Prepared By:

Thomasfield Homes Limited

Hydrogeological Study for Grand Valley Business Park Part Lot 32, Concession 1, Geo. Twp. of East Luther

GMBP File: 117184-1

January 2022

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650 WOODLAWN RD. W., BLOCK C, UNIT 2, GUELPH ON N1K 1B8 P: 519-824-8150
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TABLE OF CONTENTS

APPENDICES

HYDROGEOLOGICAL STUDY FOR GRAND VALLEY BUSINESS PARK

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1. INTRODUCTION

Thomasfield Homes Limited (the Client) has retained GM BluePlan Engineering Limited (GMBP) to prepare a hydrogeological study to support the municipal planning and approval process for a proposed business park development on a property approximately 13.3 ha in size and located at Lot 32, Concession 1 of the Geographic Township of East Luther (the "Site", see Figure 1). The Site is located in the southeastern part of the incorporated area of the Town of Grand Valley, County of Dufferin.

It is our understanding that the proposed development will involve the creation of several blocks for employment land use as well as roads and stormwater management facilities to service the development. Water and wastewater servicing will be provided by the Grand Valley municipal systems.

The Client is also considering potential future development of other lands within Lot 32, Concession 1, located to the north and south of the Site. Though the development of these lands (the "Future Development Area") is not the immediate subject of this study, in anticipation of their potential / future development this study will consider a larger Study Area to better accommodate the Future Development Area. Figure 2 shows the layout of the Site, the Future Development Area and the Study Area against an aerial photo basemap.

This report presents the findings of the hydrogeological study, which has gathered data from a review of background information and field investigations, to assess the potential impact that the proposed development may have on the local groundwater and other receptors.

1.1 Purpose and Scope

The purpose of this report is to gather information about the Site from existing sources as well as from Site-specific field investigation activities to characterize the hydrogeological setting of the Site and to provide a general assessment of hydrogeological impacts associated with the development. This study will generally consider a Study Area that encloses the area lying within 500 m of the Site and the Future Development Area.

To gather necessary information for the required assessment, the scope of work generally includes:

- Desktop study concerning the Study Area, including review of topographic, geological, and hydrogeological mapping; a search of MECP water well records; review of Source Protection information and other sources as available.
- Completion of overburden boreholes and installation of monitoring wells on the Site and Future Development Area, for characterization of overburden hydrogeological conditions (completed as part of Geotechnical Investigation by V.A. Wood (Guelph) Inc.);
- Monitoring of groundwater levels, collection and analysis of groundwater quality samples and estimation of hydrogeological properties of local soils;

- Hydrogeological impact assessment, including with respect to Source Protection and with respect to construction dewatering.

A more detailed description of the field investigation activities is provided in Section 3.1 (Methodology).

2. BACKGROUND

For the purposes of this report, the term “north” shall be taken to mean true north, and all other directions “east”, “west” and “south” taken relative to it.

The term “subject property” refers to the area comprising the “Site” and the “Future Development Area”. The “Study Area” is that area within 500 m of the subject property. The “Site” is the area for which a draft plan is being submitted and the “Future Development Area” are other lands owned by the Client which are being considered for future development.

2.1 Site Location and Setting

The Site is situated in Part of Lot 32, Concession 1 of the Geographic Township of East Luther. It lies within the Town of Grand Valley (lower-tier municipality) and the County of Dufferin (upper-tier municipality).

The Site occupies an area of approximately 13.3 ha and lies adjacent to the west side of Amaranth-East Luther Townline Road and generally south of the Grand River, east of Boyne Creek, and north of County Road 109.

The Site is presently under agricultural use as cropland and there are no existing buildings on-Site.

Figure 1 shows the location of the Site on a regional scale and Figure 2 shows an aerial view of the Site and Study Area.

2.2 Proposed Development

It is our understanding that the Site is proposed to be a business park (e.g. commercial/industrial subdivision) featuring seven (7) blocks for employment use ranging in size from 0.45 ha to 3.82 ha. Two stormwater management facilities are proposed to be constructed: one (SWM Pond “A”) to be located approximately 90 m to the north of the Site and adjacent to the Boyne Creek ravine; and one (SWM Pond “B”) to be located in the southwestern part of the subject property, adjacent to County Road 109. SWM Pond “B” will be constructed later as part of the future development of the southern part of the subject property. The draft plan of the proposed development is provided in Appendix A.

The proposed development will be serviced by the municipal water and wastewater systems. These services are expected to be extended across the Boyne Creek ravine along with a roadway (to be completed by others) to connect the Site to the residential lands on the west side of Boyne Creek.

The Client is also considering the potential for future development of the other lands within Lot 32 to the north and south of the Site, also for employment land use. Though the potential development of this “Future Development Area” is not the immediate subject of this Study, in anticipation of this possible future development the investigation work undertaken for this Study will collect and present data concerning these other lands.

2.3 Local Relief and Drainage

The ground elevation of the Site ranges from about 460 metres above sea level (masl) in the northern/northwestern part of the Site to about 475 masl in the southeastern part of the Site. The general slope of the Site dips in a northwesterly direction. The slope in the northern part of the Future Development Area also dips northwesterly, though in the southern part of the Future Development Area the dip is mainly westerly.

Overland drainage from the Site and Future Development Area generally flows in a northwesterly direction toward Boyne Creek. Some subtle swales appear to cross these areas, generally draining in this northwesterly direction.

The Site lies within the watershed of the Grand River.

The northern part of the Study Area intersects the Grand River and Boyne Creek. The confluence of these two watercourses lies within the Study Area as well, approximately 500 m north of the Site.

2.4 Geology and Physiography

The Site is located at the boundary between two physiographic regions, the Dundalk Till Plain and the Stratford Till Plain (Chapman and Putnam 2007). Figure 3a shows the locations of these physiographic regions relative to the Study Area. The Dundalk Till Plain is "characterized by swamps or bogs and by poorly drained depressions" (Chapman and Putnam 1984). Much of the Dundalk Till Plain has a layer of silt (perhaps windblown loess) typically less than 0.6 m in depth. The northern part of the Stratford Till Plain is a rather level region of clay plains which were deposited as ground moraine (Chapman and Putnam 1984).

In terms of physiographic landforms, the Site and most of the Study Area lie on a till plain. The northern part of the Study Area and a part of the Future Development Area lie within a spillway landform that coincides with the present-day Grand River valley. See Figure 3b for the distribution of physiographic landforms relative to the Site.

According to mapping from the Ontario Geological Survey (2010), the surficial geological materials of the Site and Study Area are primarily Tavistock Till, which is a fine-textured (silt to clayey-silt) till. Along the valleys of Boyne Creek and the Grand River the surficial geology indicates alluvial (i.e., heterogeneous river deposits) and glaciofluvial outwash (i.e., sand and gravel) deposits. Figure 4 shows the distribution of surficial materials on Site and within the Study Area.

Ontario Geological Survey (2011) mapping indicates that the bedrock materials that subcrop beneath the Site are those of the sedimentary Guelph Formation, which is mainly composed of dolostone.

A review of water well records (MECP 2021) indicates that the bedrock subcrop lies at a depth of about 26 to 35 m below ground surface. The overburden is variable but is predominantly clayey/silty till material with occasional sand and gravel layers.

2.5 Local Use of Groundwater

2.5.1 Source Protection

Review of mapping available through the MECP indicates that the Site lies within the jurisdiction of the Grand River Source Protection Area (MECP 2021a).

According to mapping provided by the Ontario Source Protection Information Atlas (MECP 2021a), the Site does not intersect any wellhead protection areas (WHPAs). The nearest municipal wellhead is located approximately 1 km north-northwest of the Site (PW-3 of the Grand Valley supply well network, located on Melody Lane).

A large portion of the Site is intersected by an IPZ-3(2.7) (i.e., Intake Protection Zone 3, vulnerability score 2.7).

Neither the Site nor the Future Development Area lie within a Highly Vulnerable Aquifer (HVA) or Significant Groundwater Recharge Area (SGRA).

To show the layout of important source protection features relative to the Study Area, select maps from the Ontario Source Protection Information Atlas (2021) GIS are provided in Appendix B.

The vulnerable area designations applicable to the Site, as identified under the local Sourcewater Protection Plan, will be used to assess the proposed development for significant threats to drinking water and to determine, if required, suitable monitoring and/or mitigation activities for the protection of drinking water resources.

2.5.2 Water Well Records

A desktop review of water wells via the MECP Water Well Information System (2021) indicates 14 water well records attributable to locations within the Study Area (i.e., the lands within 500 m of the Site and the Future Development Area). Figure 5 shows the locations of the water well records in the Study Area. Table 1 gives select details pertaining to the construction and usage information reported in these water well records. Copies of the water well records are provided in Appendix C.

The stratigraphic descriptions in the water well records indicate a general stratigraphic pattern of a thick overburden of glacial till (interpreted from the descriptions of “clay gravel” and “clay stones” in the well records) overlying bedrock. In the vicinity of the subject property, the depth to bedrock varies between about 26.0 mbgs and 32.6 mbgs. Some well records indicate the presence of a layer of coarse material (e.g. “f. gravel – f. sand” at 4.9 mbgs at Well ID 1703594, located just east of the Site) within the till. In the Grand River valley (i.e. Well ID 1706266) the soils appear to indicate glaciofluvial soils (e.g. silty sand overlying “gravel and stones”) extending to the bedrock surface and an absence of till.

The following is a brief summary of the findings from the water well search:

- No water well records were identified to be attributed to the Site.
- One water well record was identified to be attributed to the Future Development Area (Well ID 1702472)
    - The well record describes this well to be a drilled well with steel casing to at least 19.8 mbgs (metres below ground surface). The stratigraphic record for this well is unusual, indicating a layer of limestone bedrock above the sand and gravel aquifer. The depth of the well indicates the possibility for bedrock (limestone at 23.8 mbgs) overlying a highly weathered bedrock stratum (“sand gravel” at 26.5 mbgs) but it is possible that the layer indicated as “limestone” is a hardpan till overlying an unconsolidated sand and gravel stratum.
- Of the 14 water well records:
    - 8 were bedrock wells
        - 7 of these were for domestic or livestock usage
        - 1 was for observation
    - 5 were overburden wells
        - All 5 were for monitoring purposes
    - One was unspecified (abandonment record, Well ID 7255744)
- Of the wells reported to reach bedrock:
    - The average depth to bedrock was 24.1 mbgs.
    - The average static water level was 13.9 mbgs.

Based on the water well record search, it appears that there are some local water users that use groundwater for their domestic or farm water supply needs and that these users primarily obtain their water from deep wells installed in the bedrock aquifer.

2.6 Relevant Local and Site-Specific Reports

2.6.1 Geotechnical Investigation – V.A. Wood (Guelph) Inc.

A geotechnical investigation was completed by V.A. Wood (Guelph) Inc. and included a drilling program carried out May 31 to June 1, 2021. A total of ten boreholes (BH1 through BH10) were drilled using a solid stem auger and a monitoring well was installed in each borehole. The boreholes ranged in depth from 5.2 to 6.7 mbgs.

Stratigraphic and well installation logs are provided in Appendix D. A map showing the locations of the boreholes is provided in Figure 6.

Generally, the investigation encountered soil conditions as follows:

- topsoil, overlying
- sandy silt till overlying
- clayey silt till.

The sandy silt till (i.e. Upper Till) was mainly brown, compact and moist. It was not encountered at BH1, BH2, BH4, or BH5. In some locations where the sandy silt till was not present a layer of fill overlaid the clayey silt till (BH1, BH2, BH5). The fill was of varying texture, but generally less than 1.6 m thick. At BH3, the Upper Till transitions to a coarser silt and sand till at a depth of 3 m.

The clayey silt till (i.e., Lower Till) was mainly brown transitioning to grey at depth, with moisture content varying from moist to wet. It was not encountered at BH3 in the southeastern part of the Site or in BH6 in the northern part of the Future Development Area (near the proposed location for SWM Pond “A”).

Based on water level measurements taken by V.A. Wood on June 3, 2021 (two or three days after well installation), the following monitoring wells were noted to be dry:

- BH1, total depth 6.7 mbgs
- BH5, total depth 6.4 mbgs
- BH6, total depth 6.4 mbgs
- BH8, total depth 6.5 mbgs

2.7 Identified Receptors

Receptors are those entities which may be affected by the proposed development or its construction. They may include anthropogenic features, water users, or ecological features.

Receptors relevant to this Site include the following:

- Municipal water resources (per the Source Protection Plan),
- Private water wells on nearby sites,
- Construction activities,
- The Boyne Creek ravine area.

3. FIELD INVESTIGATION

3.1 Methodology

The hydrogeological field investigation involved the following activities:

- Drilling of exploratory boreholes and installation of monitoring wells,
- Water level monitoring,
- Installation of data loggers for continuous water level monitoring,
- Hydraulic conductivity testing,
- Groundwater quality sampling,
- Desktop and Door-to-Door Water Well Survey,
- Site reconnaissance.

Borehole drilling and monitoring well installation were conducted by V.A. Wood (Guelph) Inc. in collaboration with GMBP hydrogeological staff.

The drilling of boreholes is summarized in Section 2.6.1 and is provided in detail in the geotechnical report (V.A. Wood 2021). Generally, the geotechnical investigation included the drilling of 10 boreholes (BH1 through BH10), each furnished with a monitoring well. Select soil characterization tests (e.g. grain-size distribution analyses) were also completed (see Appendix D).

Water levels were measured by GMBP at each monitoring well. A summary of groundwater level measurements collected to date is provided in Table 2. Datalogging pressure transducers were also installed in all 10 monitoring wells to monitor seasonal fluctuation of groundwater levels.

Hydraulic conductivity testing was completed on July 9, 2021, at five (5) select monitoring wells to characterize the hydraulic properties of the existing soils in-situ. These wells (BH2, BH3, BH4, BH7 and BH8) were selected to provide general coverage of the Site and Future Development Area. This testing was undertaken following a single-well response test (or "slug test") methodology in the "rising-head" mode. In the rising-head mode, a volume of water was rapidly withdrawn from the well using a well-dedicated bailer and the drawdown-recovery response was monitored with time. Data was then analyzed using the Bouwer-Rice (1976) method to estimate the *in situ* hydraulic conductivity of the soils intersected by the well-screen.

