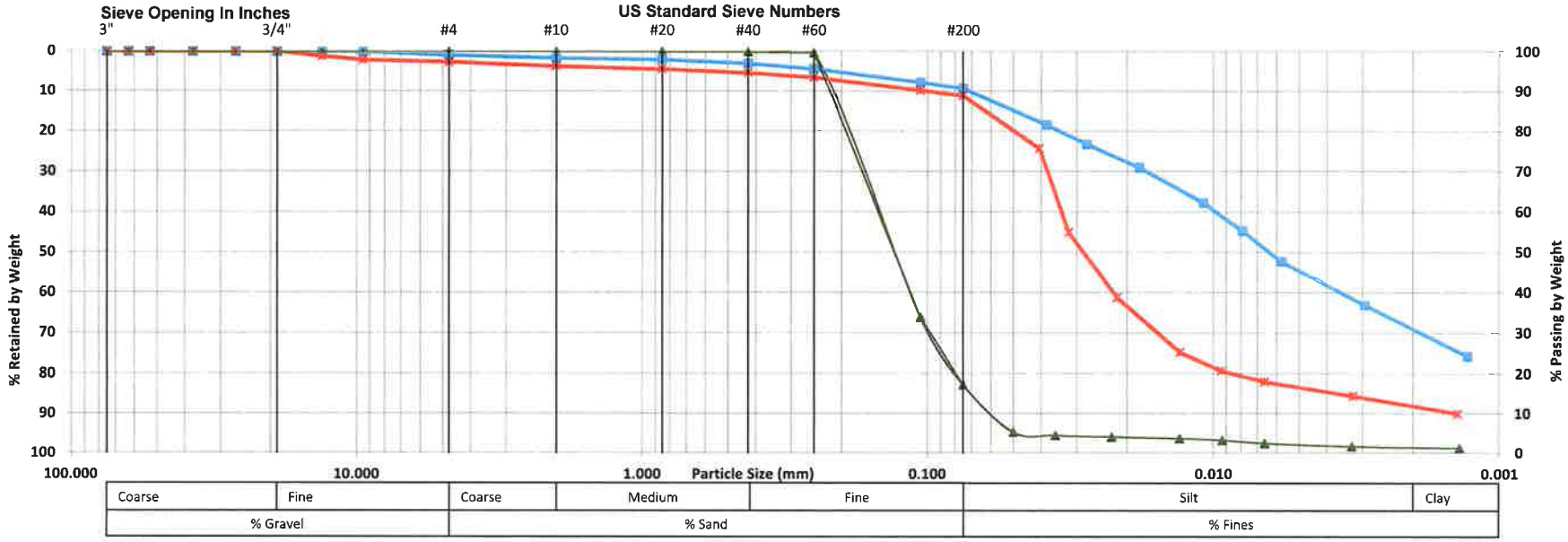
Particle Size Distribution Analysis Test Results

PROJECT NAME: 1012 Snyder's Road West Development
CLIENT: Nideva Properties Inc.
LOCATION: 1012 Snyder's Road West, Baden, ON

DATE SAMPLED: June 3, 2019
DATE TESTED: June 5-7, 2019

FILE No.: 40777-800
TABLE #: 1

Unified Soil Classification



Symbol	Borehole ID	Sample #	*Sample Depth*	Description
▲	MW101-19	SS-7	6.1-6.7 mbgs	SAND, some Silt, trace Clay
■	MW102-19	SS-8	7.6-8.2 mbgs	Clayey SILT, trace Sand and Gravel
✱	MW103-19	SS-8	7.6-8.2 mbgs	SILT, some Clay, trace Sand and Gravel

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

NOTES:

MTE Consultants Inc.
365 Horne Street
Stratford, Ontario N5A 2A5
Phone: 519-271-7952
Fax: 519-271-3545
www.mte85.com

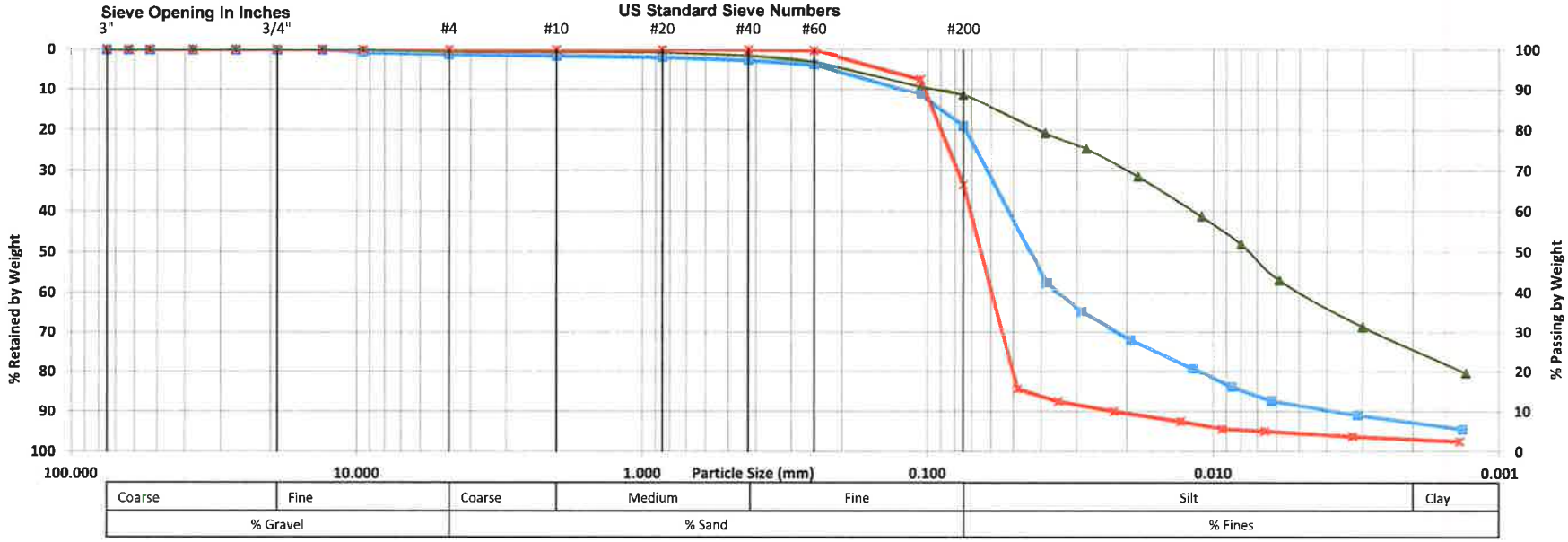
Particle Size Distribution Analysis Test Results

PROJECT NAME: 1012 Snyder's Road West Development
CLIENT: Nideva Properties Inc.
LOCATION: 1012 Snyder's Road West, Baden, ON

DATE SAMPLED: June 3, 2019
DATE TESTED: June 5-7, 2019

FILE No.: 40777-800
TABLE #: 2

Unified Soil Classification



Symbol	Borehole ID	Sample #	*Sample Depth*	Description
▲	MW104-19	SS-6	4.6-5.2 mbgs	Clayey SILT, some Sand, trace Gravel
■	MW105-19	SS-8	7.6-8.2 mbgs	SILT, some Sand, trace Clay and Gravel
✕	MW106A-19	SS-15	16.8-17.4 mbgs	Sandy SILT, trace Clay

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

NOTES:

MTE Consultants Inc.
365 Home Street
Stratford, Ontario N5A 2A5
Phone: 519-271-7952
Fax: 519-271-3545
www.mte85.com

Appendix C: Particle Size Distribution Analysis

Well ID	Sample ID	Depth Top (m)	Depth Bottom (m)	Soil Description	Grain Size at which 10% is finer (mm) d_{10}	Grain size at which 60% is finer (mm) d_{60}	% passing .02mm sieve % P_1	% passing .06mm sieve % P_2	Hazen Coefficient (-) C	Uniformity Index[1] (-) $C_u = d_{60}/d_{10}$	Porosity[2] (-) $n=0.255(1+0.83^{Cu})$	Hydraulic Conductivity[3] (m/sec)					
												Hazen[3]	Beyer[3]	Kozeny-Carmen[3]	Wang[3]	Kaubisch[4]	Geometric Mean
MW101-19	SS-7	6.1	6.7	SAND, some silt, trace clay	0.06	0.16	4.1	10.1	-	2.7	0.410	N/A	N/A	3.2E-05	5.9E-05	N/A	4.4E-05
MW102-19	SS-8	7.6	8.2	Clayey SILT, trace sand and gravel		0.01	72.1	87.1	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW103-19	SS-8	7.6	8.2	SILT, some clay, trace sand and gravel	0.0015	0.036	36.2	83.1	-	24.0	0.258	N/A	N/A	N/A	N/A	N/A	N/A
MW104-19	SS-6	4.6	5.2	Clayey SILT, some sand, trace gravel		0.013	69.7	84.8	-		0.510	N/A	N/A	N/A	N/A	N/A	N/A
MW105-19	SS-8	7.6	8.2	SILT, some sand, trace clay and gravel	0.0038	0.013	28.6	65.4	-	3.42	0.390	N/A	N/A	N/A	N/A	N/A	N/A
MW106A-19	SS-15	16.8	17.4	Sandy SILT, trace clay	0.025	0.071	9.4	37.9	-	2.8	0.405	N/A	N/A	5.3E-06	N/A	N/A	5.3E-06

Water Moraine Aquifer: 1.5E-05

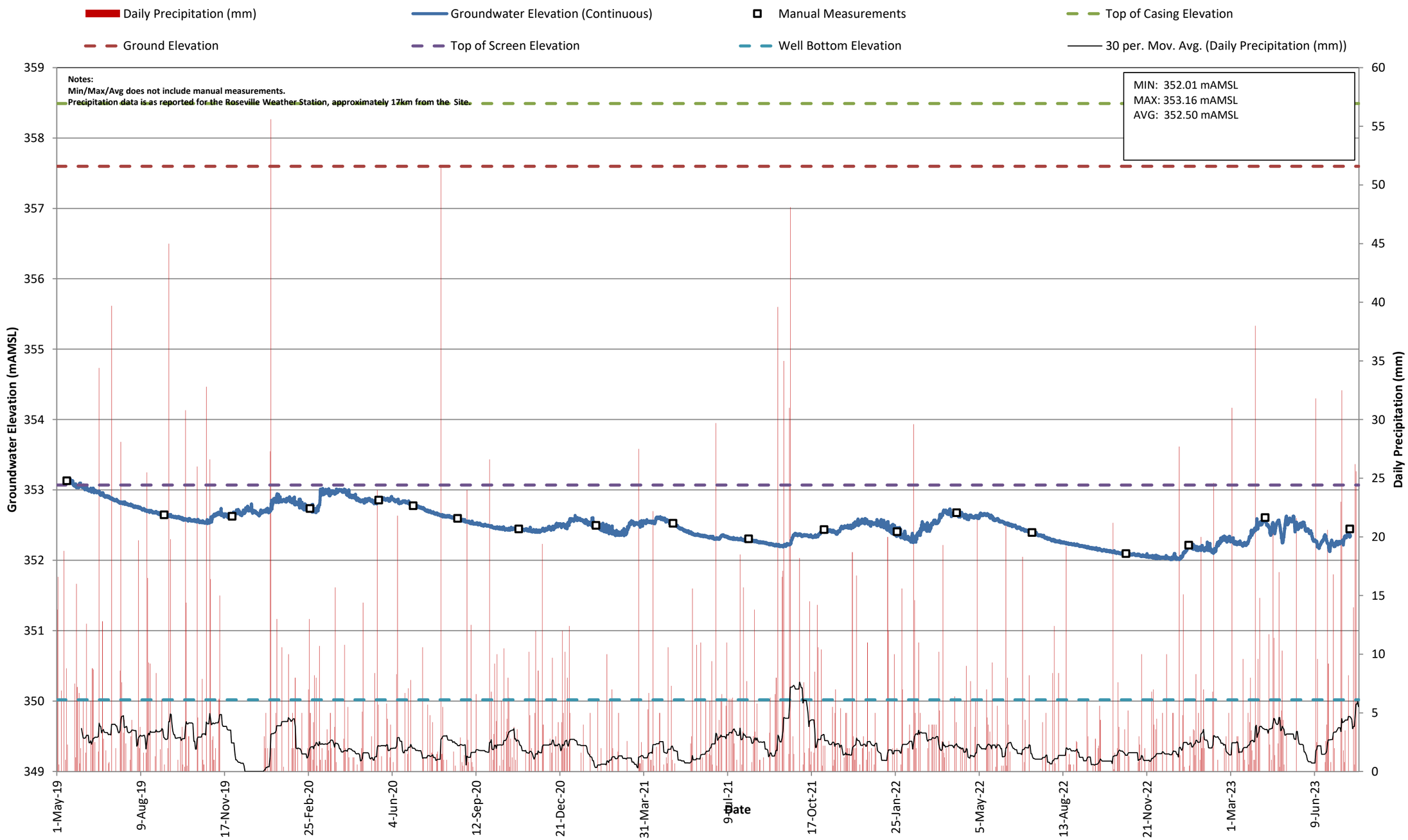
Notes:

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

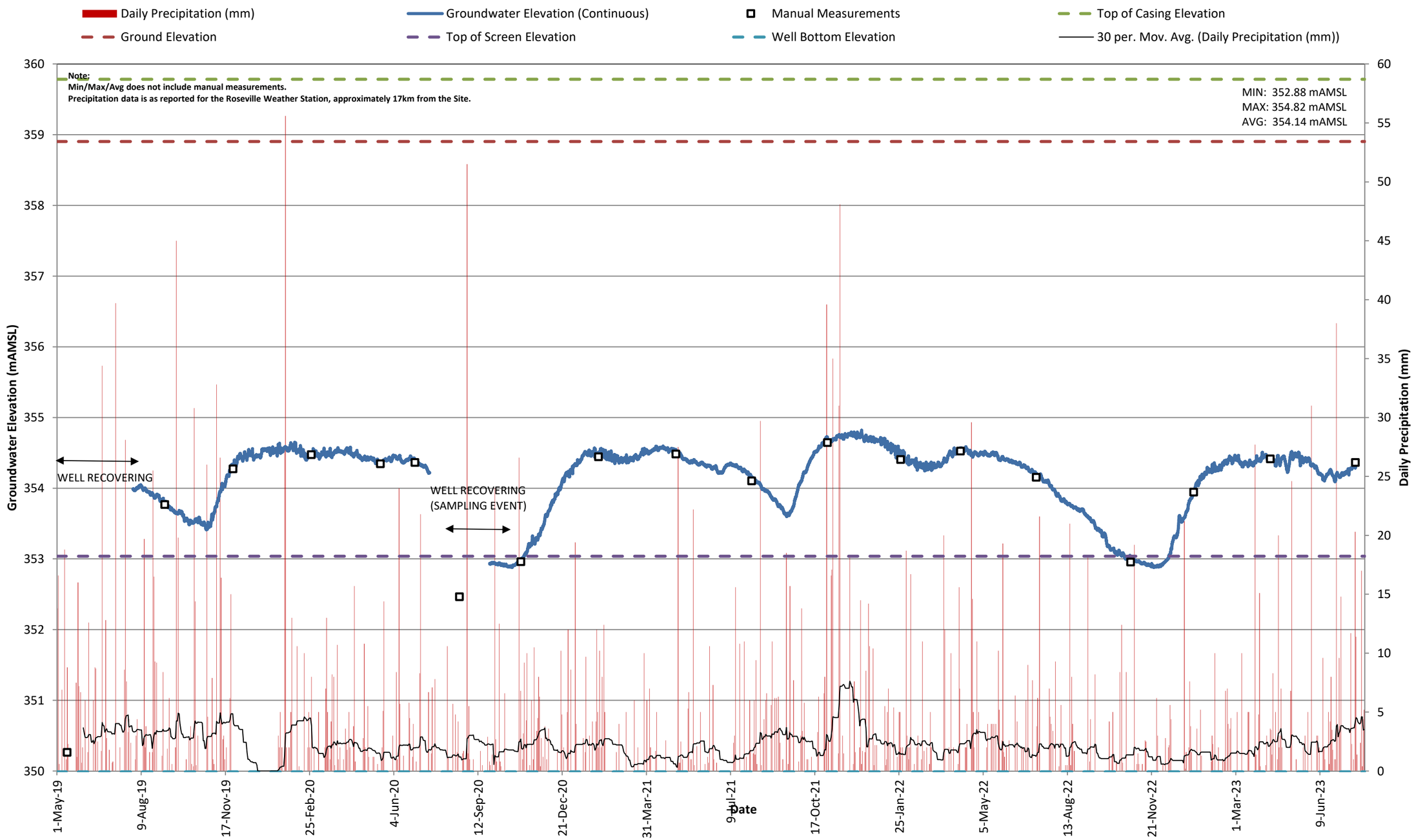
Appendix D

Hydrographs

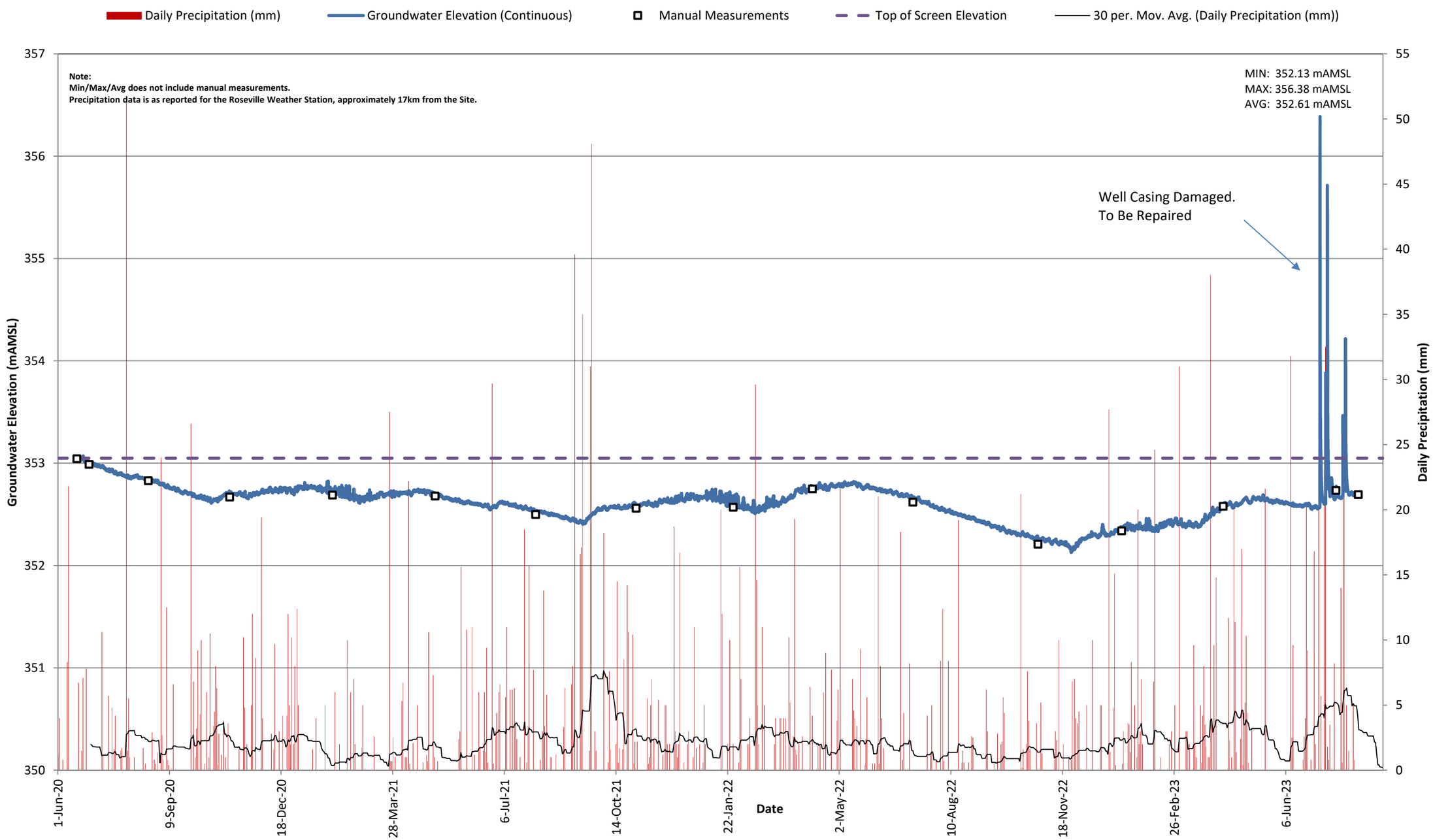
Hydrograph 1: Groundwater Elevations (mAMSL) - MW101-19



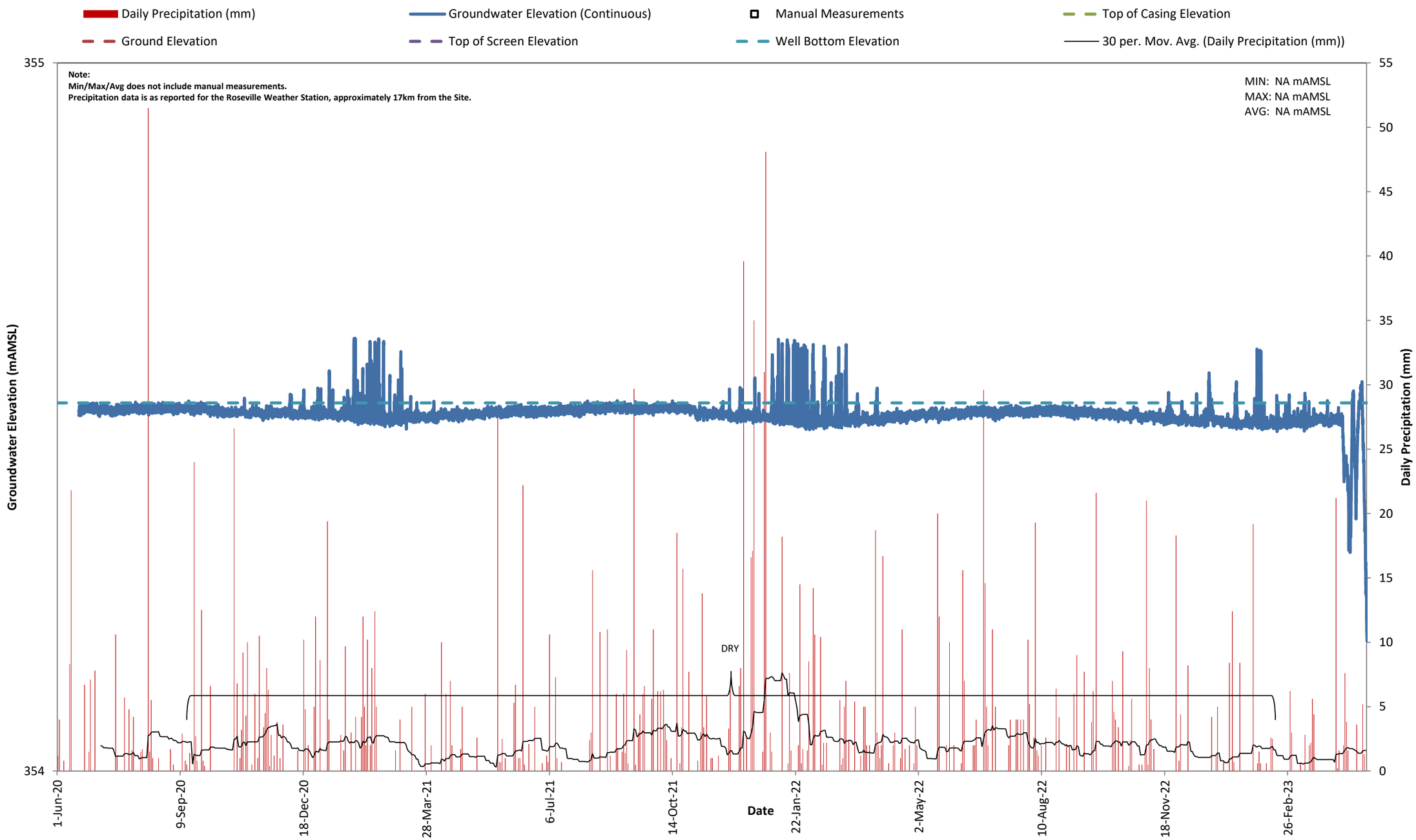
Hydrograph 2: Groundwater Elevations (mAMSL) - MW102-19