Groundwater samples were collected from select monitoring wells (BH3, BH4, BH7 and BH8). These monitoring wells were chosen to focus on locations that will be subject to the first stages of construction per the proposed development plan (i.e., the Site and the stormwater management area). Groundwater samples were collected on July 7, 2021. Prior to sampling, each monitoring well to be sampled was purged, using dedicated inertial pump tubes, of at least three (3) well volumes of water, or until dry (whichever occurred first). Using the same dedicated pump tube, water quality samples were then collected into laboratory supplied bottles specific to the requested analysis. Samples were kept cool (between 0 and 10°C) and submitted to a CALA/SCC-accredited laboratory under standard chain-of-custody protocols for analyses. Samples for metals analysis were field filtered using 0.45 µm Waterra® inline disposable filter and preserved using laboratory prepared preservative. Laboratory results are presented in Tables 3a and 3b.

Site reconnaissance was made by GMBP to visually observe the Site and confirm desktop study information. This occurred concurrently with other field activities undertaken in July 2021.

In order to obtain an accurate assessment of the local private water supplies, a door-to-door survey was conducted to establish an inventory of the water supply wells within approximately 500 m of the proposed development. On July 9, 2021 a representative of GMBP hand delivered a package informing the local residents of the proposed development and the request to identify water supply wells in order to develop an inventory of water supply wells. The delivery area (500 m radius) is shown on Figure 2.

The delivered package included the following:

- A cover letter briefly explaining the proposed development and the well inventory program on behalf of Thomasfield Homes Limited (a copy of the letter is enclosed in Appendix H);
- A 'Well Information Request Form' (enclosed in Appendix H); and
- A postage paid return envelope, so the form could be easily returned to GMBP.

In total, the well survey package was delivered to 13 properties in the study area. The letter packages were left with the homeowner (if present at the time of delivery), placed in the mailboxes (where mailbox present, at some locations), or were delivered to available locations at the respective property (such as within doorways or on door handles, if no mailbox present).

3.2 Groundwater Level Monitoring

Table 2 provides a summary of manual measurements and other monitoring well information (e.g. top of casing and ground surface elevations). Groundwater level data collected by the dataloggers from the period of July 9,

2021 to November 19, 2021 have been plotted alongside the manual measurements for each of the monitoring wells (see Charts 1 through 10).

Figures 7a and 7b provide a graphical representation of the interpreted water table elevation across the subject property based on the measurements collected on July 7, 2021 and November 19, 2021, respectively. The contour lines were determined using a "natural neighbor" analysis to create a digital elevation model (DEM) of the groundwater surface. An interpolation algorithm was applied to the DEM create the groundwater contour lines. Because the monitoring wells at BH5 and BH6 were dry at the time of monitoring on July 7, 2021 (and for much of the summer), in Figure 7a the portion of the contour lines extending toward BH6 and BH5 were extrapolated based on assumed values for the groundwater level at those locations.

3.2.1 Groundwater Levels

Charts 1 through 10 provide plots of the record of groundwater level measurements made during the period from July 9, 2021 to November 19, 2021.

Most of the monitoring wells show a stable or declining groundwater level through the summer months followed by an increasing trend into the fall. In some of the monitoring wells (most notably BH3) there is a gradual trend of increasing water levels in July 2021: this is inferred to be a period of slow recovery from monitoring well development/purging during summer fieldwork activities.

In the southern part of the subject property (e.g. as indicated in monitoring wells BH1, BH2, BH3, and BH10), groundwater levels began rising in late September-early October and by mid-November 2021 appear to have reached steady "seasonal high" levels within about 0 to 1 m of the ground surface.

In the northern part of the subject property (e.g. as indicated in monitoring wells BH5 and BH6), the rise in groundwater level began later in October and groundwater levels remained deeper at more than 3 mbgs.

3.2.2 Groundwater Gradients and Flow Direction

Reviewing the interpreted groundwater level contours (Figure 7a and 7b), it is noted that the horizontal component of groundwater flow varies with location: in the southern part of the Future Development Area , it is generally toward the west; in the central part of the area (i.e. the Site), horizontal flow is generally toward the northwest; and in the northern part of the Future Development Area, it is more toward the north.

Comparing the groundwater flow directions to the arrangement of swales and existing surface water features (i.e. Grand River, Boyne Creek), it is evident that the horizontal direction of groundwater flow is generally in a similar direction as the direction of overland drainage of swales as they drain toward those surface water features.

Groundwater gradients tend to decrease with increasing distance from Grand River. The magnitude of the estimated horizontal groundwater gradient varies across the subject property from about 4% to less than 1% and is greatest in the northern parts of the property and least in the southern parts.

The vertical gradient in the shallow overburden is interpreted to be downward (i.e., "recharge" conditions). This is based on the relative elevation of the property compared to the stage of Boyne Creek and Grand River, which lie in deep channels well below the upland area proposed for development.

3.3 Hydraulic Conductivity Testing

Single-well response tests were conducted at five of the monitoring wells: BH2, BH3, BH4, BH7 and BH8.

Calculation sheets presenting the analysis of the test data are included in Appendix E. Table 4 summarizes the hydraulic conductivity values obtained from the data analysis.

Generally, the hydraulic conductivity of the native overburden soils at the Site and Future Development Area are low to very low. Seepage rates in the native soils are likely to be very slow due to the predominance of soils of low hydraulic conductivity.

Due to the depth of monitoring well installation, the tests allowed for the estimation of hydraulic conductivity of two different local soil types:

- Sand and Silt Till (BH3, in the eastern part of the Site)
  - Estimated hydraulic conductivity: $1.3x10^{-7}$ m/s
- Clayey Silt Till (BH2, BH4, BH7 and BH8; covering areas from the southeastern part of the Future Development Area, the eastern and western parts of the Site, and the northern Future Development Area).
  - Estimated hydraulic conductivity: $2.3x10^{-7}$ m/s (range from $1.1x10^{-8}$ m/s to $3.5x10^{-6}$ m/s)

The water level (i.e., displacement) data from the test conducted at BH8 contained some anomalies, such as changing trends from increasing to decreasing displacement, very slow recovery, relatively short water column, and discontinuities in the data (i.e., sudden jumps). Due to these reasons, the estimated result for BH8 is not considered a reliable estimate of hydraulic conductivity.

3.4 Shallow Groundwater Quality

Groundwater samples were collected from monitoring wells BH3, BH4, BH7 and BH8. Each of these monitoring wells was screened in the glacial till overburden. The samples were analyzed by an accredited environmental laboratory (Bureau Veritas, Mississauga) for a suite of general environmental chemistry parameters. A copy of the certificates of analysis, as issued by the laboratory, is included in Appendix F.

The results of analyses are tabulated in Tables 3a and 3b and compared against the Provincial Water Quality Objectives (PWQO). This set of standards was chosen for comparison because project excavations may require construction dewatering and the release of dewatering discharge to the environment. The results were not compared to the Ontario Drinking Water Standards (ODWS) because the proposed project will not utilize private wells for water supply.

The results indicate that the shallow groundwater is mineralized, with elevated hardness, calcium and magnesium concentrations. All samples collected meet the Provincial Water Quality Objectives. Other notable results are as follows:

- BH3 indicated elevated chloride (130 mg/L) and conductivity (870 µS/cm).
  - Due to the location of BH3 to an existing developed industrial/agricultural property (Sheik Halal Farms) and to the townline road, the elevated chloride concentration may be due to application of road salt.
- BH4 and BH7 both indicate elevated nitrate concentrations (8.08 mg/L and 9.73 mg/L, respectively).
  - Elevated nitrate in rural areas is typically caused by agricultural activity (i.e., fertilizer application to land). These two monitoring wells lie in the the northern part of the Future Development Area. Due to the agricultural use of the area, the source of nitrate may be due to fertilizer application on the subject property lands.

The groundwater quality results do not indicate an impediment to the proposed project.

3.5 Door-to-Door Water Well Survey Responses

Of the 13 properties that were included in the door-to-door water well survey, only one response was received, namely from the residents at 173011 County Road 25, which is located at the southwestern margin of the Study Area (i.e., about 500 m from the Site).

The respondent indicated that they use their well for all purposes. The well was reported to be a drilled well with a steel casing and a total depth of approximately 100' (30.5 m) deep. Based on comparison with the locations of other mapped well records, it is inferred that the well record belonging to this well is Well ID 1702322, which is a drilled well mapped at 173011 County Road 25, but which indicates a total depth of 215'.

3.6 Site Reconnaissance

While attending the subject property to undertake other fieldwork activities, GMBP made reconnaissance observations to verify, where possible, findings from the desktop review.

During the reconnaissance, the subject property was observed to be under agricultural use for multiple crops (i.e. alfalfa, soya bean, grass cover). There were no water wells specifically identified on the Site apart from the monitoring wells installed during the concurrent geotechnical investigation completed by V.A. Wood (Guelph) Inc.

The topography of the subject property was confirmed to have a gently undulating pattern, with slope tending generally to northwest/west.

No standing water bodies or channels were identified during the site reconnaissance in areas of the Site visited and observed. Several, of what appeared to be tile drainage channels, dry at the time of the Site reconnaissance, were observed to be present throughout some of the agricultural fields, sloping down in a northwesterly direction.

4. HYDROGEOLOGICAL CONCEPTUAL SITE MODEL

A "conceptual model" of a site describes its physical setting and provides an interpreted overview of the hydrogeological behavior of the subject property. It provides a basis for general understanding of groundwater flows and other hydrogeological phenomena as well as a basis for the assessment of potential impacts.

Topographically, the subject property features relatively flat to undulating terrain, with swales indicating a general overland drainage to the northwest toward Boyne Creek and Grand River. Boyne Creek and Grand River lie to the west and north of the subject property, respectively, and lie in deep channels well below the elevation of the subject property.

The local hydrostratigraphy at the subject property is conceptualized as a thick overburden aquitard composed of glacial till (texture varying from sand-silt till to clayey silt till) overlying dolostone bedrock of the Guelph Formation. Though it appears that the glacial till persists from surface to the bedrock subcrop across most of the Study Area, there is evidence of a discontinuous layer of coarse material (e.g. sand and gravel) within the till. In the Grand River valley to the north of the subject property, the hydrostratigraphy is composed of glaciofluvial materials (varying from silt and sand to sand and gravel) extending from surface to bedrock an absence of till. The presence of these coarse materials adjacent to the till deposit appear to result in improved drainage of the till soils in the northern part of the subject property, as indicated by the seasonal "dry" conditions observed at monitoring wells BH5 and BH6.

Groundwater levels vary seasonally and spatially. Groundwater levels approach elevations near the ground surface in the fall in the southern part of the subject property. This is interpreted to be due to the combination of relatively flat topography and the prevalence of soils of low-hydraulic conductivity, which result in poor drainage. As evapotranspiration decreases from summer to fall, groundwater levels are allowed to increase in these areas. In the northern part of the subject property, groundwater levels generally remain deeper later into the fall. This is interpreted to be due to the improved drainage of the till soils due in part to their proximity to the coarse glaciofluvial soils associated with the Grand River valley (as described above).

The general pattern of groundwater flow across the subject property is interpreted to be vertically downward (i.e., "recharge" conditions). The horizontal component of groundwater flow varies across the subject property and appears to be influenced by location relative to the nearest drainage feature (i.e., Boyne Creek or Grand River).

The horizontal component of groundwater flow is westerly toward Boyne Creek in the southern part of the subject property and it is northerly (i.e., toward Grand River) in the northern part of the subject property. In the vicinity of the Site it is generally west-northwesterly. The magnitude of the horizontal groundwater gradient also varies across the subject property, with the lowest gradients in the south and largest gradients in the north. However, due to the hydraulic conductivity of the overburden soils, it is interpreted that groundwater seepage rates are generally very slow.

Groundwater quality indicates chemistry typical of overburden groundwater in the Dufferin-Wellington area: moderate mineralization with elevated hardness owing to calcium and magnesium concentrations. Elevated chloride and conductivity have been identified (i.e., at BH3 in the eastern part of the Site) and are attributed to road salt application. Elevated nitrate concentrations have been identified in the northern part of the subject property (BH4 and BH7) and these are attributed to agricultural use and application of fertilizer to land.

5. WATER BALANCE

Water balance calculations have been prepared by GMBP and have been provided under separate cover (Functional Servicing Report, December 2021).

As part of the water balance, the volume of water infiltrated annually was calculated for both the pre-development (i.e., existing) and post-development (i.e., proposed) conditions. The post-development condition was taken to be the ultimate developed state in which the Site and the Future Development Area are assumed to be fully built-out.

- Pre-Development Infiltration 95,613 m^3/yr
- Post-Development Infiltration 36,072 m^3/yr
- Change 59,541 m^3/yr
- Proportional Change -62.2 %

Despite the decrease in infiltration that is expected post-development, no impacts to ecological receptors are anticipated. Due to the extent of the glacial till aquitard across the Site, the contribution of the subject property to nearby surface water bodies is mainly via runoff rather than infiltration and groundwater discharge. The reduced infiltration caused by the proposed development is not expected to negatively affect surface water environments. The discharge rate of runoff will be controlled by two stormwater management facilities, one (SWM Pond “A”) discharging to Boyne Creek and one (SWM Pond “B”) discharging to the ditch alongside County Road 109, to protect the receiving environment from excessive erosion or potential flooding. It is noted that SWM Pond “B” will be constructed as part of the development of the Future Development Area in the southern part of the subject property.

Furthermore, the decrease in infiltration is not expected to result in significant effects to the local groundwater supplies. In response to the reduced infiltration post-development, groundwater levels in the overburden soils may decrease in the developed area but this will not significantly affect the overall rate of recharge into the local supply aquifer (i.e. the Guelph Formation bedrock aquifer). This is because, due to the predominance of soils of low hydraulic conductivity (i.e., overburden aquitards), the subject property is not a significant groundwater recharge area in the context of the local watershed.

6. CONSTRUCTION DEWATERING ANALYSIS

An estimate of construction dewatering rates can be obtained based on the hydrogeological conditions of the subject property (i.e., soil properties, groundwater levels) and the excavation work that is expected to be required in construction of the proposed development. For the purposes of this report, the construction dewatering analysis will focus on the Site (i.e., the proposed development) and the stormwater management ponds (SWM Pond “A” and future SWM Pond “B”).

Because the proposed development will primarily be industrial in nature, it is expected that the buildings will be constructed slab-on-grade and that no basements will be involved. Therefore, the main excavations of note are as follows:

- Servicing: trenches constructed for watermains, sanitary sewers, and storm sewers, likely at depths less than 3 mbgs.
- Stormwater Management Pond Construction: the depths of the SWM Ponds have been determined from the set of design drawings submitted for draft plan approval (GMBP, 2021a).