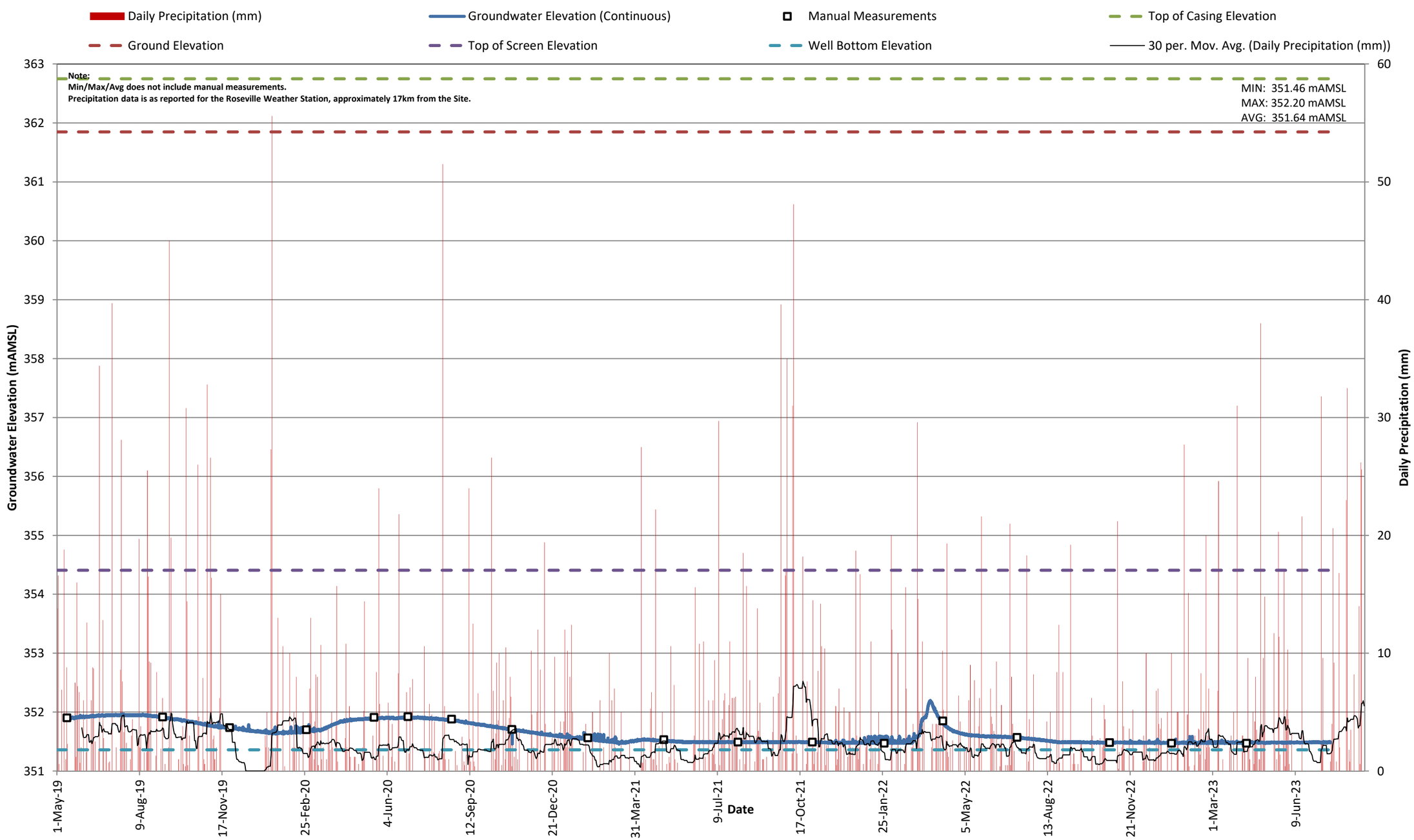
Hydrograph 3: Groundwater Elevations (mAMSL) - MW103-19



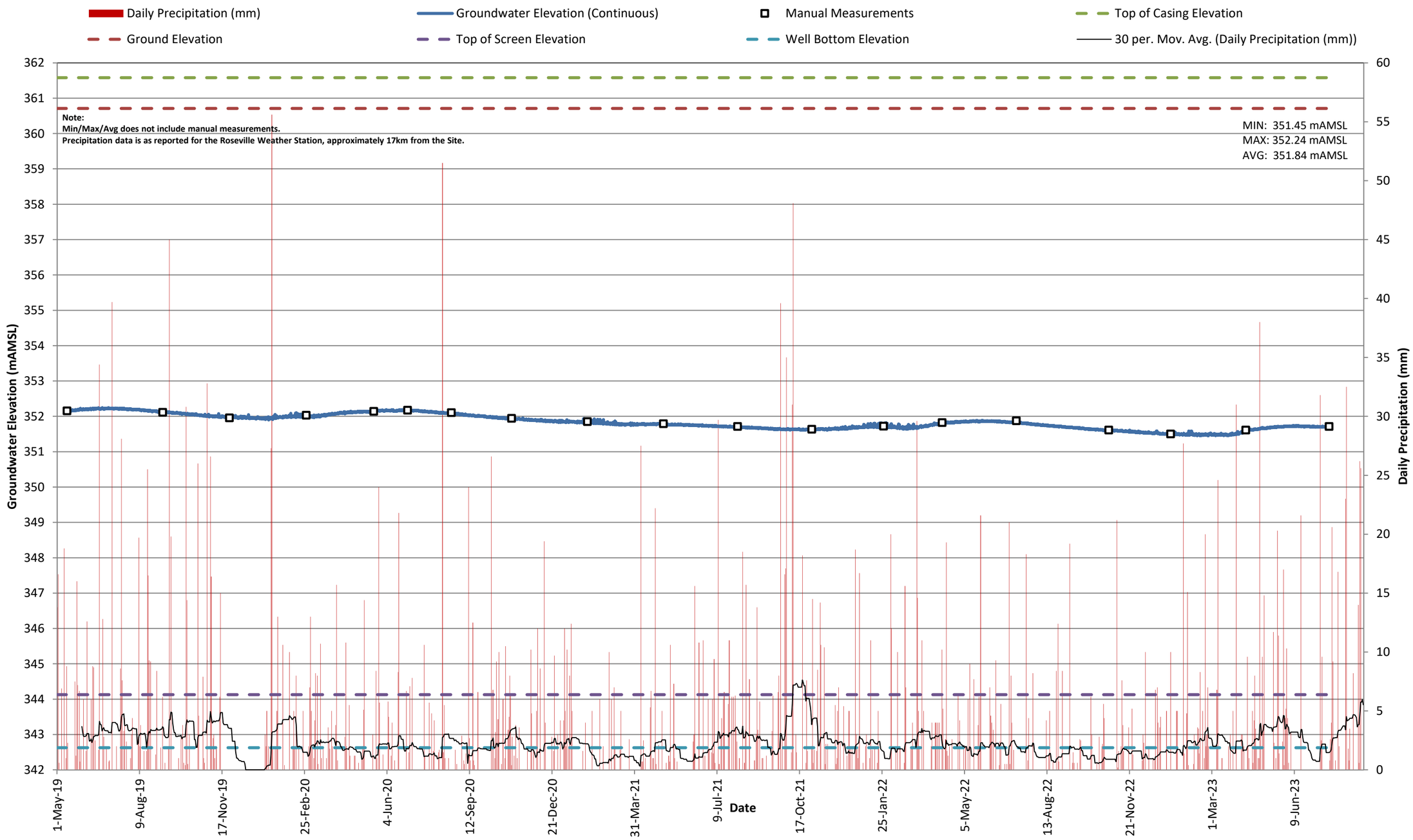
Hydrograph 4: Groundwater Elevations (mAMSL) - MW104-19



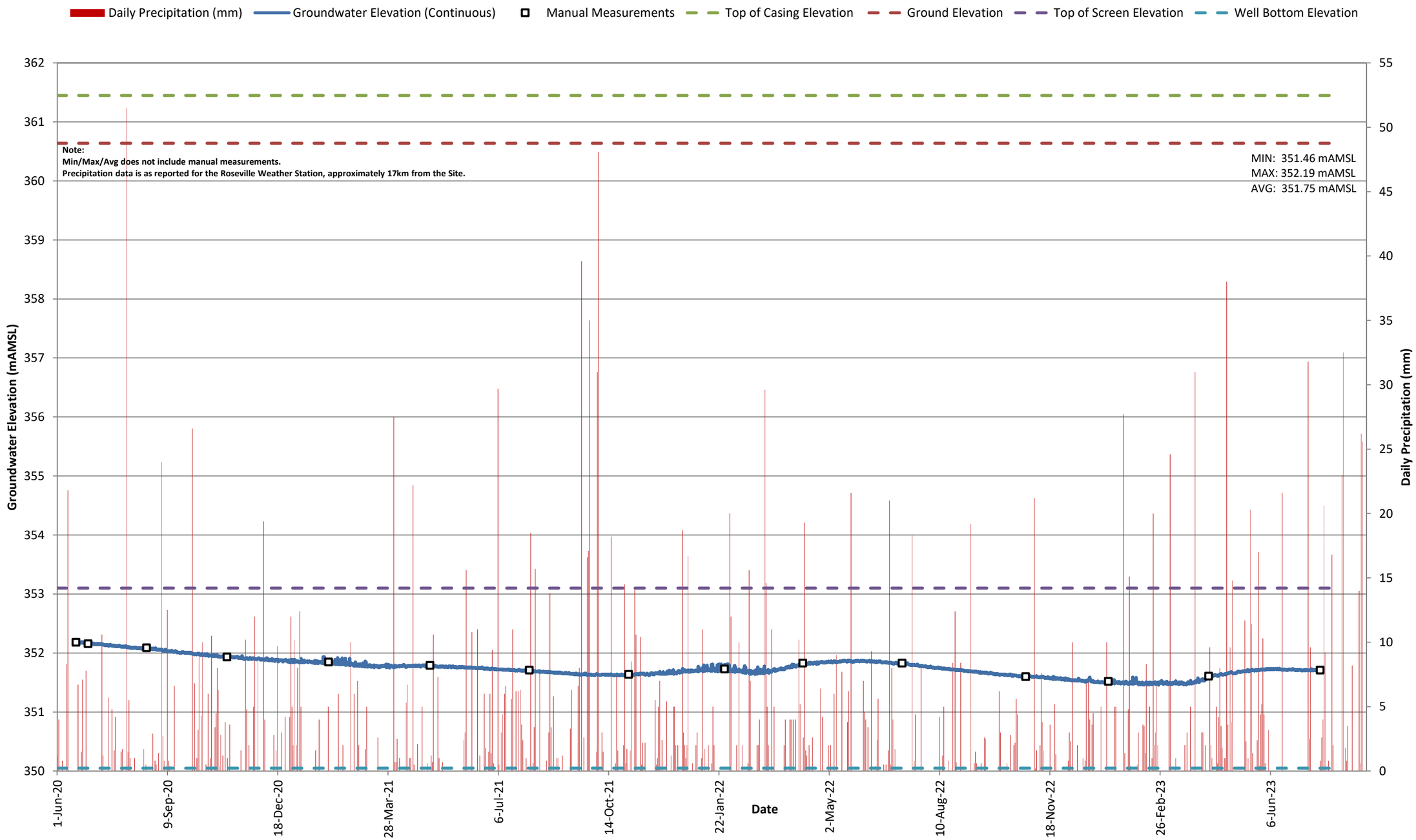
Hydrograph 5: Groundwater Elevations (mAMSL) - MW105-19