Dewatering estimation requires an estimate of static groundwater level. To-date, a fulsome determination of seasonal groundwater fluctuations, including at least 12 consecutive months of groundwater level monitoring, has not been completed. However, in the southern part of the subject property, groundwater levels have been observed to coincide with the ground surface, which is a practical limit of maximum groundwater level. In the northern part of the subject property, in the vicinity of the proposed Stormwater Management Pond "A", groundwater levels will be assumed to be up to 0.5 m higher than the maximum groundwater levels that have been observed to date.

Based on the above assumptions of excavation depth and groundwater levels, the effective groundwater level and target groundwater level during dewatering for these types of excavations is estimated as follows:

- Servicing:
  - Static Groundwater Level 0.0 mbgs (c.f. BH3)
  - Target Groundwater Level 3.5 mbgs (0.5 m below base of excavation).
- Stormwater Management Pond "A"
  - Static Groundwater Level 1.0 mbgs (c.f. BH7, adjusted)
  - Target Groundwater Level 5.7 mbgs (depth of pond forebay).
- Future Stormwater Management Pond "B"
  - Static Groundwater Level 0.0 mbgs (c.f. BH10)
  - Target Groundwater Level 1.0 mbgs (depth of pond base)

Appendix G provides sample calculations showing how the construction dewatering rates were estimated for each type of excavation. The calculation sheets also list assumptions and formulae used in the estimation process. Due to the hydrogeological conditions at the Site, the flow into the excavations is determined using analytical models for "unconfined aquifer" (i.e., water-table aquifer) flows. Material properties are estimated conservatively (i.e., upper values are used) based on review of the slug test information the soil types present.

For SWM Pond "A", the excavation has been modeled as flow to a one-sided trench. This is because the location of the SWM Pond near the steep-slope toward Grand River and Boyne Creek, as well as the much lower groundwater levels at monitoring wells BH5 and BH6, indicates that groundwater levels typically decrease sharply across the proposed SWM Pond area. Therefore, this estimation method assumes that groundwater flow into the excavation will mainly occur on the upgradient side of the SWM Pond (i.e., over a length of approximately 350 m).

For future SWM Pond "B", which is expected to be enclosed in fill embankments largely above the existing grade, but which which will have a base extending a short depth below existing ground, the excavation has been modeled as flow to a well in an unconfined aquifer condition.

For servicing construction (i.e., trenching) the excavation has been modeled as a "finite trench" with width 2.5 m and length 30 m.

For approvals purposes, the construction dewatering rates have been estimated to be as follows (from calculations provided in Appendix G):

- **Expected Maximum Daily Discharge: 199,000 L**

  - Accounts for the flow from the stormwater management facilities as well as from servicing.
- **Expected Typical Daily Discharge: 12,000 L/d**
  - Accounts for the flow from servicing trenches only.

The zone of influence is expected to be relatively small (less than 30 m in all cases). Because local use of groundwater is generally from the bedrock aquifer and the dewatering will address groundwater in the overburden, impacts to local groundwater well users is not expected.

Though the site is near some local water bodies, construction dewatering for the proposed development is not expected to cause groundwater quantity impacts in ecological areas because the taking of groundwater will be at relatively low rates. There is also substantial hydraulic separation between the excavation areas and the surface water bodies due to the predominance of soils of low hydraulic conductivity.

Based on groundwater quality analyses (See Section 3.4), it is expected that discharge from the construction dewatering operations will be manageable using typical erosion and sediment control practices (e.g. check dams, temporary discharge pads or ponds, filter bags) such as are described in OPSS.MUNI 805 (*Construction Specification for Temporary Erosion and Sediment Control Measures*),

Based on the estimates obtained herein, construction site dewatering has the potential to exceed 50,000 L/d but is expected to be less than 400,000 L/d. As such, a water-taking approval in the form of a registration with the Environmental Activity and Sector Registry (EASR) will be applicable to this project.

Ontario Regulation 63/16 governs the use and requirements of EASR approvals for construction dewatering. To ensure that potential risks associated with construction dewatering activities (i.e., water-taking and discharge) are properly assessed and mitigated against, *Ontario Regulation 63/16* stipulates that water-taking and discharge plans must be completed by a Qualified Person and that those plans, in addition to the standard requirements of *O.Reg. 63/16*, be followed by the water-taker (i.e., the contractor). Once the plan documents have been prepared, the actual registration of the EASR is completed online and can be obtained in a very short period of time (hours to days).

7. IMPACT ASSESSMENT

A proposed development may result in hydrogeological impacts due to the effects it may have on the hydrogeological system. Hydrogeological impacts generally fall into two categories: water quality impacts or water quantity impacts. A given receptor may be impacted by both, either, or neither of these types of impacts depending on the potential severity of the effect, whether there is a pathway between the source and the receptor, and whether the receptor is sensitive to that type of impact. The table below provides the results of a screening assessment used to identify which types of impacts apply to which receptors. Potential impacts identified in the screening process will be discussed in greater detail in the following sections.

Screening of Potential Hydrogeological Impacts.

Receptor	Impact Category		Rationale
	Water Quantity	Water Quality	
Municipal Water Resources/ Source Water Protection		■	Neither the Site nor the SWM Pond lie within a Wellhead Protection Area, Significant Groundwater Recharge Area, or Highly Vulnerable Aquifer. The Site and SWM pond do lie within an Intake Protection Zone IPZ-3(2.7).
Private Water Wells		■	Several domestic water well records within the Study Area indicate that groundwater is commonly used as a water supply for local residents and/or businesses. Because the development will be publicly serviced for water and sewer, the main potential source of impacts will be the SWM Pond (i.e., groundwater quality).
Construction Dewatering		■	Construction dewatering may be required to complete servicing activities. However, the Construction Dewatering Analysis (Section 6) has indicated that groundwater quantity impacts are not expected. Impacts with respect to groundwater quality are not expected. However, because construction dewatering discharge is likely to be released overland, there is potential for surface water quality impacts.
Riparian Areas (Grand River and Boyne Creek)	■	■	Water quantity impacts would be primarily with respect to mitigation of peak runoff flows from stormwater. There will be no transfer of water between major basins. Similarly, there is potential for surface water quality impacts due to release of stormwater.

7.1 Municipal Water Resources / Source Water Protection

Water Quality

With respect to Source Water Protection, the only vulnerable area identified within the Site area is an IPZ-3 with vulnerability 2.7.

Based on the *Tables of Drinking Water Threats* (2017, accessed by MECP 2021b), no activities are identified to constitute “Significant” drinking water threats within IPZ-3(2.7) areas.

According to the Grand River Source Protection Plan (LESPC 2021), there are no source protection policies applicable to IPZ-type vulnerable areas which specify risk management plans or prohibit certain activities.

Therefore, with respect to Source Water Protection, no concerns regarding potential impacts are identified regarding the proposed development.

7.2 Private Water Wells

Water Quality

Because the proposed development will be publicly-serviced, there will be no on-site sewage systems (i.e., septic systems) or private water wells constructed in the proposed subdivision. Therefore, the potential impact to existing/nearby private water wells is limited to the potential for impact due to the stormwater management pond.

Generally, the local groundwater users obtain their groundwater supply from the bedrock aquifer, which lies more than 26 m below the surface. There is significant hydraulic separation between the surface and the bedrock aquifer due to the presence of thick deposits of dense glacial till and fine-textured soils of low hydraulic conductivity in the overburden. The operation of the SWM pond is not expected to impact the bedrock aquifer.

Through the search of the MECP water wells database and the door-to-door water well survey, no overburden water supply wells have been identified to be near the proposed SWM Pond locations. Use of groundwater from the overburden has thus not been identified in the area but is technically possible. Effects of the SWM Ponds on overburden groundwater would mainly be limited to areas immediately downgradient from the SWM Ponds. If overburden well users are identified within 100 m of either SWM Pond location, it is recommended that a water well monitoring program be developed and that an invitation be extended to the applicable well users.

Therefore, the potential for the SWM Pond to impact local groundwater users is generally low.

7.3 Construction Dewatering

As explained in Section 6, construction dewatering may result in water-taking rates in excess of 50,000 L/d and so it has been recommended that the activity be registered with the Environmental Activity and Sector Registry (EASR).

Construction dewatering is not likely to result in impacts to local water well users or ecological features as a result of water-taking (see Section 6 for details).

However, if the discharge from construction dewatering is not managed properly there is potential for impacts to surface water quality. To mitigate these risks a water-taking and discharge plan (according to the requirements of O.Reg. 63/16, as amended) shall be developed by a Qualified Person and implemented by the contractor. The primary means of controlling impacts will be via an erosion and sediment control plan that includes mitigation measures for the management of discharge flows and the capture of sediment from the discharge water.

To ensure the effectiveness of these mitigation measures, it is recommended that a monitoring plan be implemented primarily consisting of field tests (i.e., daily turbidity tests) and observations (i.e., daily inspection of discharge works and erosion and sediment control structures; checking discharge for hydrocarbon sheen). These monitoring activities should also form part of the water-taking and discharge plan.

7.4 Riparian Areas and Surface Water Bodies

The initial screening assessment (Section 7) identified potential impacts to both water quantity and water quality in surface water bodies and riparian areas.

Because there are no transfers of water between major basins and no water usage (i.e., private wells) included in the proposed development, the potential for water quantity impacts is with respect to the management of stormwater runoff.

The stormwater management design should include provisions to attenuate peak flows from the proposed development as applicable to limit erosion and prevent flooding. The Functional Servicing Report (GMBP 2021) has provided an analysis of pre- vs. post-development discharge rates and compared them to allowable release

rates to the receiving channels (e.g. roadside ditch on County Road 109 and Boyne Creek) and determined that it will be feasible to maintain post-development discharge rates within the allowable release rates.

With respect to water quality, the stormwater management plan should also ensure that the stormwater management pond is designed to provide the required level of treatment to stormwater prior to release to the environment. The Functional Servicing Report (GMBP 2021) has indicated that the stormwater ponds will be constructed with sediment capture forebays, designed in accordance with MECP guidelines, and that the overall pond design is intended to provide "Enhanced" water quality treatment per the MECP *Stormwater Management Planning and Design Manual* (2003). As such, the SWM plan is expected to provide suitable mitigation against the potential for impacts to surface water due to stormwater runoff.

8. SUMMARY

A hydrogeological study has been undertaken to support the proposed development of an industrial subdivision on a site (the Site) located in Part of Lot 32, Concession 1 of the Geographic Township of East Luther. The hydrogeological system and regulatory setting have been characterized and a hydrogeological impact assessment has been completed. It is understood that the proposed development will be serviced by the local municipal water and wastewater systems. A summary of the findings of the study is as follows:

- The Site proposed for development is approximately 13.3 ha in size and lies in the southeastern part of the Grand Valley settlement area.
    - Additional lands within Lot 32 to the north and south of the Site are expected to be developed at a future time.
- The topography of the subject property is flat with subdued undulations and favours surface drainage in north and northwesterly directions.
- The Site is in the watershed of the Grand River and the River itself is located approximately 500 m north of Site.
- The Site is situated near the boundary between the Dundalk Till Plain and the Stratford Till Plain physiographic regions. The Site lies on a till plain landform, with a spillway landform lying to the north mainly corresponding to the Grand River valley.
- The geological setting of the Site consists of:
    - Glacial till (texture varying from sandy silt till to clayey silt till, with some lenses of coarse material) typically over 26 m thick, overlying
    - Guelph Formation bedrock (primarily dolostone).
- The subject property partially overlaps with an Intake Protection Zone "3" of vulnerability score 2.7. A review of the *Tables of Drinking Water Threats* indicates that there are no activities identified with the proposed development that would constitute a "Significant" drinking water threat.
- Monitoring wells installed in the overburden soils on the subject property indicate groundwater levels range significantly across the subject property, spatially and seasonally. Generally, groundwater levels remain deeper in the northern parts of the subject property while in the southern parts of the subject property the groundwater levels approach ground surface in the fall.
- Hydraulic testing of overburden soils indicates that the hydraulic conductivities of the till soils are generally low, with the highest hydraulic conductivity being estimated at 3.5×10^{-6} m/s.
- Based on the upland location of the subject property, it is expected that the vertical component of groundwater flow in the shallow overburden is downward.
- The horizontal component of groundwater flow on the subject property is generally in a west-northwesterly direction.
- Groundwater quality on the subject property is typical of shallow overburden groundwater in the Wellington-Dufferin area, with moderate mineralization and elevated hardness. One of the monitoring wells indicated potential effects of road salt application (i.e. elevated sodium and chloride

concentrations). No particular water quality characteristics were identified that would be of significant concern to the proposed development.

- Construction dewatering is expected to be required for this site for the construction of servicing and the stormwater management facility, especially if construction occurs during seasons of high groundwater (e.g. late fall, winter and spring). Discharge requirements for construction dewatering have been estimated to be as high as 199,000 L/d. It is expected that a water-taking approval in the form of registration to the Environmental Activity and Sector Registry (EASR) will be required.
- Generally, the proposed development is expected to have low potential for impacts to water quantity and quality. Potential impacts that should be considered for mitigation are mainly with respect to stormwater management (peak flow attenuation and water quality).

9. CONCLUSIONS AND RECOMMENDATIONS

Based on the information presented in this report, the hydrogeological impact assessment indicates that there are no major regulatory or practical obstacles to the proposed development. Based on a review of the *Tables of Drinking Water Threats* and the potential activities associated with the proposed development, no "Significant" drinking water threats have been identified and it is therefore expected that a Risk Management Plan will not be required.