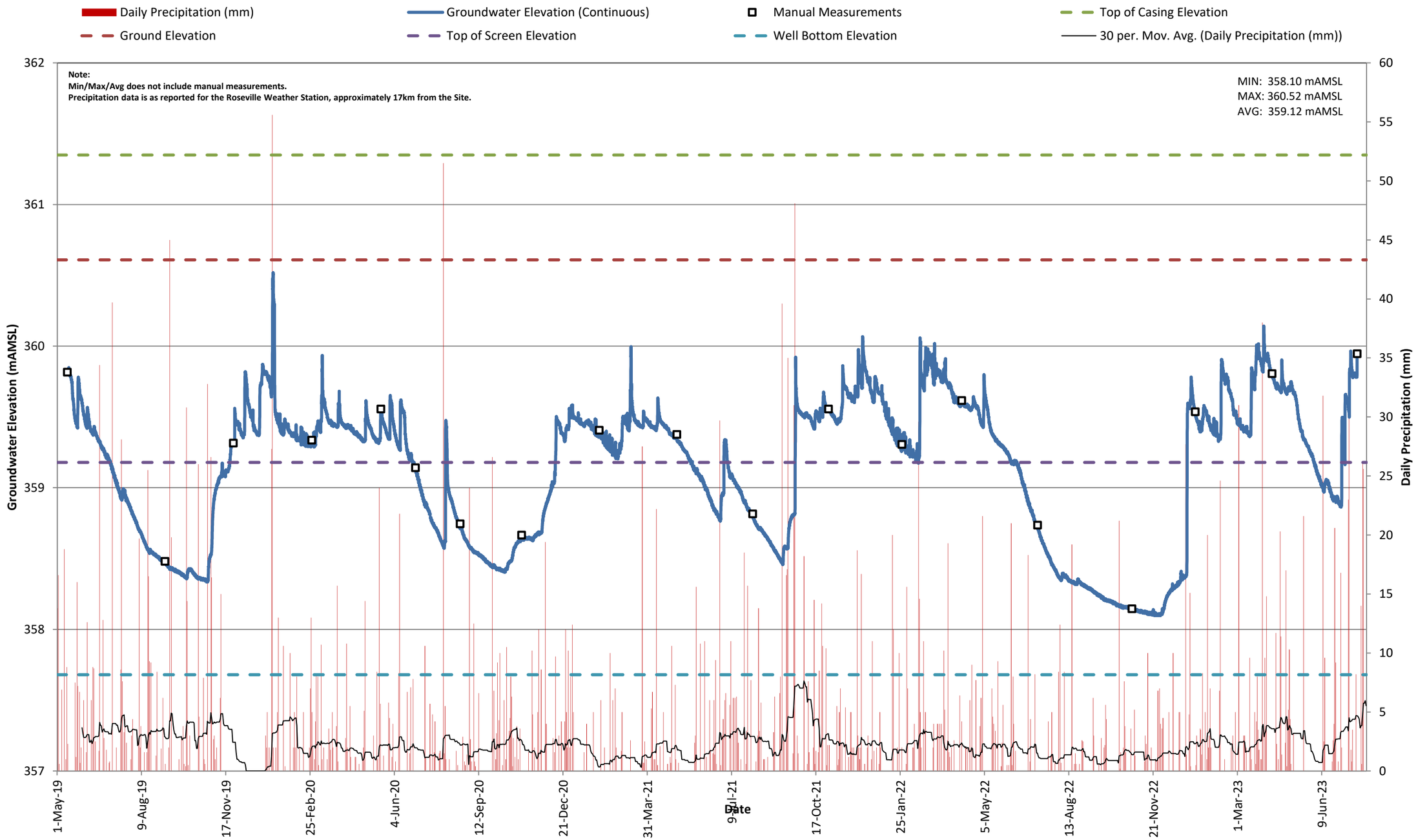
Hydrograph 6: Groundwater Elevations (mAMSL) - MW106A-19



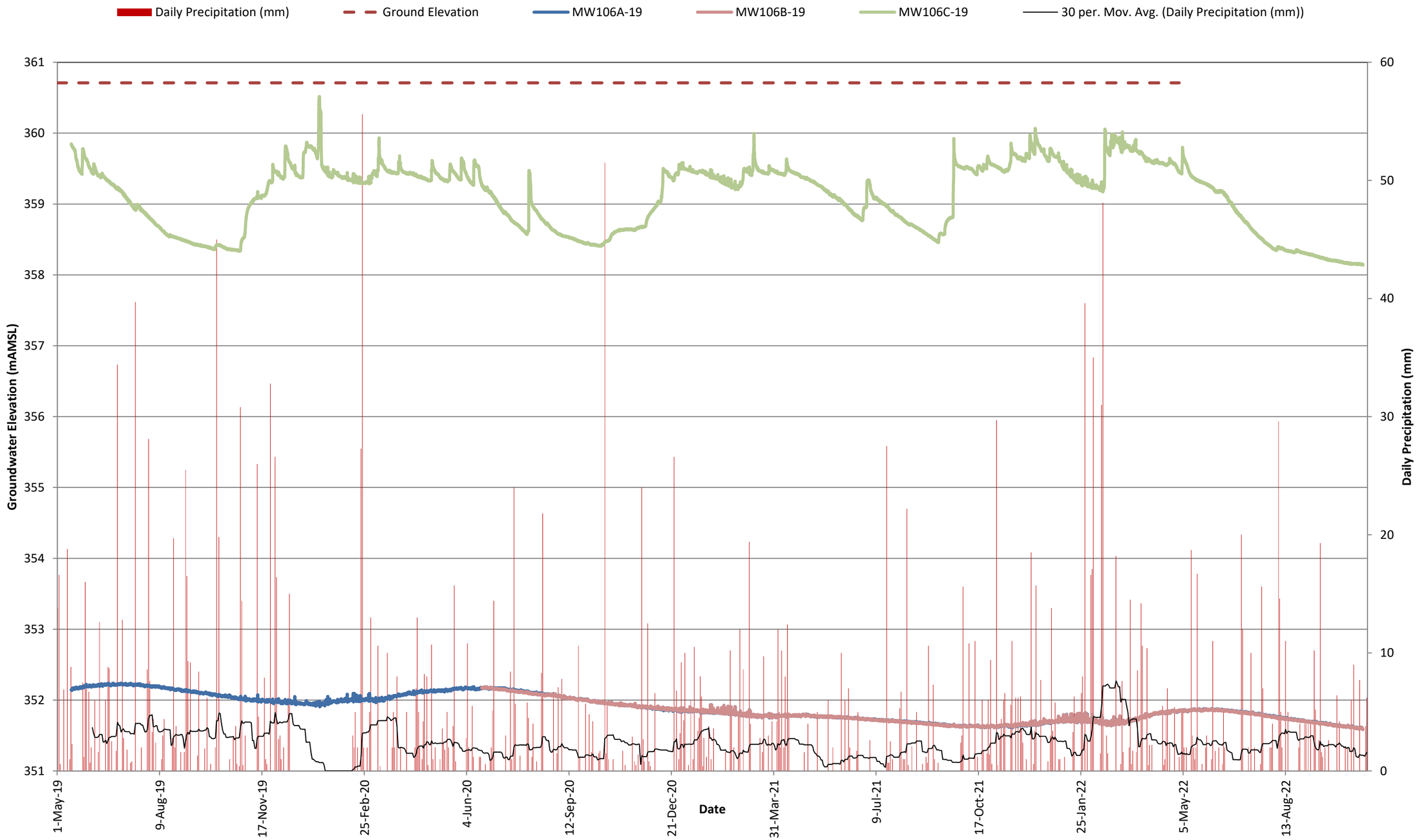
Hydrograph 7: Groundwater Elevations (mAMSL) - MW106B-19



Hydrograph 8: Groundwater Elevations (mAMSL) - MW106C-19

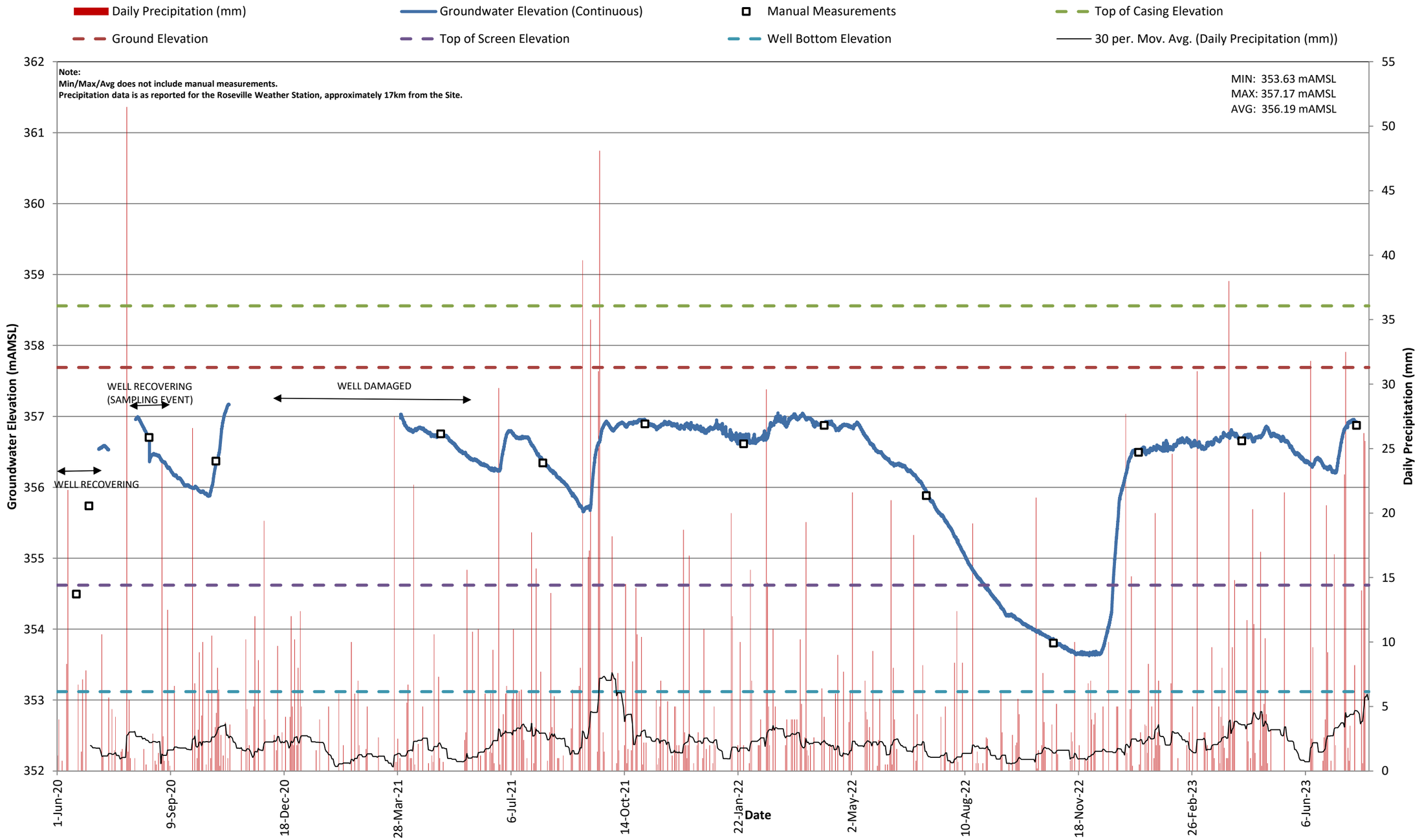


Hydrograph 9: Groundwater Elevations (mAMSL) - MW106A/B/C-19

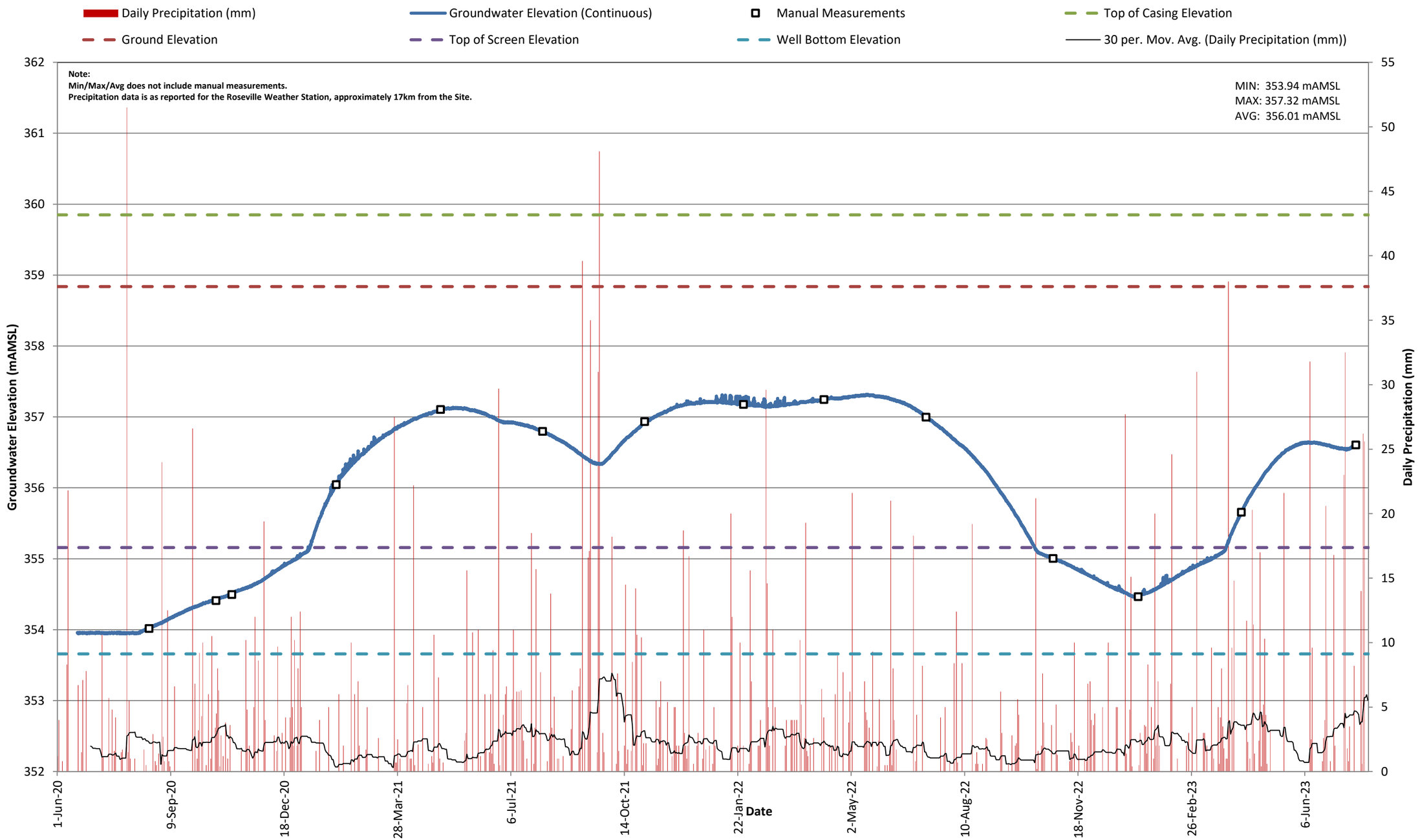


Hydrograph 10: Groundwater Elevations (mAMSL) - MW201-20

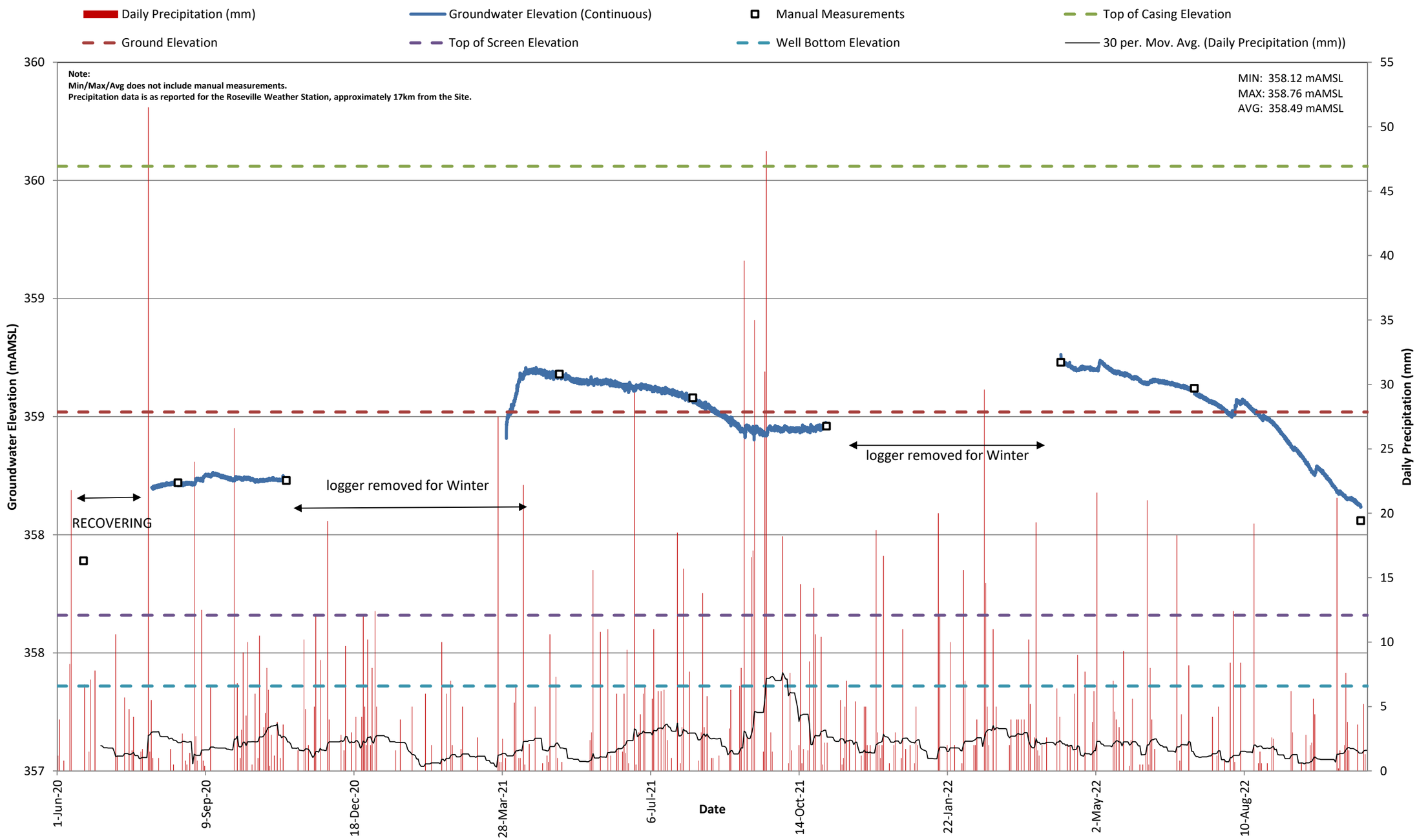
Hydrograph 11: Groundwater Elevations (mAMSL) - MW202-20



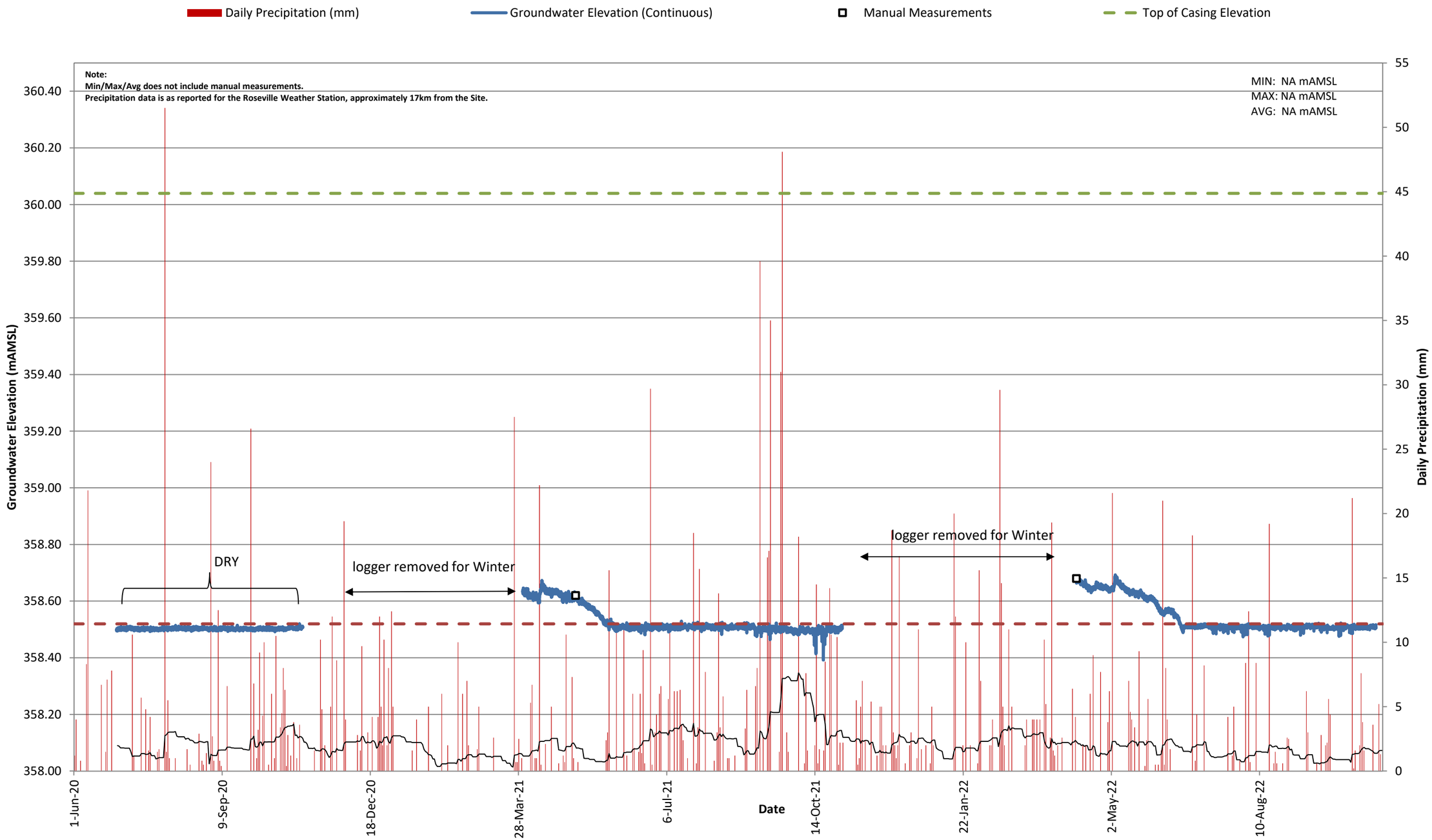
Hydrograph 12: Groundwater Elevations (mAMSL) - MW203-20



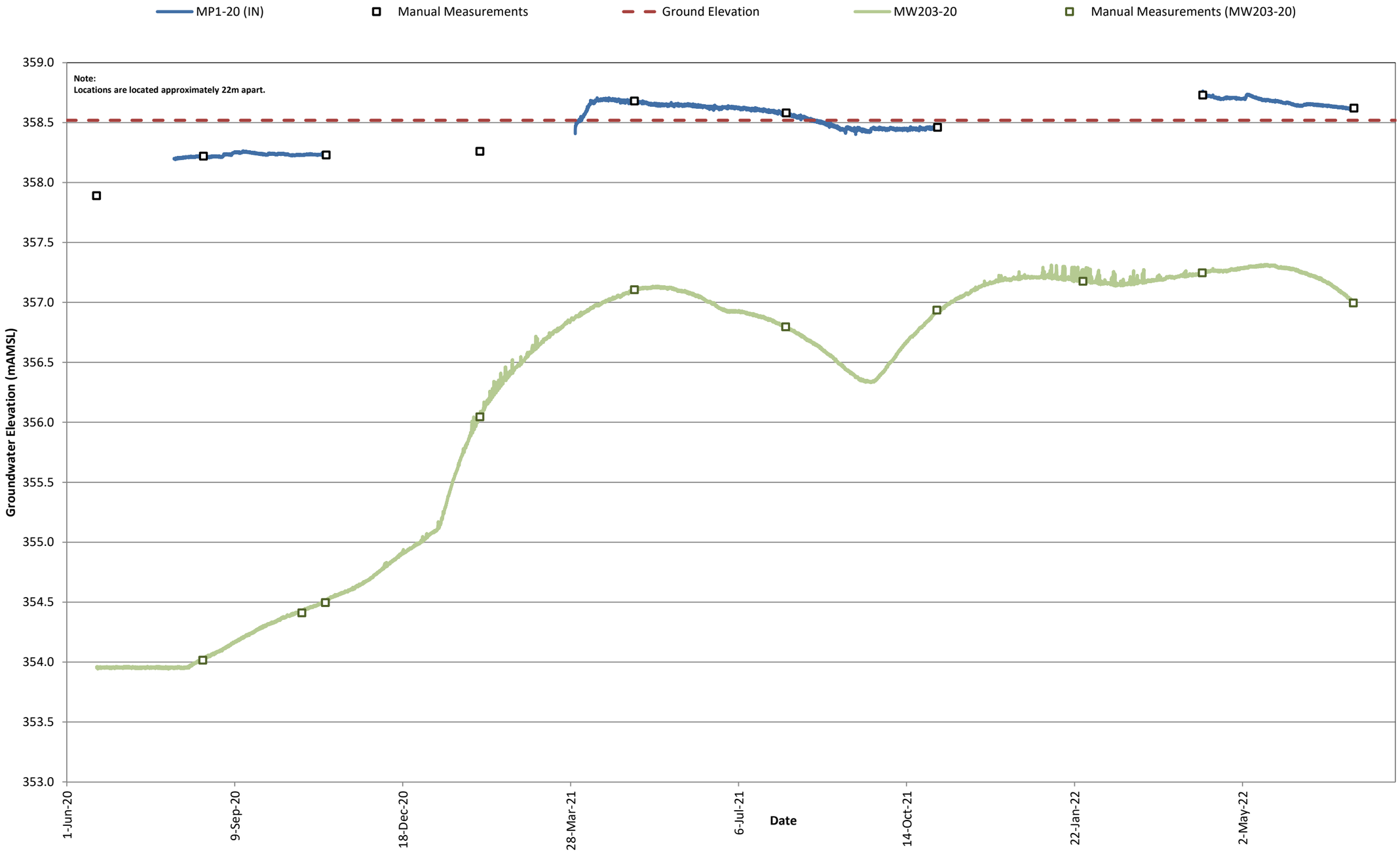
Hydrograph 13: Groundwater Elevations (mAMSL) - MP1-20 (IN)