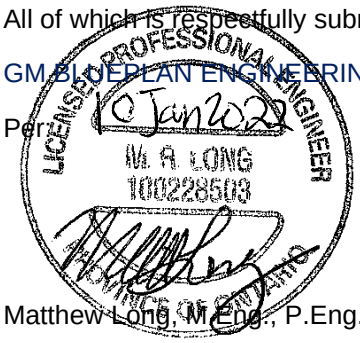
Regarding the hydrogeological conditions and impact assessment of the Site, GMBP make the following recommendations for consideration in design and construction of the development:

- It is recommended that the ongoing monitoring of groundwater levels continue until a period of at least 12 consecutive months of groundwater level data has been collected.
    - Dataloggers were installed in July 2021, so monitoring shall continue until July 2022.
- Ontario Regulation 903 states that a well that remains unused for a period of 2 years or more shall be decommissioned. It is recommended that all on-site monitoring wells shall be decommissioned by a licensed water well drilling contractor just prior to the start of area grading. If a regulatory or review agency requires monitoring to continue beyond this time, arrangements shall be made to protect the monitoring wells during construction or to install replacement wells at locations where they will not be disturbed by construction activities.
- The stormwater management plan and design of the stormwater management facilities, following the direction set by the Functional Servicing Report (GMBP 2021), should:
    - attenuate peak stormwater runoff flows according to the allowable release rates of the receiving channels, and
    - adhere to the applicable MECP stormwater management design guidelines with respect to providing "Enhanced" water quality treatment.
- To support construction dewatering at the Site, a water-taking approval is recommended to be obtained from the Ministry of the Environment, Conservation, and Parks, in the form of registration to the Environmental Activity and Sector Registry (EASR).
    - According to *Ontario Regulation 63/16*, EASR-regulated construction dewatering requires that a qualified person be retained to prepare water-taking and discharge plans and that all dewatering activities be completed in accordance with those prepared plans as well as the conditions in the *Regulation*.
    - It is recommended that the monitoring plan consist primarily of field-measurements and observations (i.e., turbidity measurements, inspection of discharge management systems and sediment control structures, inspection of discharge for sheen).
- In the event that it is identified that water well users exist within 100 m of the SWM Pond locations, and the water wells in question are overburden wells, it is recommended that a water well monitoring program be developed and that invitations to the well monitoring program be extended to the applicable well users.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

Per:



Matthew Long, M.Eng., P.Eng.

Joanna Olesiuk, M.A.Sc., C.Tech., P.Geo. (Limited)

10. STATEMENT OF LIMITATIONS

The information in this report is intended for the sole use of Thomasfield Homes Limited. GM BluePlan Engineering Limited accepts no liability for use of this information by third parties. Any decisions made by third parties on the basis of information provided in this report are made at the sole risk of the third parties.

GM BluePlan Engineering Limited cannot guarantee the accuracy or reliability of information provided by others. GM BluePlan Engineering Limited does not accept liability for unknown, unidentified, undisclosed, or unforeseen surface or sub-surface conditions that may be later identified.

The conclusions pertaining to the condition of soils and/or groundwater identified at the site are based on the visual observations at the locations of the investigative boreholes/monitoring wells and on the reported laboratory results for the selected soil and/or groundwater samples. GM BluePlan Engineering Limited cannot guarantee the condition of soil and/or groundwater that may be encountered at the site in locations that were not specifically investigated as part of this investigation. This report is considered to be representative of the condition of the Site as of November 19, 2021.

11. REFERENCES

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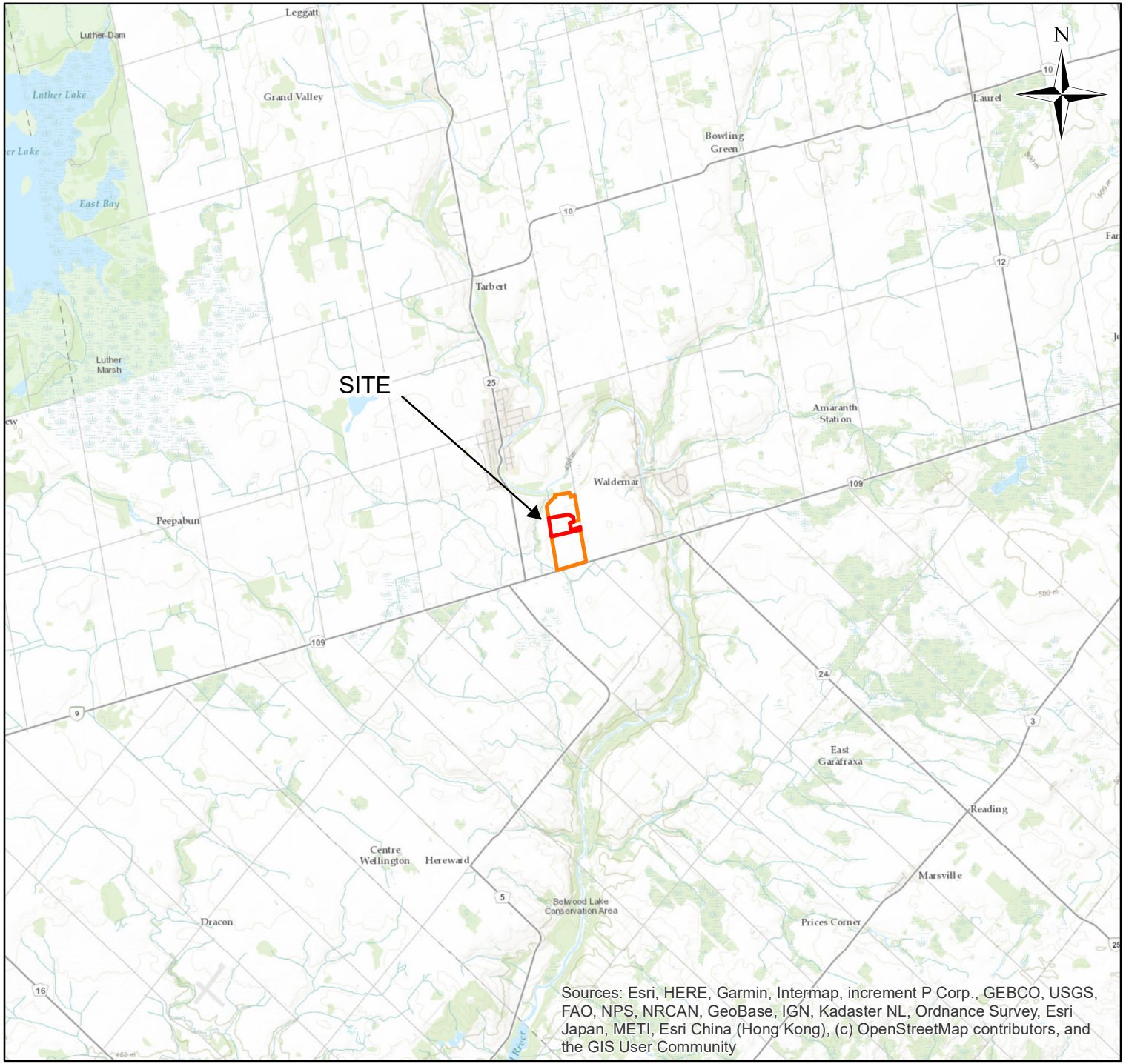
FIGURES



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Site Boundary
Future Development Area

Scale: 1: 100,000
July 2021

Figure 1:
Site Location

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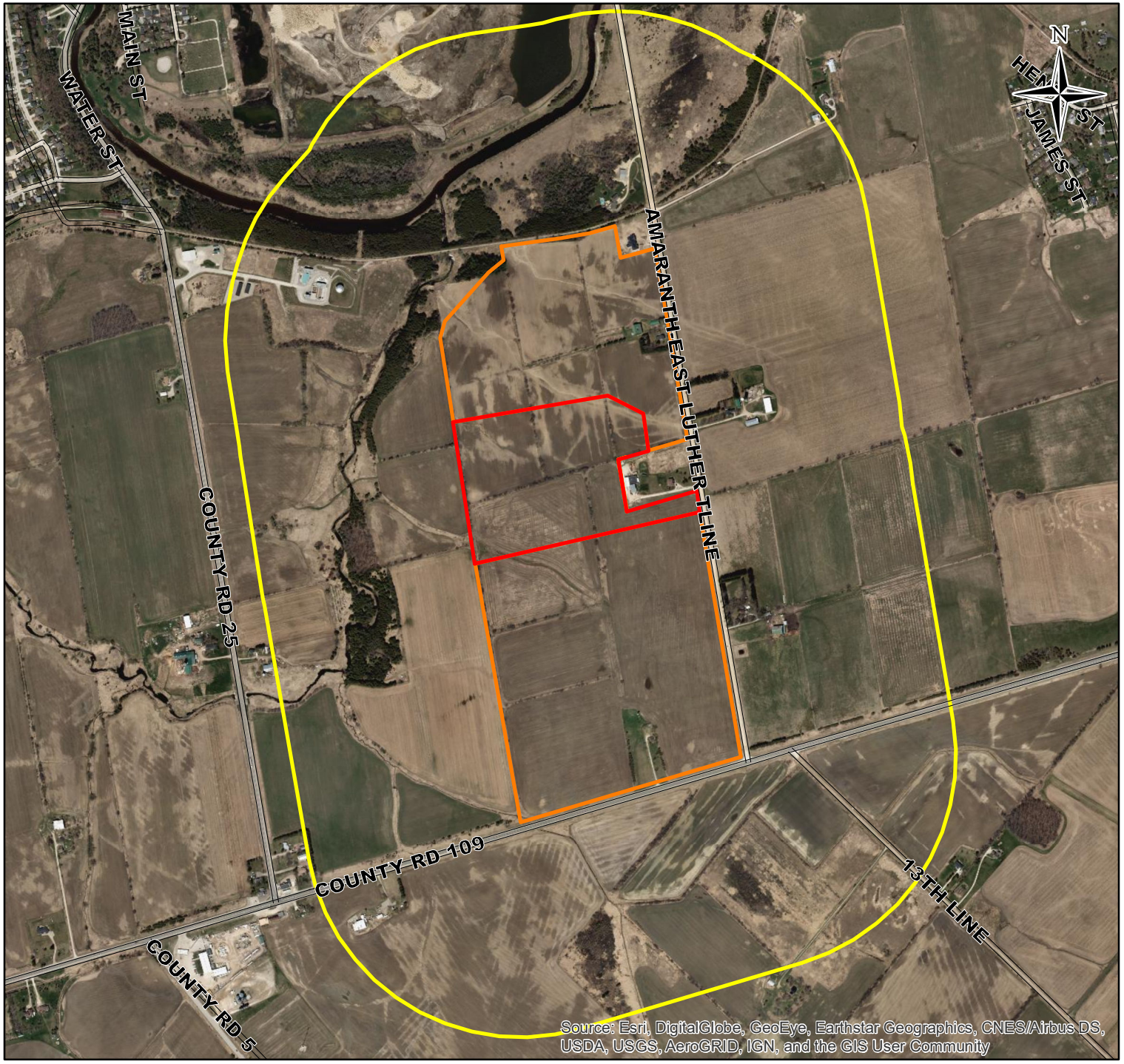


Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

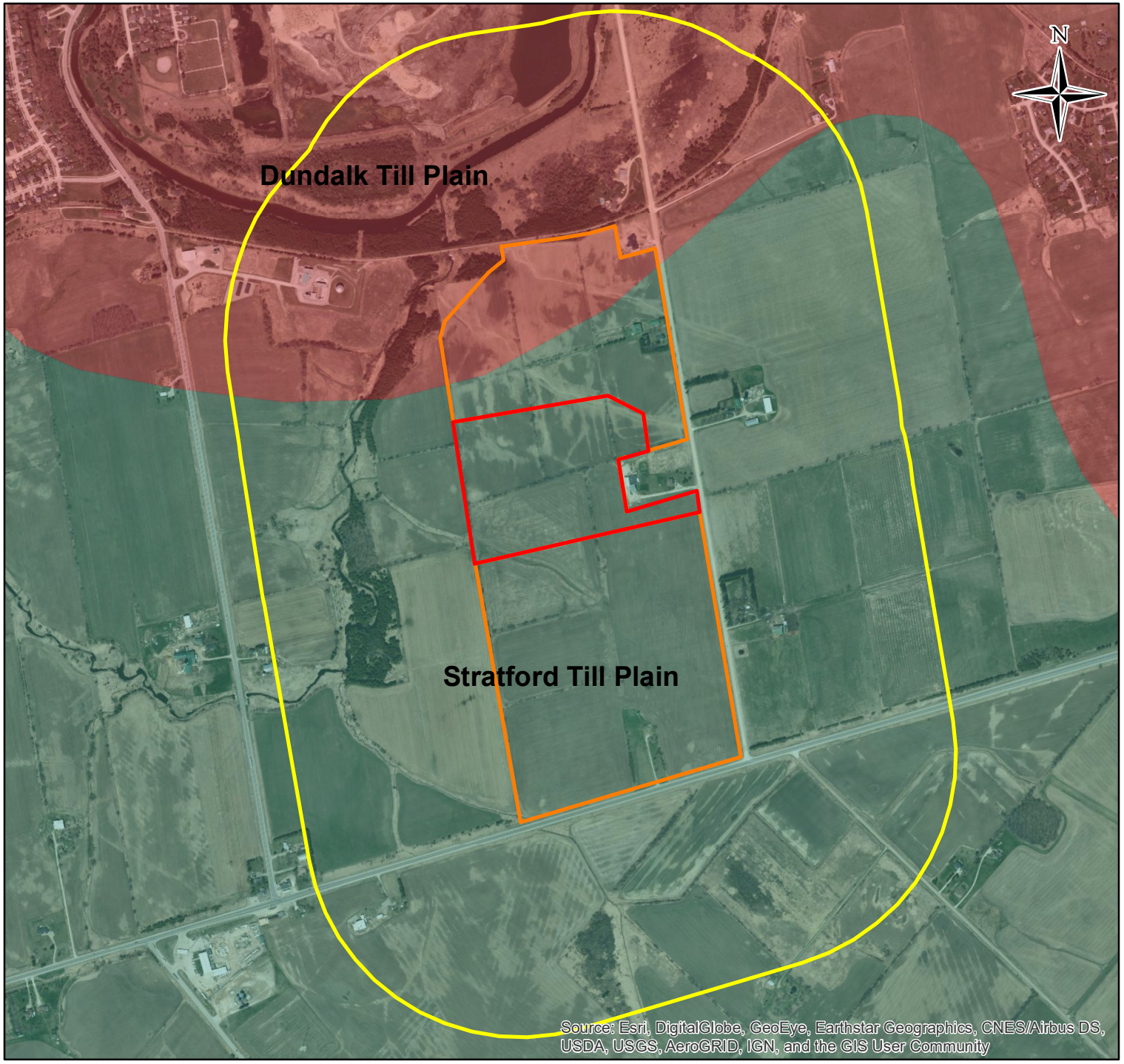
Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Roads
Study Area
Site Boundary
Future Development Area

Scale: 1: 13,000
July 2021

Figure 2:
Study Area Layout

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Study Area
Site Boundary
Future Development Area

Physiographic Regions

UNIT, REGION

7, Dundalk Till Plain
8, Stratford Till Plain

Scale: 1: 13,000
July 2021

Figure 3a:
Physiographic Regions

BluePlan ENGINEERING

Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Study Area
Site Boundary
Future Development Area