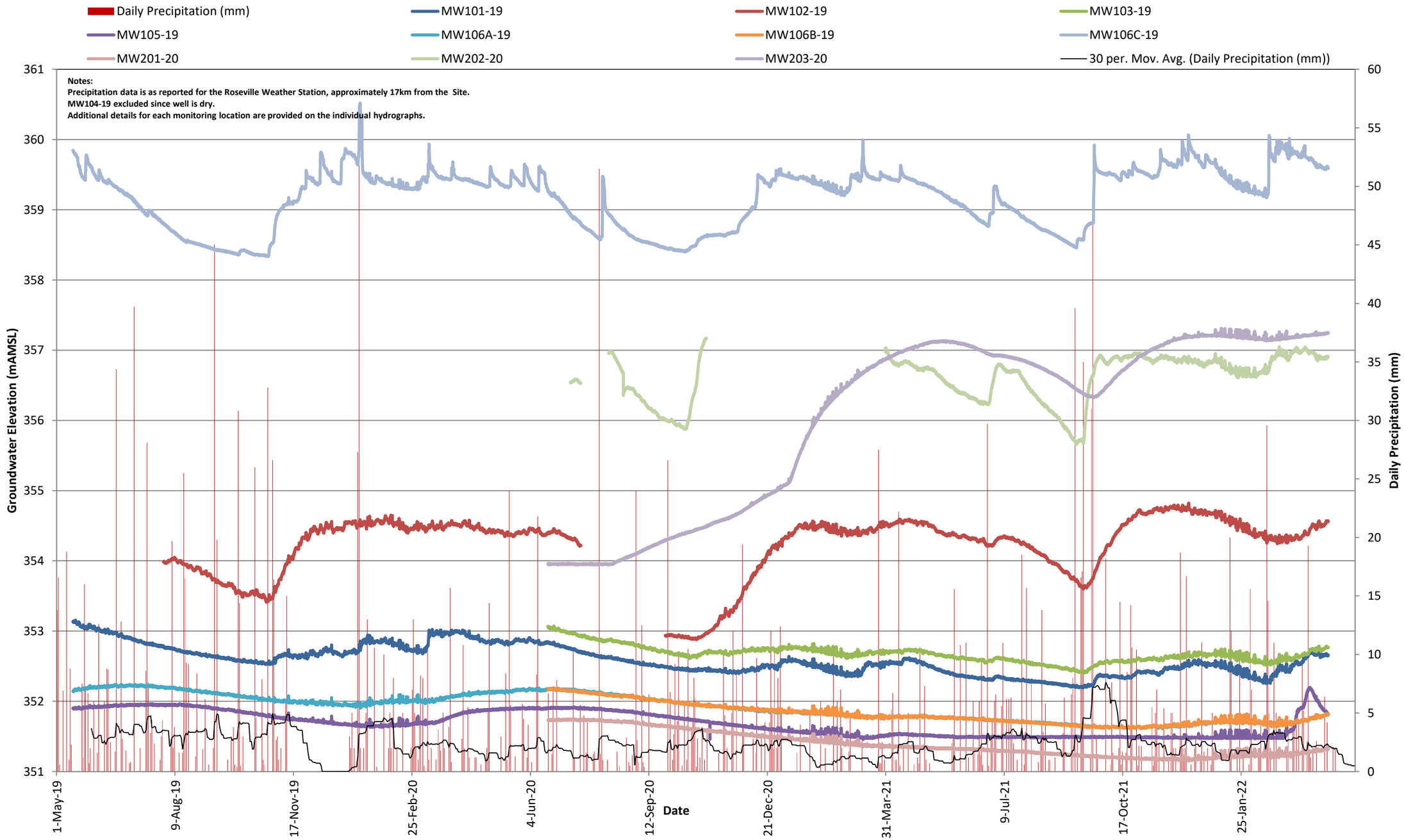
Hydrograph 14: Groundwater Elevations (mAMSL) - MP1-20 (OUT)



Hydrograph 15: Groundwater Elevations (mAMSL) - MP1-20 (IN) & MW203-20



Hydrograph 16: Groundwater Elevations (mAMSL) - Compiled Monitoring Well Hydrographs



Appendix E

Laboratory Certificates of Analysis

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

Date Received: 16-JUL-20
Report Date: 23-JUL-20 15:29 (MT)
Version: FINAL

Client Phone: 519-743-6500

Certificate of Analysis

Lab Work Order #: L2475516

Project P.O. #: NOT SUBMITTED
Job Reference: 40777-800
C of C Numbers: 17-793680
Legal Site Desc:

Emily Hansen
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2475516-1 MW202-20 Sampled By: KW on 16-JUL-20 @ 12:45 Matrix: WATER							
Physical Tests							
Colour, Apparent	26.0		2.0	CU		16-JUL-20	R5156143
Conductivity	856		3.0	umhos/cm		17-JUL-20	R5157608
Hardness (as CaCO3)	414		0.50	mg/L		17-JUL-20	
pH	7.70		0.10	pH units		17-JUL-20	R5157608
Total Dissolved Solids	574	DLDS	20	mg/L		22-JUL-20	R5164279
Turbidity	189		0.10	NTU	17-JUL-20	17-JUL-20	R5156776
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	340		10	mg/L		17-JUL-20	R5157608
Ammonia, Total (as N)	0.128		0.010	mg/L		20-JUL-20	R5159863
Chloride (Cl)	3.45		0.50	mg/L		20-JUL-20	R5159617
Fluoride (F)	0.392		0.020	mg/L		20-JUL-20	R5159617
Nitrate (as N)	0.126		0.020	mg/L		20-JUL-20	R5159617
Nitrite (as N)	0.025		0.010	mg/L		20-JUL-20	R5159617
Orthophosphate-Dissolved (as P)	0.0053		0.0030	mg/L		17-JUL-20	R5157124
Sulfate (SO4)	144		0.30	mg/L		20-JUL-20	R5159617
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					17-JUL-20	R5156355
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Antimony (Sb)-Dissolved	0.00019		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Arsenic (As)-Dissolved	0.00039		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Barium (Ba)-Dissolved	0.207		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Boron (B)-Dissolved	0.045		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Cadmium (Cd)-Dissolved	0.0000115		0.0000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Calcium (Ca)-Dissolved	93.1		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Cobalt (Co)-Dissolved	0.00028		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Copper (Cu)-Dissolved	0.00320		0.00020	mg/L	17-JUL-20	17-JUL-20	R5157527
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Magnesium (Mg)-Dissolved	44.0		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Manganese (Mn)-Dissolved	0.0560		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Molybdenum (Mo)-Dissolved	0.00186		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Nickel (Ni)-Dissolved	0.00181		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Potassium (K)-Dissolved	3.86		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Selenium (Se)-Dissolved	0.00124		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silicon (Si)-Dissolved	7.12		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Sodium (Na)-Dissolved	24.4		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527

* 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
L2475516-1 MW202-20 Sampled By: KW on 16-JUL-20 @ 12:45 Matrix: WATER							
Dissolved Metals							
Strontium (Sr)-Dissolved	0.902		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Thallium (Tl)-Dissolved	0.000024		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Tin (Sn)-Dissolved	0.00030		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Uranium (U)-Dissolved	0.00693		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Zinc (Zn)-Dissolved	0.0025		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
L2475516-2 MW102-19 Sampled By: KW on 16-JUL-20 @ 13:49 Matrix: WATER							
Physical Tests							
Colour, Apparent	24.5		2.0	CU		16-JUL-20	R5156143
Conductivity	934		3.0	umhos/cm		17-JUL-20	R5157608
Hardness (as CaCO3)	451		0.50	mg/L		17-JUL-20	
pH	7.50		0.10	pH units		17-JUL-20	R5157608
Total Dissolved Solids	608	DLDS	20	mg/L		22-JUL-20	R5164279
Turbidity	1190		0.10	NTU	17-JUL-20	17-JUL-20	R5156776
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	428		10	mg/L		17-JUL-20	R5157608
Ammonia, Total (as N)	0.021		0.010	mg/L		20-JUL-20	R5159863
Chloride (Cl)	23.7		0.50	mg/L		20-JUL-20	R5159617
Fluoride (F)	0.324		0.020	mg/L		20-JUL-20	R5159617
Nitrate (as N)	0.060		0.020	mg/L		20-JUL-20	R5159617
Nitrite (as N)	<0.010		0.010	mg/L		20-JUL-20	R5159617
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		17-JUL-20	R5157124
Sulfate (SO4)	88.5		0.30	mg/L		20-JUL-20	R5159617
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					17-JUL-20	R5156355
Aluminum (Al)-Dissolved	0.0788		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Antimony (Sb)-Dissolved	0.00014		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Arsenic (As)-Dissolved	0.00074		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Barium (Ba)-Dissolved	0.215		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Boron (B)-Dissolved	0.029		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Cadmium (Cd)-Dissolved	0.0000098		0.0000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Calcium (Ca)-Dissolved	94.8		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Copper (Cu)-Dissolved	0.00197		0.00020	mg/L	17-JUL-20	17-JUL-20	R5157527

* 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
L2475516-2 MW102-19 Sampled By: KW on 16-JUL-20 @ 13:49 Matrix: WATER							
Dissolved Metals							
Iron (Fe)-Dissolved	0.070		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Lead (Pb)-Dissolved	0.000116		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Magnesium (Mg)-Dissolved	52.0		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Manganese (Mn)-Dissolved	0.0343		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Molybdenum (Mo)-Dissolved	0.00339		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Nickel (Ni)-Dissolved	0.00069		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Potassium (K)-Dissolved	3.95		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Selenium (Se)-Dissolved	0.000256		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silicon (Si)-Dissolved	7.39		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Sodium (Na)-Dissolved	29.2		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Strontium (Sr)-Dissolved	0.441		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Thallium (Tl)-Dissolved	0.000016		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Titanium (Ti)-Dissolved	0.00272		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Uranium (U)-Dissolved	0.00729		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Vanadium (V)-Dissolved	0.00152		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Zinc (Zn)-Dissolved	0.0022		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
L2475516-3 MW106A-19 Sampled By: KW on 16-JUL-20 @ 13:10 Matrix: WATER							
Physical Tests							
Colour, Apparent	7.7		2.0	CU		16-JUL-20	R5156143
Conductivity	694		3.0	umhos/cm		17-JUL-20	R5157608
Hardness (as CaCO3)	311		0.50	mg/L		17-JUL-20	
pH	7.79		0.10	pH units		17-JUL-20	R5157608
Total Dissolved Solids	462	DLDS	20	mg/L		22-JUL-20	R5164279
Turbidity	35.1		0.10	NTU	17-JUL-20	17-JUL-20	R5156776
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	266		10	mg/L		17-JUL-20	R5157608
Ammonia, Total (as N)	0.049		0.010	mg/L		20-JUL-20	R5159863
Chloride (Cl)	18.1		0.50	mg/L		20-JUL-20	R5159617
Fluoride (F)	0.156		0.020	mg/L		20-JUL-20	R5159617
Nitrate (as N)	<0.020		0.020	mg/L		20-JUL-20	R5159617
Nitrite (as N)	<0.010		0.010	mg/L		20-JUL-20	R5159617
Orthophosphate-Dissolved (as P)	<0.0030		0.0030	mg/L		17-JUL-20	R5157124
Sulfate (SO4)	80.5		0.30	mg/L		20-JUL-20	R5159617
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					17-JUL-20	R5156355

* 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
L2475516-3 MW106A-19 Sampled By: KW on 16-JUL-20 @ 13:10 Matrix: WATER							
Dissolved Metals							
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Arsenic (As)-Dissolved	0.00420		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Barium (Ba)-Dissolved	0.118		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Boron (B)-Dissolved	0.021		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Calcium (Ca)-Dissolved	80.0		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	17-JUL-20	17-JUL-20	R5157527
Iron (Fe)-Dissolved	0.333		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Magnesium (Mg)-Dissolved	27.0		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Manganese (Mn)-Dissolved	0.0793		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Molybdenum (Mo)-Dissolved	0.00779		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Nickel (Ni)-Dissolved	0.00404		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Potassium (K)-Dissolved	2.86		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silicon (Si)-Dissolved	8.13		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Sodium (Na)-Dissolved	18.8		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Strontium (Sr)-Dissolved	0.440		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Uranium (U)-Dissolved	0.00216		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Vanadium (V)-Dissolved	0.00051		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527
L2475516-4 MW106C-19 Sampled By: KW on 16-JUL-20 @ 13:30 Matrix: WATER							
Physical Tests							
Colour, Apparent	96.4		2.0	CU		16-JUL-20	R5156143
Conductivity	600		3.0	umhos/cm		17-JUL-20	R5157608
Hardness (as CaCO3)	207		0.50	mg/L		17-JUL-20	
pH	7.52		0.10	pH units		17-JUL-20	R5157608
Total Dissolved Solids	418	DLDS	20	mg/L		22-JUL-20	R5164279

* 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
L2475516-4 MW106C-19 Sampled By: KW on 16-JUL-20 @ 13:30 Matrix: WATER							
Physical Tests							
Turbidity	567		0.10	NTU	17-JUL-20	17-JUL-20	R5156776
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	264		10	mg/L		17-JUL-20	R5157608
Ammonia, Total (as N)	7.7	DLHC	1.0	mg/L		17-JUL-20	R5159863
Chloride (Cl)	10.1		0.50	mg/L		20-JUL-20	R5159617
Fluoride (F)	0.255		0.020	mg/L		20-JUL-20	R5159617
Nitrate (as N)	6.76		0.020	mg/L		20-JUL-20	R5159617
Nitrite (as N)	2.73		0.010	mg/L		20-JUL-20	R5159617
Orthophosphate-Dissolved (as P)	0.279	DLHC	0.030	mg/L		17-JUL-20	R5157124
Sulfate (SO4)	19.2		0.30	mg/L		20-JUL-20	R5159617
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					17-JUL-20	R5156355
Aluminum (Al)-Dissolved	0.0116		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Antimony (Sb)-Dissolved	0.00015		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Arsenic (As)-Dissolved	0.00238		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Barium (Ba)-Dissolved	0.0455		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Boron (B)-Dissolved	0.047		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Cadmium (Cd)-Dissolved	0.0000398		0.0000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Calcium (Ca)-Dissolved	69.6		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Cobalt (Co)-Dissolved	0.00098		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Copper (Cu)-Dissolved	0.0459		0.00020	mg/L	17-JUL-20	17-JUL-20	R5157527
Iron (Fe)-Dissolved	0.017		0.010	mg/L	17-JUL-20	17-JUL-20	R5157527
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Magnesium (Mg)-Dissolved	8.11		0.0050	mg/L	17-JUL-20	17-JUL-20	R5157527
Manganese (Mn)-Dissolved	0.370		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Molybdenum (Mo)-Dissolved	0.00125		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Nickel (Ni)-Dissolved	0.00222		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Phosphorus (P)-Dissolved	0.381		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Potassium (K)-Dissolved	18.5		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Selenium (Se)-Dissolved	0.000281		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silicon (Si)-Dissolved	4.35		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	17-JUL-20	17-JUL-20	R5157527
Sodium (Na)-Dissolved	4.55		0.050	mg/L	17-JUL-20	17-JUL-20	R5157527
Strontium (Sr)-Dissolved	0.128		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Thallium (Tl)-Dissolved	0.000016		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527
Titanium (Ti)-Dissolved	<0.00050	DLUI	0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	17-JUL-20	17-JUL-20	R5157527

* 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
L2475516-4 MW106C-19 Sampled By: KW on 16-JUL-20 @ 13:30 Matrix: WATER							
Dissolved Metals							
Uranium (U)-Dissolved	0.000307		0.000010	mg/L	17-JUL-20	17-JUL-20	R5157527
Vanadium (V)-Dissolved	0.00149		0.00050	mg/L	17-JUL-20	17-JUL-20	R5157527
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L	17-JUL-20	17-JUL-20	R5157527
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	17-JUL-20	17-JUL-20	R5157527

* 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	Calcium (Ca)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2475516-1, -2, -3, -4
Matrix Spike	Ammonia, Total (as N)	MS-B	L2475516-1, -2, -3, -4

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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-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.

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:

17-793680

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: L2475516 Report Date: 23-JUL-20

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R5157608								
WG3364634-4 DUP		**WG3364634-3**						
Alkalinity, Total (as CaCO3)		194	198		mg/L	2.0	20	17-JUL-20
WG3364634-2 LCS								
Alkalinity, Total (as CaCO3)			105.8		%		85-115	17-JUL-20
WG3364634-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-JUL-20
CL-IC-N-WT	**Water**							
Batch R5159617								
WG3366168-9 DUP		**WG3366168-8**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	20-JUL-20
WG3366168-7 LCS								
Chloride (Cl)			103.5		%		90-110	20-JUL-20
WG3366168-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-JUL-20
WG3366168-10 MS		**WG3366168-8**						
Chloride (Cl)			99.8		%		75-125	20-JUL-20
COLOUR-APPARENT-WT	**Water**							
Batch R5156143								
WG3364364-3 DUP		**L2475516-1**						
Colour, Apparent		26.0	22.0		CU	17	20	16-JUL-20
WG3364364-2 LCS								
Colour, Apparent			101.6		%		85-115	16-JUL-20
WG3364364-1 MB								
Colour, Apparent			<2.0		CU		2	16-JUL-20
EC-WT	**Water**							
Batch R5157608								
WG3364634-4 DUP		**WG3364634-3**						
Conductivity		2360	2360		umhos/cm	0.0	10	17-JUL-20
WG3364634-2 LCS								
Conductivity			102.5		%		90-110	17-JUL-20
WG3364634-1 MB								
Conductivity			<3.0		umhos/cm		3	17-JUL-20
F-IC-N-WT	**Water**							
Batch R5159617								
WG3366168-9 DUP		**WG3366168-8**						
Fluoride (F)		0.023	0.022		mg/L	1.1	20	20-JUL-20
WG3366168-7 LCS								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R5159617								
WG3366168-7 LCS								
Fluoride (F)			108.1		%		90-110	20-JUL-20
WG3366168-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-JUL-20
WG3366168-10 MS		**WG3366168-8**						
Fluoride (F)			104.4		%		75-125	20-JUL-20
MET-D-CCMS-WT	**Water**							
Batch R5157527								
WG3364461-4 DUP		**WG3364461-3**						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-JUL-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-JUL-20
Arsenic (As)-Dissolved		0.00059	0.00063		mg/L	6.0	20	17-JUL-20
Barium (Ba)-Dissolved		0.00393	0.00386		mg/L	1.9	20	17-JUL-20
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-JUL-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-JUL-20
Boron (B)-Dissolved		0.047	0.049		mg/L	3.7	20	17-JUL-20
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	17-JUL-20
Calcium (Ca)-Dissolved		62.6	64.2		mg/L	2.5	20	17-JUL-20
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-JUL-20
Cobalt (Co)-Dissolved		0.00022	0.00022		mg/L	3.3	20	17-JUL-20
Copper (Cu)-Dissolved		0.00180	0.00179		mg/L	0.7	20	17-JUL-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-JUL-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-JUL-20
Magnesium (Mg)-Dissolved		11.6	11.8		mg/L	1.6	20	17-JUL-20
Manganese (Mn)-Dissolved		0.00146	0.00143		mg/L	2.4	20	17-JUL-20
Molybdenum (Mo)-Dissolved		0.000151	0.000138		mg/L	9.6	20	17-JUL-20
Nickel (Ni)-Dissolved		0.00082	0.00087		mg/L	6.0	20	17-JUL-20
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	17-JUL-20
Potassium (K)-Dissolved		2.56	2.56		mg/L	0.2	20	17-JUL-20
Selenium (Se)-Dissolved		0.000069	0.000052	J	mg/L	0.000017	0.0001	17-JUL-20
Silicon (Si)-Dissolved		6.45	6.55		mg/L	1.6	20	17-JUL-20
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-JUL-20
Sodium (Na)-Dissolved		7.91	7.88		mg/L	0.5	20	17-JUL-20
Strontium (Sr)-Dissolved		0.0873	0.0871		mg/L	0.2	20	17-JUL-20

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5157527								
WG3364461-4 DUP		**WG3364461-3**						
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-JUL-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-JUL-20
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	17-JUL-20
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-JUL-20
Uranium (U)-Dissolved		0.000203	0.000204		mg/L	0.3	20	17-JUL-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-JUL-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-JUL-20
Zirconium (Zr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3364461-2 LCS								
Aluminum (Al)-Dissolved			99.2		%		80-120	17-JUL-20
Antimony (Sb)-Dissolved			95.9		%		80-120	17-JUL-20
Arsenic (As)-Dissolved			99.8		%		80-120	17-JUL-20
Barium (Ba)-Dissolved			99.6		%		80-120	17-JUL-20
Beryllium (Be)-Dissolved			93.4		%		80-120	17-JUL-20
Bismuth (Bi)-Dissolved			98.5		%		80-120	17-JUL-20
Boron (B)-Dissolved			92.6		%		80-120	17-JUL-20
Cadmium (Cd)-Dissolved			101.3		%		80-120	17-JUL-20
Calcium (Ca)-Dissolved			96.5		%		80-120	17-JUL-20
Chromium (Cr)-Dissolved			97.6		%		80-120	17-JUL-20
Cobalt (Co)-Dissolved			97.3		%		80-120	17-JUL-20
Copper (Cu)-Dissolved			96.9		%		80-120	17-JUL-20
Iron (Fe)-Dissolved			98.8		%		80-120	17-JUL-20
Lead (Pb)-Dissolved			100.9		%		80-120	17-JUL-20
Magnesium (Mg)-Dissolved			99.5		%		80-120	17-JUL-20
Manganese (Mn)-Dissolved			97.9		%		80-120	17-JUL-20
Molybdenum (Mo)-Dissolved			98.8		%		80-120	17-JUL-20
Nickel (Ni)-Dissolved			97.4		%		80-120	17-JUL-20
Phosphorus (P)-Dissolved			95.8		%		80-120	17-JUL-20
Potassium (K)-Dissolved			95.2		%		80-120	17-JUL-20
Selenium (Se)-Dissolved			98.1		%		80-120	17-JUL-20
Silicon (Si)-Dissolved			96.4		%		60-140	17-JUL-20
Silver (Ag)-Dissolved			100.3		%		80-120	17-JUL-20
Sodium (Na)-Dissolved			97.2		%		80-120	17-JUL-20

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5157527								
WG3364461-2 LCS								
Strontium (Sr)-Dissolved			102.1		%		80-120	17-JUL-20
Thallium (Tl)-Dissolved			100.2		%		80-120	17-JUL-20
Tin (Sn)-Dissolved			96.3		%		80-120	17-JUL-20
Titanium (Ti)-Dissolved			95.7		%		80-120	17-JUL-20
Tungsten (W)-Dissolved			98.8		%		80-120	17-JUL-20
Uranium (U)-Dissolved			105.5		%		80-120	17-JUL-20
Vanadium (V)-Dissolved			97.8		%		80-120	17-JUL-20
Zinc (Zn)-Dissolved			98.3		%		80-120	17-JUL-20
Zirconium (Zr)-Dissolved			96.0		%		80-120	17-JUL-20
WG3364461-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	17-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	17-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	17-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	17-JUL-20
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	17-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	17-JUL-20
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	17-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUL-20
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	17-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	17-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	17-JUL-20
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	17-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUL-20