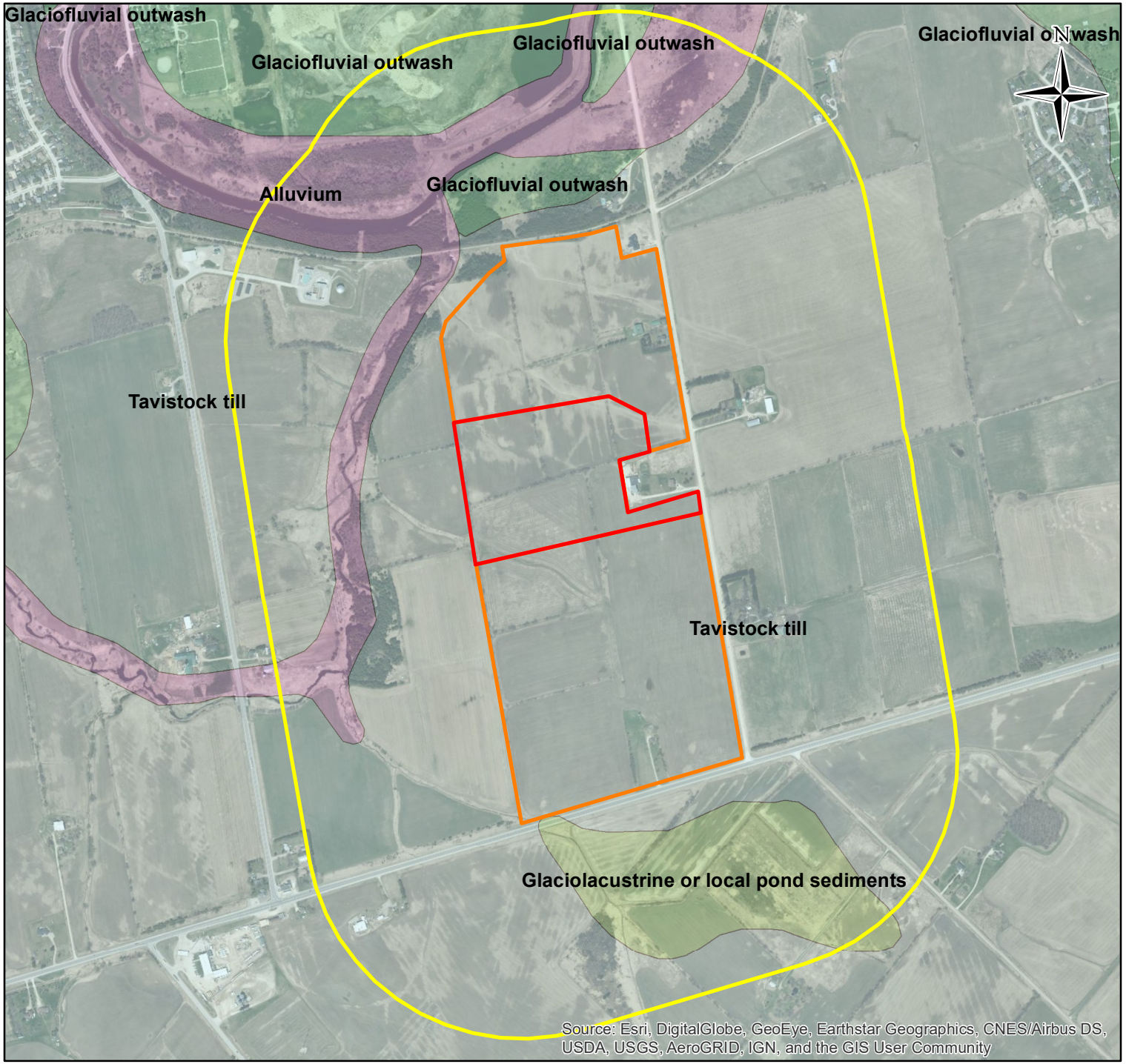
Physiography of Southern Ontario

Spillways
Till Moraines
Till Plains (Undrumlinized)

Scale: 1: 13,000
July 2021

Figure 3b:
Physiographic Landforms

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Study Area
Site Boundary
Future Development Area

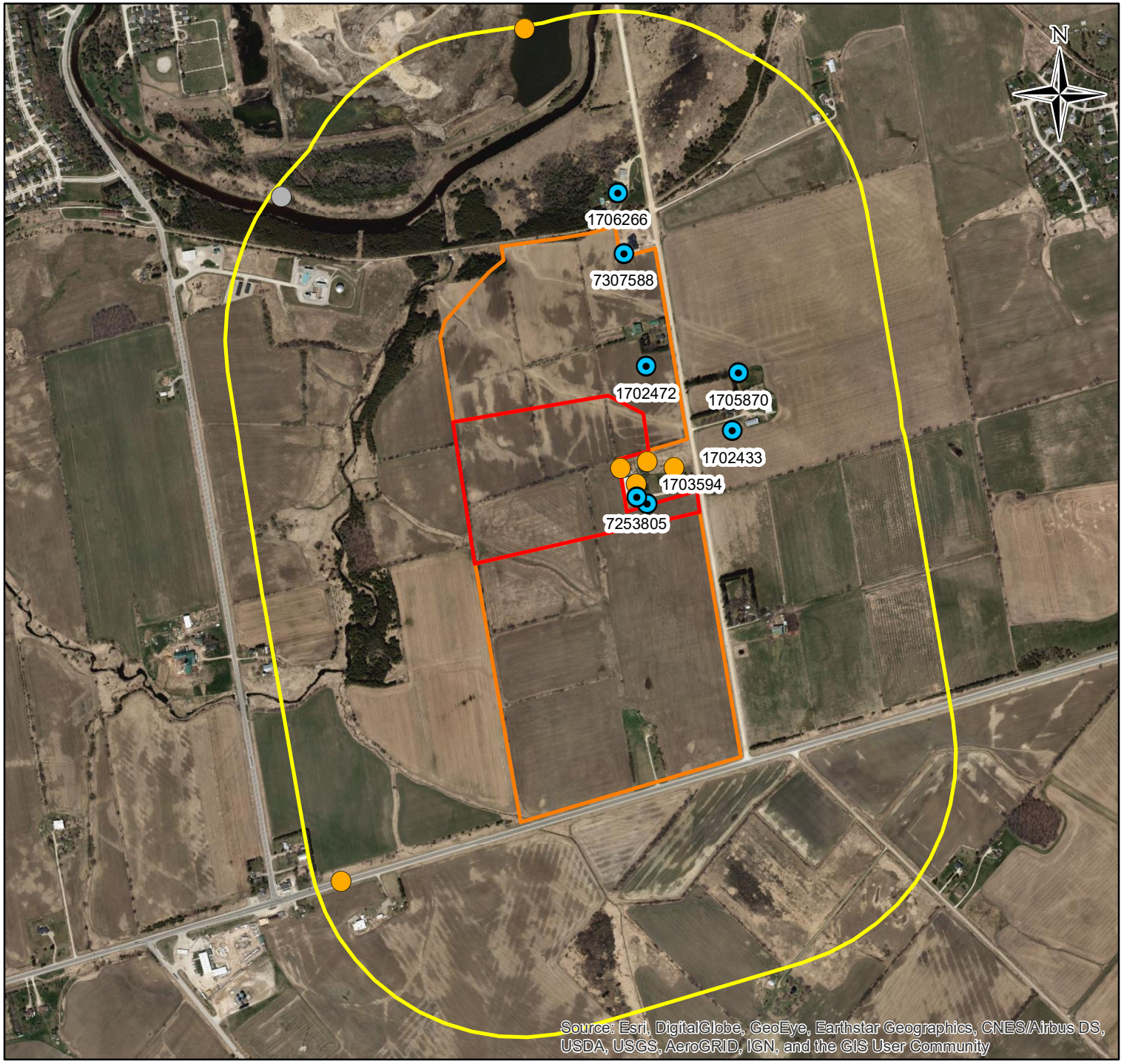
Surficial Geology of Ontario

Alluvium
Glaciofluvial outwash
Glaciolacustrine or local pond sediments
Tavistock till

Scale: 1: 13,000
July 2021

Figure 4:
Surficial Geology

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

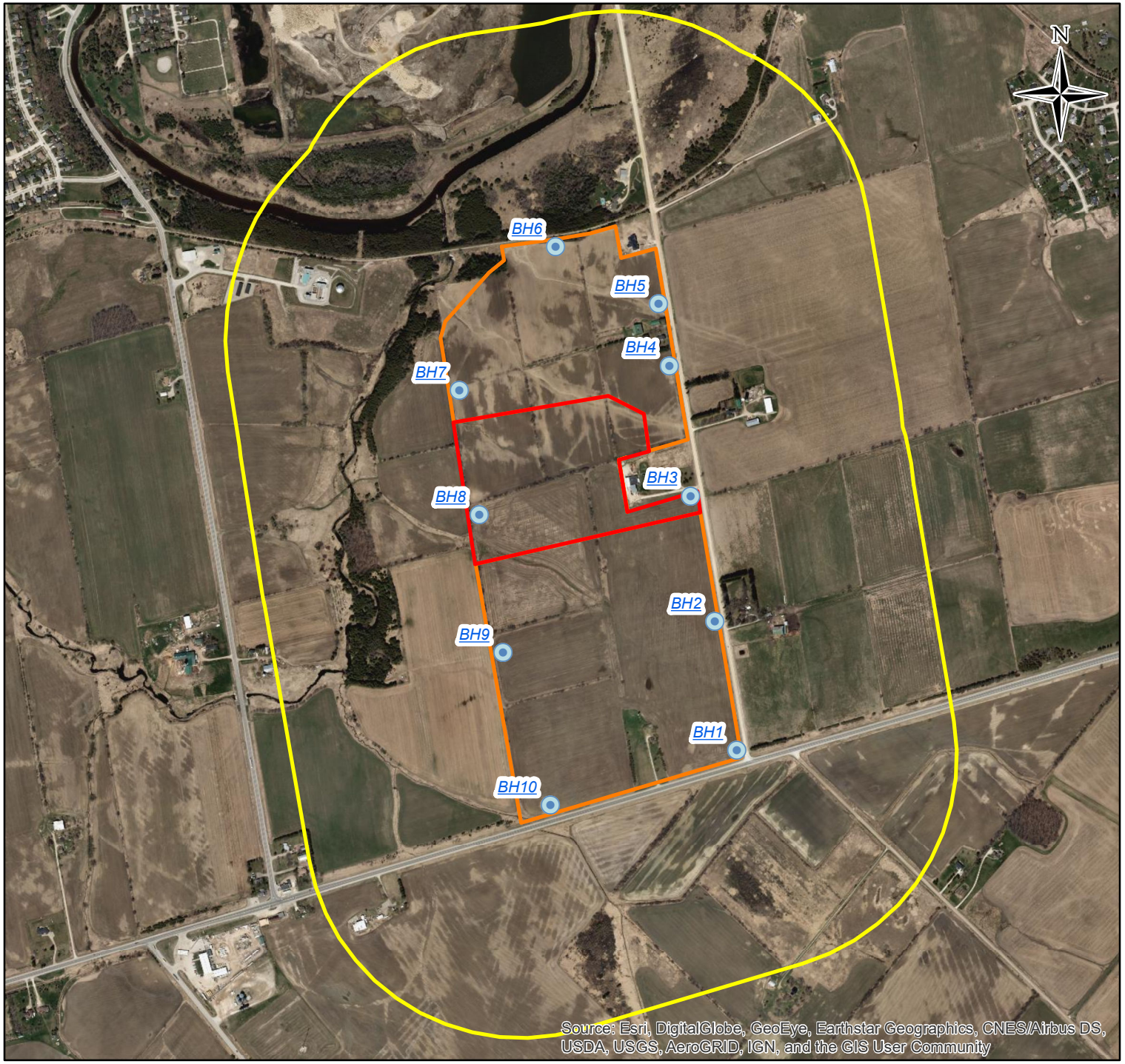
Well Type, Use

- Bedrock, Supply
- Overburden, Non-Supply
- Unknown, Unknown
- Study Area
- Site Boundary
- Future Development Area

Scale: 1: 13,000
July 2021

Figure 5:
MECP Water Well Records

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

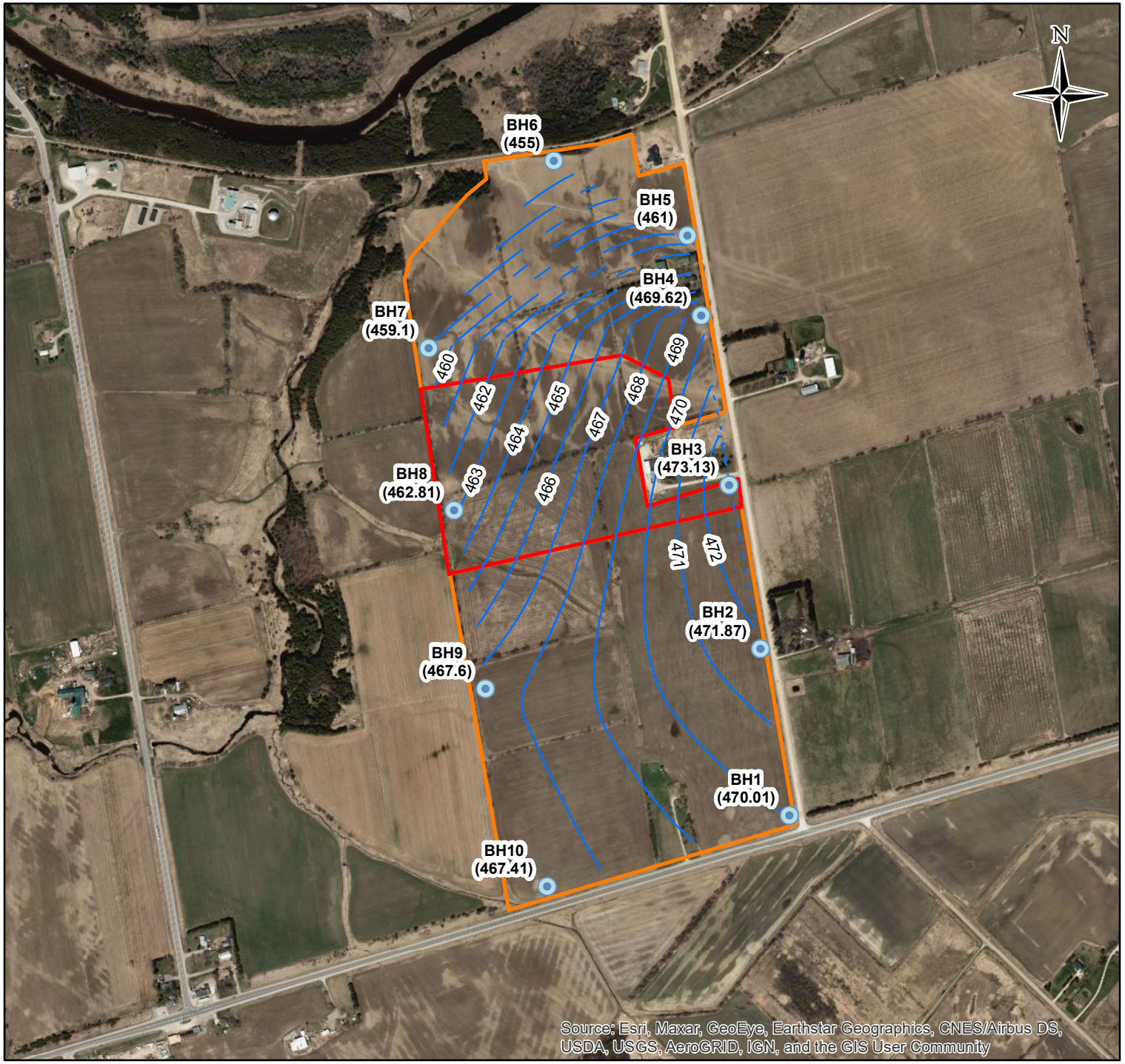
Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Monitoring Wells
Study Area
Site Boundary
Future Development Area