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5157527								
WG3364461-1 MB								
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	17-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-JUL-20
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	17-JUL-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	17-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUL-20
Zirconium (Zr)-Dissolved			<0.00020		mg/L		0.0002	17-JUL-20
WG3364461-5 MS		**WG3364461-3**						
Aluminum (Al)-Dissolved			99.2		%		70-130	17-JUL-20
Antimony (Sb)-Dissolved			96.3		%		70-130	17-JUL-20
Arsenic (As)-Dissolved			110.1		%		70-130	17-JUL-20
Barium (Ba)-Dissolved			97.3		%		70-130	17-JUL-20
Beryllium (Be)-Dissolved			100.5		%		70-130	17-JUL-20
Bismuth (Bi)-Dissolved			85.0		%		70-130	17-JUL-20
Boron (B)-Dissolved			91.5		%		70-130	17-JUL-20
Cadmium (Cd)-Dissolved			105.7		%		70-130	17-JUL-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	17-JUL-20
Chromium (Cr)-Dissolved			95.7		%		70-130	17-JUL-20
Cobalt (Co)-Dissolved			94.1		%		70-130	17-JUL-20
Copper (Cu)-Dissolved			90.8		%		70-130	17-JUL-20
Iron (Fe)-Dissolved			95.7		%		70-130	17-JUL-20
Lead (Pb)-Dissolved			97.3		%		70-130	17-JUL-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	17-JUL-20
Manganese (Mn)-Dissolved			95.7		%		70-130	17-JUL-20
Molybdenum (Mo)-Dissolved			99.2		%		70-130	17-JUL-20
Nickel (Ni)-Dissolved			91.9		%		70-130	17-JUL-20
Phosphorus (P)-Dissolved			111.6		%		70-130	17-JUL-20
Potassium (K)-Dissolved			N/A	MS-B	%		-	17-JUL-20
Selenium (Se)-Dissolved			122.8		%		70-130	17-JUL-20
Silicon (Si)-Dissolved			N/A	MS-B	%		-	17-JUL-20
Silver (Ag)-Dissolved			95.0		%		70-130	17-JUL-20
Sodium (Na)-Dissolved			N/A	MS-B	%		-	17-JUL-20

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R5157527								
WG3364461-5 MS		**WG3364461-3**						
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	17-JUL-20
Thallium (Tl)-Dissolved			99.1		%		70-130	17-JUL-20
Tin (Sn)-Dissolved			95.0		%		70-130	17-JUL-20
Titanium (Ti)-Dissolved			95.7		%		70-130	17-JUL-20
Tungsten (W)-Dissolved			96.9		%		70-130	17-JUL-20
Uranium (U)-Dissolved			102.9		%		70-130	17-JUL-20
Vanadium (V)-Dissolved			98.1		%		70-130	17-JUL-20
Zinc (Zn)-Dissolved			104.1		%		70-130	17-JUL-20
Zirconium (Zr)-Dissolved			97.2		%		70-130	17-JUL-20
NH3-F-WT	**Water**							
Batch R5159863								
WG3364351-3 DUP		**WG3364351-5**						
Ammonia, Total (as N)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	22-JUL-20
WG3364351-2 LCS								
Ammonia, Total (as N)			100.5		%		85-115	20-JUL-20
WG3364351-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	20-JUL-20
WG3364351-4 MS		**WG3364351-5**						
Ammonia, Total (as N)			N/A	MS-B	%		-	22-JUL-20
NO2-IC-WT	**Water**							
Batch R5159617								
WG3366168-9 DUP		**WG3366168-8**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-JUL-20
WG3366168-7 LCS								
Nitrite (as N)			104.4		%		90-110	20-JUL-20
WG3366168-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	20-JUL-20
WG3366168-10 MS		**WG3366168-8**						
Nitrite (as N)			101.4		%		75-125	20-JUL-20
NO3-IC-WT	**Water**							
Batch R5159617								
WG3366168-9 DUP		**WG3366168-8**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	20-JUL-20
WG3366168-7 LCS								
Nitrate (as N)			102.8		%		90-110	20-JUL-20
WG3366168-6 MB								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	**Water**							
Batch R5159617								
WG3366168-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	20-JUL-20
WG3366168-10 MS		**WG3366168-8**						
Nitrate (as N)			99.1		%		75-125	20-JUL-20
PH-WT	**Water**							
Batch R5157608								
WG3364634-4 DUP		**WG3364634-3**						
pH		7.49	7.43	J	pH units	0.06	0.2	17-JUL-20
WG3364634-2 LCS								
pH			7.00		pH units		6.9-7.1	17-JUL-20
PO4-DO-COL-WT	**Water**							
Batch R5157124								
WG3364502-7 DUP		**L2475516-1**						
Orthophosphate-Dissolved (as P)		0.0053	0.0054		mg/L	2.2	20	17-JUL-20
WG3364502-6 LCS								
Orthophosphate-Dissolved (as P)			100.5		%		80-120	17-JUL-20
WG3364502-5 MB								
Orthophosphate-Dissolved (as P)			<0.0030		mg/L		0.003	17-JUL-20
WG3364502-8 MS		**L2475516-1**						
Orthophosphate-Dissolved (as P)			94.4		%		70-130	17-JUL-20
SO4-IC-N-WT	**Water**							
Batch R5159617								
WG3366168-9 DUP		**WG3366168-8**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	20-JUL-20
WG3366168-7 LCS								
Sulfate (SO4)			103.8		%		90-110	20-JUL-20
WG3366168-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-JUL-20
WG3366168-10 MS		**WG3366168-8**						
Sulfate (SO4)			100.1		%		75-125	20-JUL-20
SOLIDS-TDS-WT	**Water**							
Batch R5164279								
WG3367675-3 DUP		**L2475516-1**						
Total Dissolved Solids		574	601		mg/L	4.7	20	22-JUL-20
WG3367675-2 LCS								
Total Dissolved Solids			106.0		%		85-115	22-JUL-20
WG3367675-1 MB								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	**Water**							
Batch R5164279								
WG3367675-1 MB								
Total Dissolved Solids			<10		mg/L		10	22-JUL-20
TURBIDITY-WT	**Water**							
Batch R5156776								
WG3364559-3 DUP		**L2475253-1**						
Turbidity		<0.10	<0.10	RPD-NA	NTU	N/A	15	17-JUL-20
WG3364559-2 LCS								
Turbidity			103.5		%		85-115	17-JUL-20
WG3364559-1 MB								
Turbidity			<0.10		NTU		0.1	17-JUL-20

Quality Control Report

Workorder: L2475516 Report Date: 23-JUL-20

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

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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2475516-COFC

COC Number: 17 - 793680

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Di	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:	Kassandra Wallace, Amy Domaratzki	Quality Control (QC) Report with Report YES NO	PRIORITY (Business Days): 4 day [P4-20%] 3 day [P3-25%] 2 day [P2-50%]
Phone:		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	
Street:		Email 1 or Fax kwallace@mte85.com	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
City/Province:		Email 2 adomaratzki@mte85.com	For tests that can not be performed according to the service level selected, you will be contacted.
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		
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 #:	40777-500	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2475516 AP

ALS Contact: Emily

Sampler: KLW

Analysis Request

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

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	F	Geochem	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	MW202-20	16/07/20	12:45	W	4		X		
	MW62-19	"	1:49	"	"		X		
	MW106A-19	"	1:10	"	"		X		
	MW106C-19	"	1:30	"	"		X		

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	metals field filtered.
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			
				13.2			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: KWallace	Date: July 16/20	Time: 3:04	Received by:	Date:	Time:	Received by:	Date: July 16/20	Time: 15:20

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**.

Appendix F

Private Well Survey Responses

WATER WELL INVENTORY - QUESTIONNAIRE

MTE Well No.: 1

Project: 1012 Snyder's Road West, Baden Job No.: 40777-800 Date: Aug 25, 2020

(1) PROPERTY DATA

Concession: _____ Lot: _____ Township: _____

Current Owner: Craig Thomas Previous Owner: 43 years.

Address: 118 Snyder Rd. W

Telephone (Home): 519-634-8927 (Business): _____

(2) WATER QUANTITY

MOE 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: 1879 Pump Intake Depth: 20 ft

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES NO

If yes, what type of problems have you experienced? None

If necessary, could we monitor water levels in your well during a pumping test? (YES) NO

(3) WATER QUALITY

Appearance: Not tested 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: Amy Domaratzki, M.A.Sc., P.Eng.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

Tel: (519) 743-6500 (ext.1389)
Fax: (519) 743-6513
E-mail: adomaratzki@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE

MTE Well No.: _____

Project: 1012 Snyder's Road West, Baden Job No.: 40777-800 Date: Sept 3, 2020

(1) PROPERTY DATA

Concession: N. Snyder's Rd PT Lot: 16 Township: Wilmot

Current Owner: C+A Wiebe Farms Limited Previous Owner: Deceased (Jutzi)

Address: 1056 Snyder's Rd W., Baden

Telephone (Home): 519-885-6367 (Business):

contact: Sheila Wiebe

(2) WATER QUANTITY

MOE Well Record No.: _____

Well Type: (Private well) Municipal well Well Use: Residential Commercial (Agricultural) Other

not sure → Aquifer Type: Bedrock Overburden Measured Well Depth: 33 ft Diameter: 6 ft or 5 ft

Date constructed: 1880 Pump Intake Depth: 33 ft

HAVE YOU HAD PROBLEMS IN THE PAST WITH YOUR WATER QUANTITY/SUPPLY? YES (NO) never!

If yes, what type of problems have you experienced? _____

If necessary, could we monitor water levels in your well during a pumping test? (YES) NO

(3) WATER QUALITY

Appearance: clear Taste: _____

Water treated? no. Odour: none

Staining of water fixtures? not at all

Have there been any tests done on your well water? If so, what were the results? yes, water fine

If necessary, could we sample your well for water quality testing? (YES) NO

* possibly - you would have to contact us before - and provide more information.

*again only by contacting us first.

(4) SITE SKETCH

Site Location NAD83 UTM Cord. E: _____ N: _____ El(m AMSL): _____

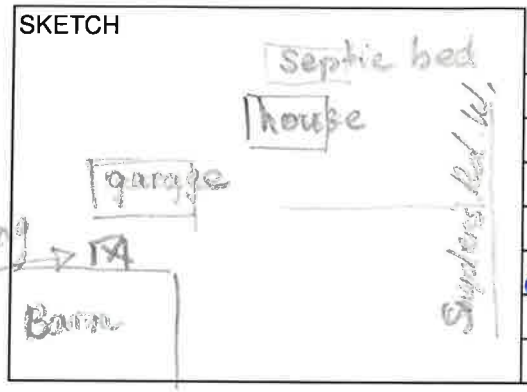
IMPORTANT: Please show location of your HOUSE, WELL(S), and SEPTIC BED on your property relative to roadways and other natural features (e.g., ponds, creeks, forested areas, etc.)

* have no ponds, no creeks, forest is at least 3/4 mile from well.

Can the well be easily accessed' YES NO

Comments: _____

SKETCH



(5) GENERAL COMMENTS

1) well is hand dug - brick lined (water from well used in barn and shop)

2) Municipal water supply - used in house

PLEASE RETURN TO:

MTE Consultants - Attention: Amy Domaratzki, M.A.Sc., P.Eng.
520 Bingeman Centre Drive, Kitchener, Ontario
N2B 3X9

Tel: (519) 743-6500 (ext.1389)
Fax: (519) 743-6513
E-mail: adomaratzki@mte85.com

WATER WELL INVENTORY - QUESTIONNAIRE MTE Well No.: _____

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? 1985

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) # in its own separate building

-Yes -No Cap (- Threaded - Unthreaded - J-Plug - Other .....) # well is covered by checkerplate steel

-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)

MTE# _____

Rec'd SEP 10 2020

FY KNR INIT. _____

- 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:
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Appendix G

Proposed Monitoring Program

TABLE G1 SURFACE AND GROUNDWATER MONITORING PROGRAM - 1012 SNYDER'S ROAD WEST

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 - Forebays and Outlet of the SWMF, Outlet of the STM outlet pipe in the Baden Creek tributary	TSS samples captured seasonally following significant rainfall events
Wetland Feature	Water Quality	All	4x per year (seasonally)	Wetland north of proposed development	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 proposed development	Water temperatures will be continuously measured with recordings taken every 1 hour.
	Water Levels	All	Continuous (6 hour interval)	Wetland north of proposed development	Water levels will be continuously measured with recordings taken every 1 hour.
Surface Water	Water Levels and Temperature	Pre-Construction	4x per year	Baden Creek Tributary.	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	Baden Creek Tributary.	Monitored on a quarterly basis (either with manual water level measurements or with electronic data loggers).
	Water Quality	All	4x per year (seasonally)	Baden Creek Tributary.	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.
Groundwater	Water Levels	Pre-Construction	4x per year	Monitoring wells MW101-19, MW102-19, MW103-19, MW104-19 MW105-19, MW106A-19, MW106B-19, MW106C-19, MW201-20, MW202-20, MW203-20, MW301-20, MW302-20, MW304-20, MW305B-20, MW309-20, MW310-20, MW101-23, MW102-23, MW103-23, MW104-23, MW105-23, MW106-23, MP1-20	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	Monitoring wells MW101-19, MW102-19, MW103-19, MW105-23, MW106-23	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. Monitoring wells identified are specifically for post-construction.
	Chemistry	During/Post-Construction	1x per year	MW106-23	Sampled on an annual basis and analyzed for general chemistry parameters (including major anions, cations, nutrients, metals, e-coli and fecal coliforms).