Scale: 1: 13,000
July 2021

Figure 6:
Site Investigation Layout

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

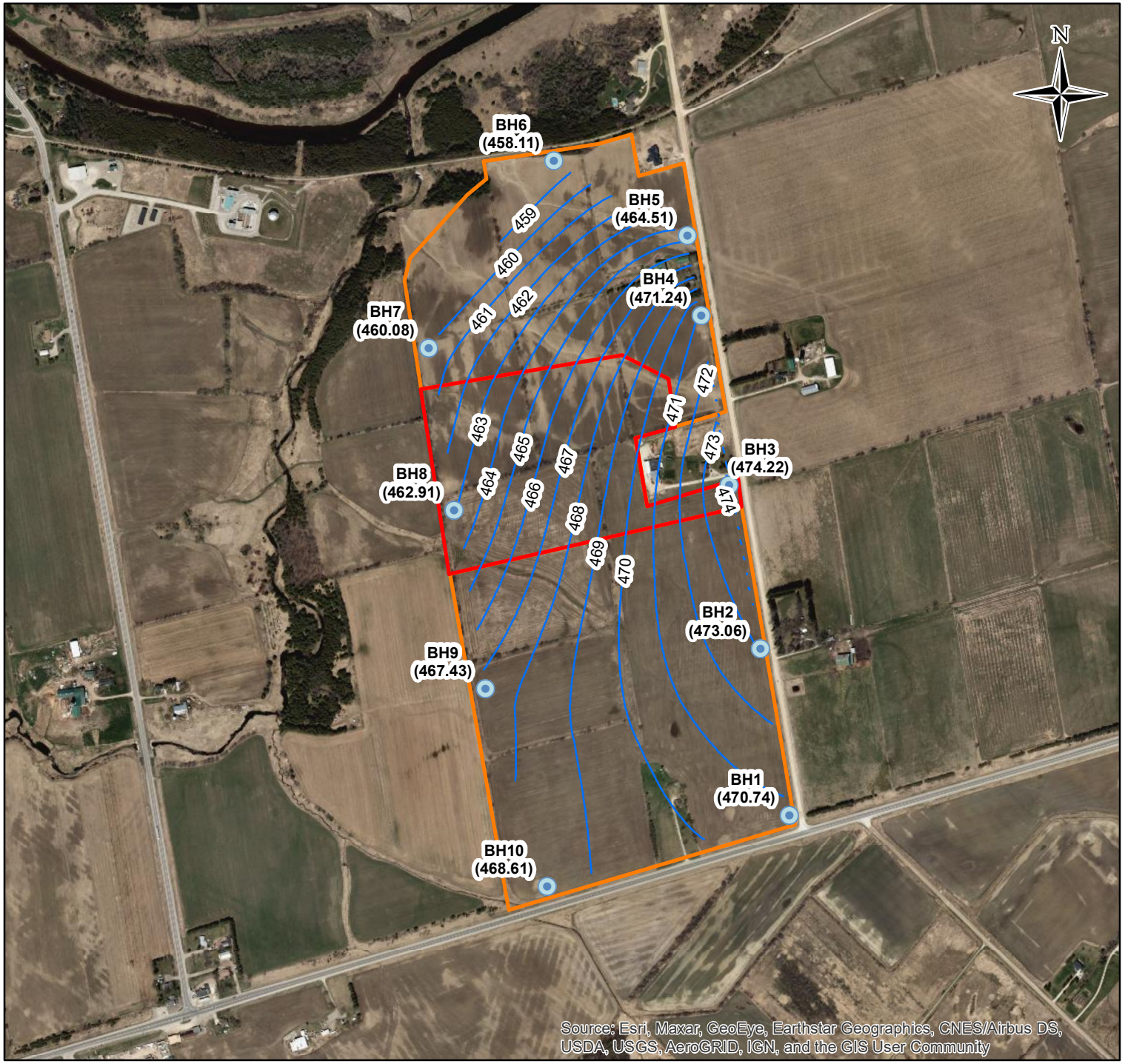
Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

- Monitoring Wells (GW Level)
- GW Contour Lines - Interpolated
- GW Contour Lines - Extrapolated
- Site Boundary
- Future Development Area

Scale: 1: 10,000
January 2022

Figure 7a:
Interpreted Groundwater Contours (Summer 2021)

BluePlan ENGINEERING



Project:117184-1
Hydrogeological Study
Grand Valley Employment Lands
Grand Valley, ON

Part of Lot 32,
Concession 1,
Geo. Twp. of Luther

Monitoring Wells (GW Level)
GW Contour Lines - Interpolated
Site Boundary
Future Development Area

Scale: 1: 10,000
January 2022

Figure 7b:
Interpreted Groundwater Contours (Fall 2021)

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TABLES

Table 1 - Summary of Water Well Records

MECP Well ID	Lot	Conc.	Easting	Northing	Township	Well Use	Bedrock/ Overburden	Depth to Bedrock (m)	Total Depth of Well (m)	Static Water Level (m)	Year Drilled	Notes
Wells Within Site												
None												
Wells Within Future Development Area												
1702472	32	1	556314	4859423	EAST LUTHER	Domestic	Bedrock	23.8	29.6	12.5	1978	
Wells Within 500 m of Site or Future Development Area												
1702433	2	10	556514	4859273	AMARANTH	Livestock	Bedrock	34.7	43.3	18.9	1978	
1703594	32	1	556316	4859104	EAST LUTHER	Domestic	Bedrock	6.7	36.6	11.9	1987	
1705870	2	10	556529	4859407	AMARANTH	Domestic	Bedrock	34.4	65.5	21.3	2002	
1706266	32	1	556248	4859826	EAST LUTHER	Domestic	Bedrock	14.6	30.8	0	2004	
1706293	32	2	556031	4860207	EAST LUTHER	Observation	Bedrock	9.5	34.5	~	2004	
7140636	31	1	555605	4858225	EAST LUTHER	Monitoring	Overburden	~	4.6	~	2010	
7165035	32	1	556379	4859187	EAST LUTHER	Monitoring	Overburden	~	3	~	2011	
7165036	32	1	556291	4859149	EAST LUTHER	Monitoring	Overburden	~	3.7	~	2011	
7165037	32	1	556316	4859202	EAST LUTHER	Monitoring	Overburden	~	3	~	2011	
7165038	32	1	556255	4859186	EAST LUTHER	Monitoring	Overburden	~	12.2	~	2011	
7253805	32	1	556292	4859119	EAST LUTHER	Domestic	Bedrock	34.4	40.2	18.7	2015	
7255744	30	2	555467	4859817	EAST LUTHER	Not Used	~	~	3.1	0.5	2015	Abandonment Record
7307588	32	1	556261	4859685	EAST LUTHER	Domestic	Bedrock	35.05	28.96	14.1	2017	

TABLE 2 - SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS

Well ID	GS Elevation	TOC Elevation	Stick up (m)	Well Depth (mbgs)	Elevation of Well Bottom (masl)	Depth to GW (mbgs) on			Elevation of Groundwater (masl) on			Notes
						7-Jul-2021	9-Jul-2021	19-Nov-2021	7-Jul-2021	9-Jul-2021	19-Nov-2021	
BH1	470.842	471.751	0.909	6.96	463.88	nm	0.84	-0.07	nm	470.01	470.91	
BH2	473.826	474.702	0.876		473.83	nm	1.95	0.81	nm	471.87	473.02	
BH3	474.308	475.189	0.881	5.49	468.82	1.18	3.12	0.09	473.13	471.19	474.21	*July 9 wl: still recovering from July 7 sampling*
BH4	471.872	472.752	0.880	6.54	465.34	2.20	2.25	0.61	469.67	469.62	471.26	
BH5	468.534	469.402	0.868	6.86	461.68	Dry	Dry	3.98	<461.68	<461.68	464.55	
BH6	462.424	463.388	0.964	6.83	455.59	Dry	Dry	4.40	<455.59	<455.59	458.02	
BH7	461.486	462.477	0.991	7.00	454.49	2.34	2.39	1.44	459.14	459.10	460.05	
BH8	467.361	468.347	0.986	6.83	460.54	4.56	5.43	4.46	462.81	461.93	462.90	*July 9 wl: still recovering from July 7 sampling*
BH9	469.767	470.67	0.903	6.97	462.80	nm	2.16	2.34	nm	467.60	467.43	
BH10	468.691	469.645	0.954	5.60	463.09	nm	1.28	0.10	nm	467.41	468.59	

Notes :

1. "Stick Up" is the height to which the well casing rises above the ground surface.
2. TOC=Top of Casing
3. GS=Ground Surface
4. GW=Groundwater
5. masl=metres above sea level
6. nm = not measured.

TABLE 3A - RESULTS OF GROUNDWATER QUALITY ANALYSIS (GENERAL CHEMISTRY PARAMETERS)

	Sample ID	BH3	BH4	BH7	BH8
	Sample Description	Groundwater	Groundwater	Groundwater	Groundwater
	Screened Interval (mbgs)	469.7 - 473.2	466.1 - 469.9	455.4 - 459.1	461.3 - 464.9
	Sampling Date	2021-07-07	2021-07-07	2021-07-07	2021-07-07
Parameters (units mg/L unless otherwise noted)	**Criteria 1**	**Concentration**			
	PWQO				
Bicarb. Alkalinity (calc. as CaCO3)		210	240	250	190
Calculated TDS		420	370	370	280
Carb. Alkalinity (calc. as CaCO3)		2.1	2.2	1.6	1.9
Hardness (CaCO3)		390	320	320	220
Conductivity (µmho/cm)		870	640	640	490
Orthophosphate (P)		0.056	<0.010	<0.010	<0.010
pH (dimensionless)	6.5:8.5	8.04	7.98	7.84	8.03
Dissolved Sulphate (SO4)		18	16	12	51
Alkalinity (Total as CaCO3)		210	240	250	190
Dissolved Chloride (Cl-)		130	38	34	12
Nitrite (N)		<0.010	0.019	0.011	<0.010
Nitrate (N)		<0.10	8.08	9.73	0.13
Nitrate + Nitrite (N)		<0.10	8.1	9.74	0.13
Dissolved Organic Carbon		1.3	1	0.96	2.8
Total Ammonia-N		0.076	0.16	<0.050	0.24

Notes:

1. Criteria are from the Provincial Water Quality Objectives. Criteria are indicated by:
   White Text for Criteria 1
2. Criteria and concentrations are given in units consistent with the units listed for the associated parameter.
3. Concentrations with bold, italic, or underlined text in shaded cells exceed the corresponding criteria.
4. Screened well intervals presented are approximate.
5. ---- represents sample parameters that were not analyzed; ~ = No value specified.
6. Bureau Veritas Laboratory job number: C1J1393

TABLE 3B - RESULTS OF GROUNDWATER QUALITY ANALYSIS (METALS PARAMETERS)

	Sample ID	BH3	BH4	BH7	BH8
	Sample Description	Groundwater	Groundwater	Groundwater	Groundwater
	Screened Interval (mbgs)	469.7 - 473.2	466.1 - 469.9	455.4 - 459.1	461.3 - 464.9
	Sampling Date	2021-07-07	2021-07-07	2021-07-07	2021-07-07
Parameters (units µg/L unless otherwise noted)	**Criteria 1**	**Concentration**			
	PWQO				
Dissolved Aluminum (Al)		8.6	6.4	<4.9	5.8
Dissolved Antimony (Sb)	20	<0.50	<0.50	<0.50	<0.50
Dissolved Arsenic (As)	100	<1.0	<1.0	<1.0	1.5
Dissolved Barium (Ba)		61	70	65	64
Dissolved Beryllium (Be)	11	<0.40	<0.40	<0.40	<0.40
Dissolved Boron (B)	200	55	18	17	55
Dissolved Cadmium (Cd)	0.2	<0.090	<0.090	<0.090	<0.090
Dissolved Calcium (Ca)		61000	80000	91000	45000
Dissolved Chromium (Cr)		<5.0	<5.0	<5.0	<5.0
Dissolved Cobalt (Co)	0.9	<0.50	<0.50	<0.50	<0.50
Dissolved Copper (Cu)	5	<0.90	<0.90	<0.90	1.7
Dissolved Iron (Fe)	300	<100	<100	<100	<100
Dissolved Lead (Pb)	5	<0.50	<0.50	<0.50	<0.50
Dissolved Magnesium (Mg)		58000	28000	23000	27000
Dissolved Manganese (Mn)		63	7.7	17	57
Dissolved Molybdenum (Mo)	40	19	3.3	0.78	8.2
Dissolved Nickel (Ni)	25	2.1	<1.0	<1.0	<1.0
Dissolved Phosphorus (P)		<100	<100	<100	<100
Dissolved Potassium (K)		6200	2400	1000	4000
Dissolved Selenium (Se)	100	<2.0	<2.0	<2.0	<2.0
Dissolved Silicon (Si)		4200	5500	3700	4400
Dissolved Silver (Ag)	0.1	<0.090	<0.090	<0.090	<0.090
Dissolved Sodium (Na)		14000	12000	7300	15000
Dissolved Strontium (Sr)		240	260	250	370
Dissolved Thallium (Tl)	0.3	<0.050	<0.050	<0.050	<0.050
Dissolved Titanium (Ti)		<5.0	<5.0	<5.0	<5.0
Dissolved Uranium (U)	5	0.92	1.1	0.66	2.1
Dissolved Vanadium (V)	6	0.6	0.68	<0.50	1.9
Dissolved Zinc (Zn)	30	<5.0	<5.0	<5.0	<5.0

Notes:

1. Criteria are from the Provincial Water Quality Objectives. Criteria are indicated by:
   White Text for Criteria 1
2. Criteria and concentrations are given in units consistent with the units listed for the associated parameter.
3. Concentrations with bold, italic, or underlined text in shaded cells exceed the corresponding criteria.
4. Screened well intervals presented are approximate.
5. ---- represents sample parameters that were not analyzed; ~ = No value specified.
6. Bureau Veritas Laboratory job number: C1J1393

TABLE 4 - SUMMARY OF HYDRAULIC CONDUCTIVITY ESTIMATES

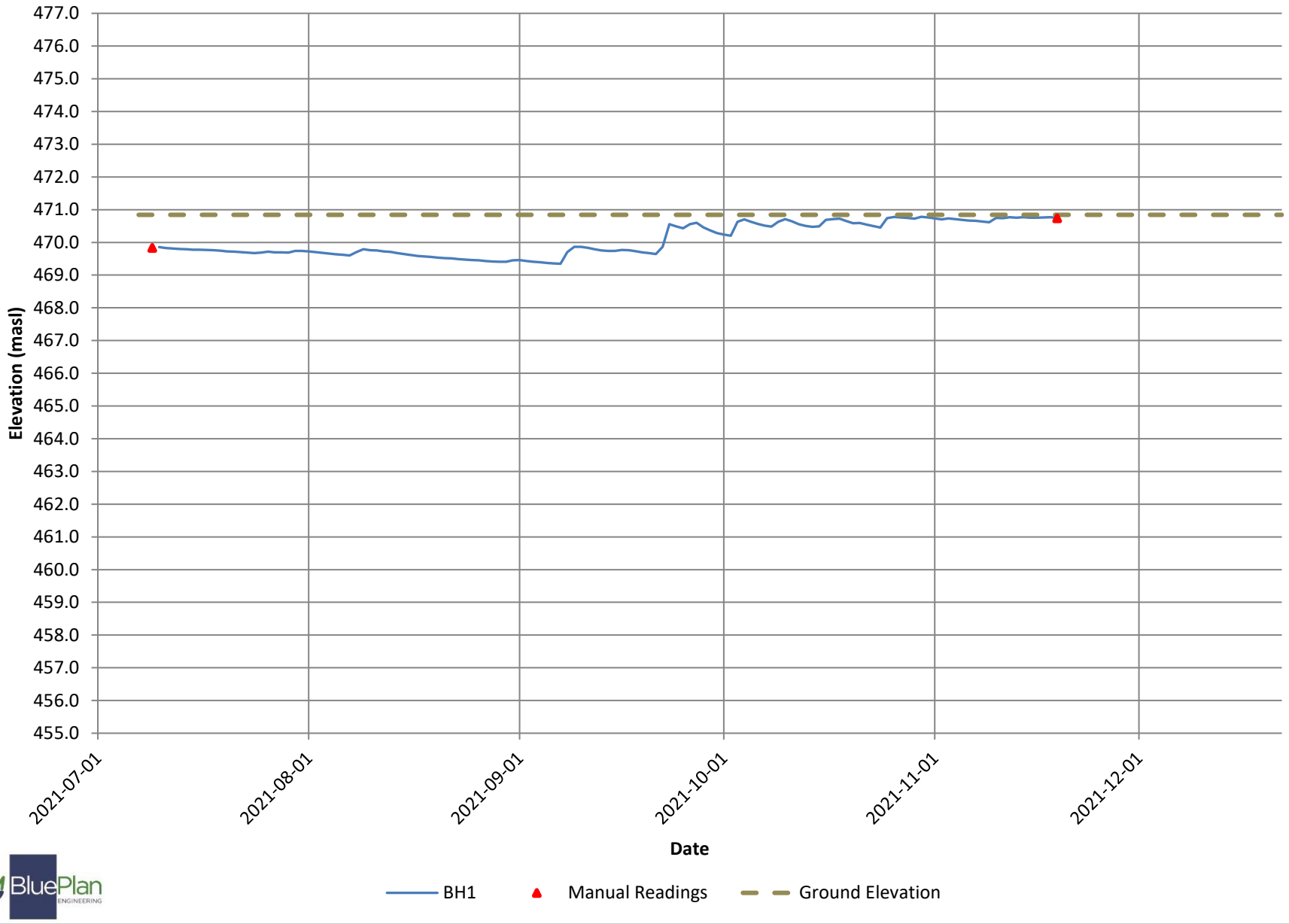
Well ID	Ground Surface Elevation (masl)	Screen Bottom Elevation (masl)	Screen/ Sandpack Length (m)	Screened Interval Unit	Test Type	Hydraulic Conductivity (m/s)
BH2	473.80	467.70	4.26	Clayey Silt Till	Falling Head	1.1E-08
BH3	474.30	469.70	4.07	Silt and Sand Till	Falling Head	1.3E-07
BH4	471.90	466.09	3.79	Clayey Silt Till	Falling Head	3.1E-07
BH7	461.50	454.96	4.09	Clayey Silt Till	Falling Head	3.5E-06
BH8	467.40	460.85	4.11	Clayey Silt Till	Falling Head	1.8E-09
Hydraulic Conductivity of Silt and Sand Till					**AVG**	**1.30E-07**
					GEOMEAN	***1.30E-07***
Hydraulic Conductivity of Clayey Silt Till*					**AVG**	**1.27E-06**
					GEOMEAN	***2.29E-07***

Note: Hydraulic conductivity calculated using Bouwer Rice Method

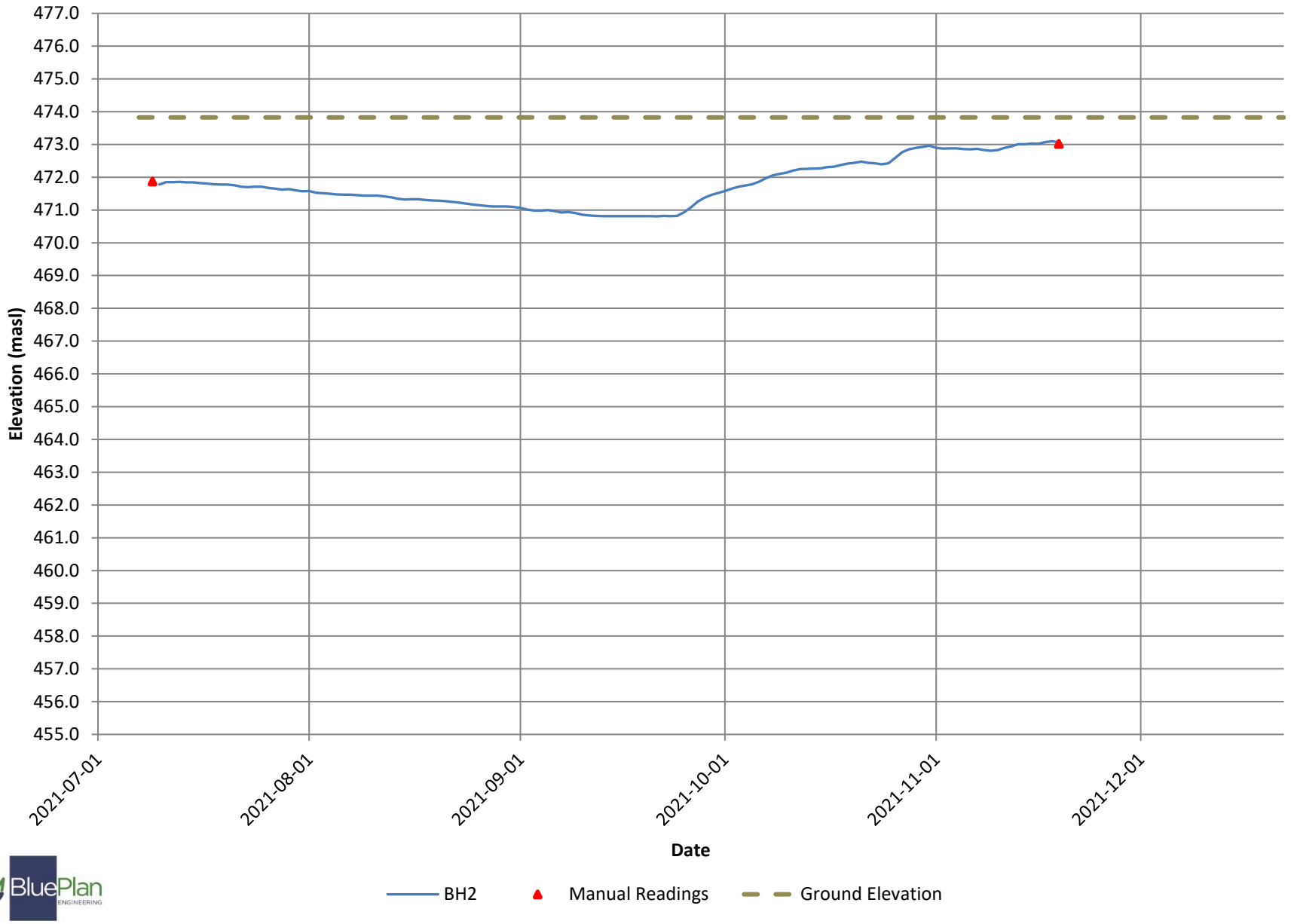
* - Does not include the result for the test at BH8.

CHARTS

Groundwater Elevation: BH1

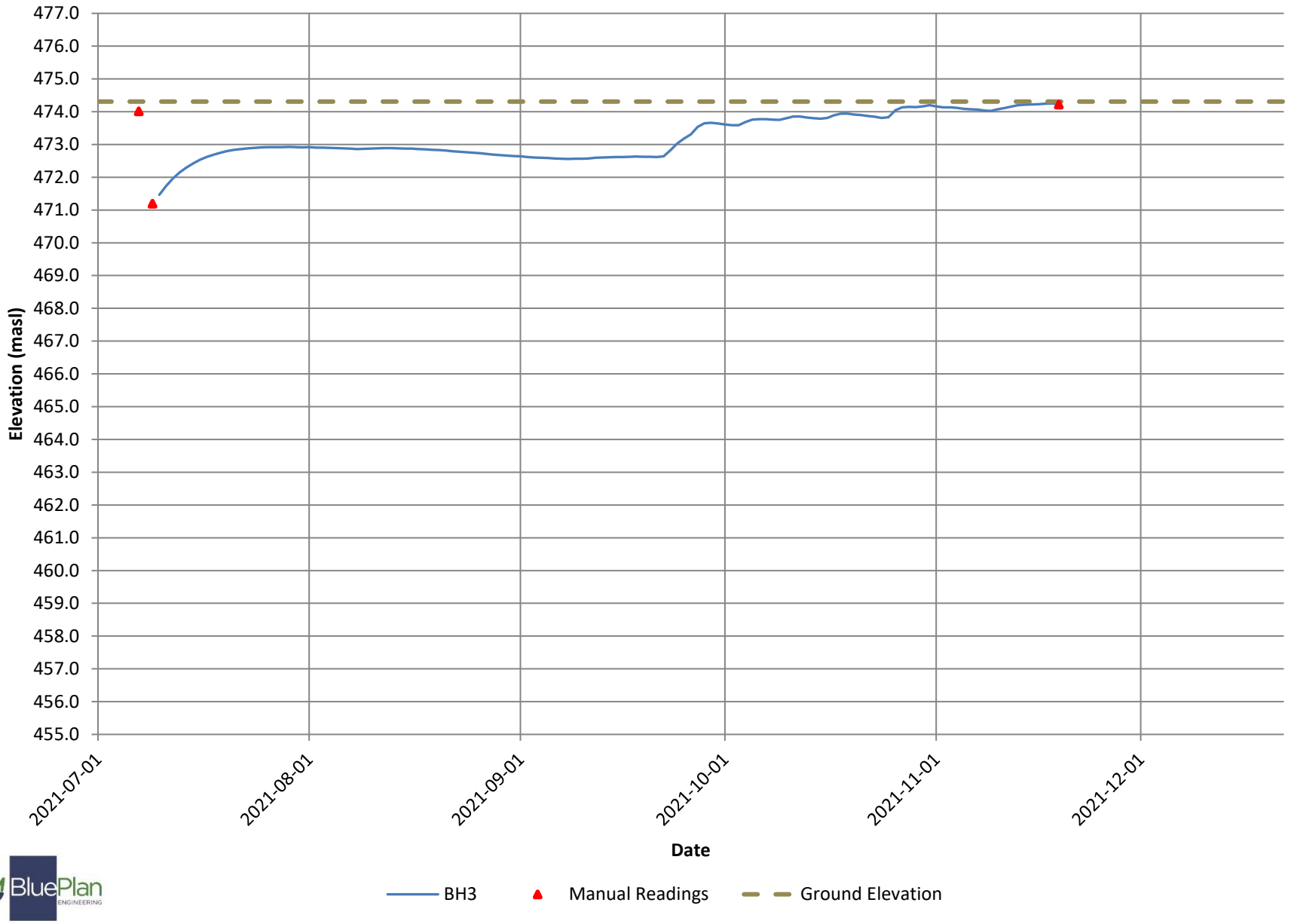


Groundwater Elevation: BH2

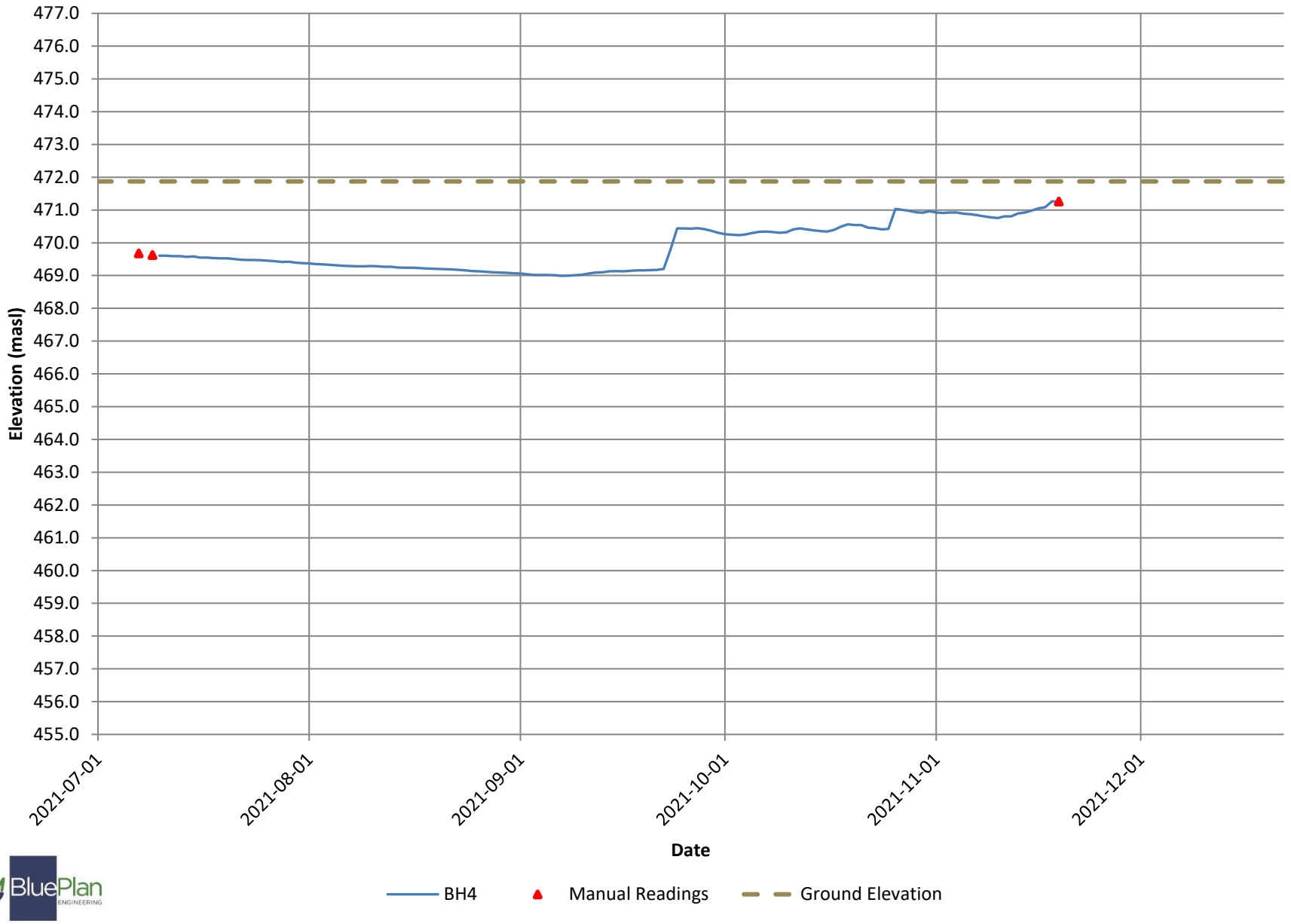


BluePlan ENGINEERING

Groundwater Elevation: BH3

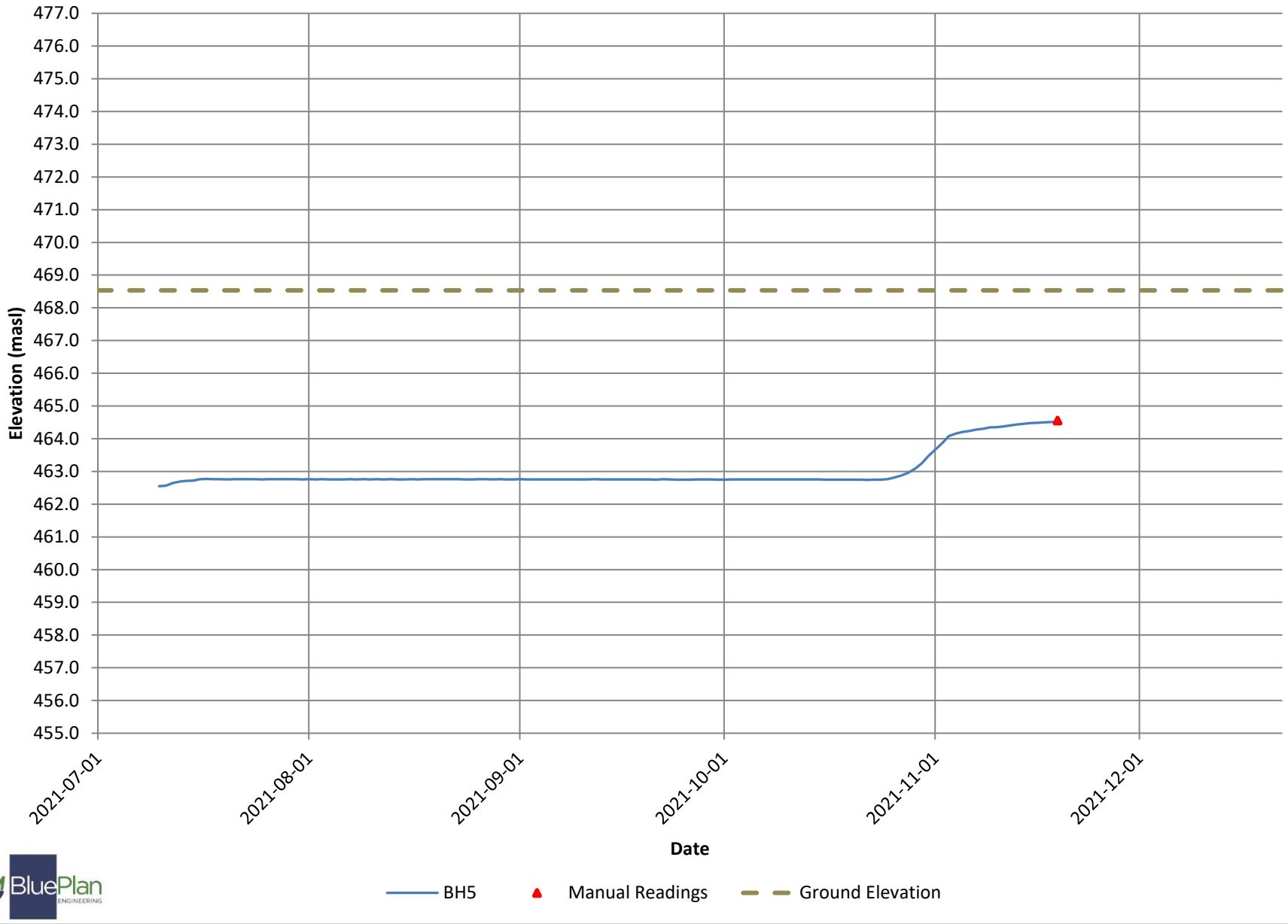


Groundwater Elevation: BH4



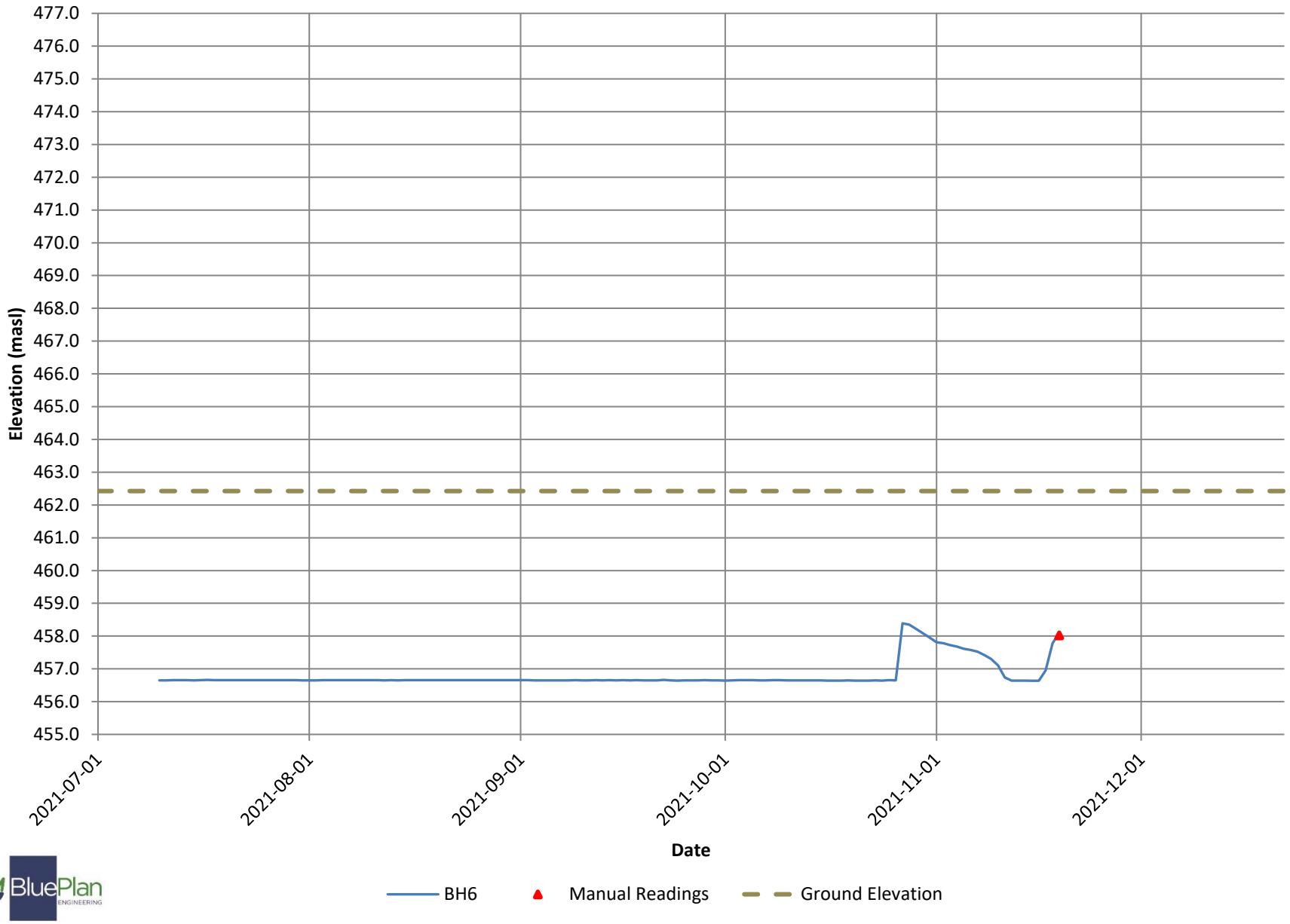
BluePlan ENGINEERING

Groundwater Elevation: BH5

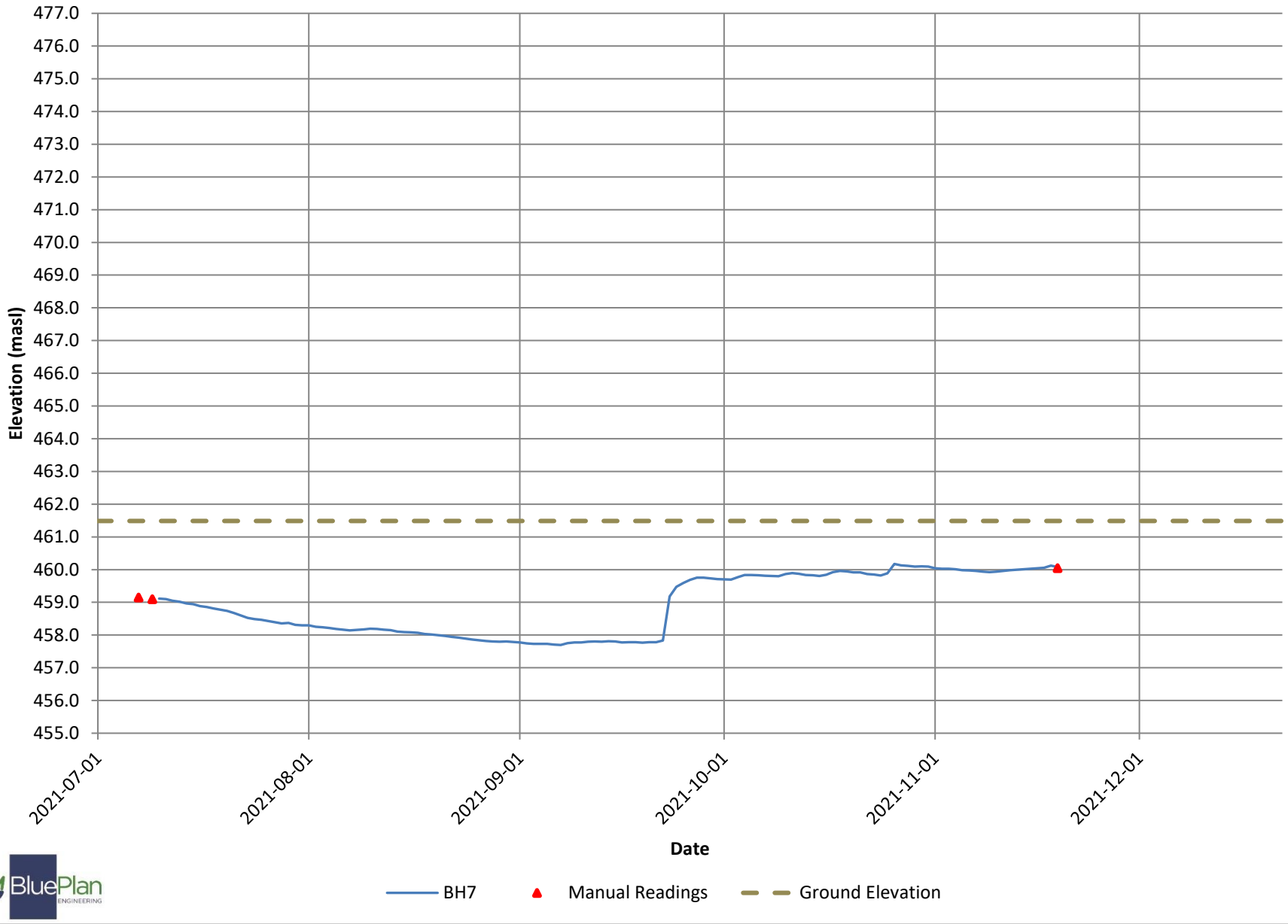


BluePlan ENGINEERING

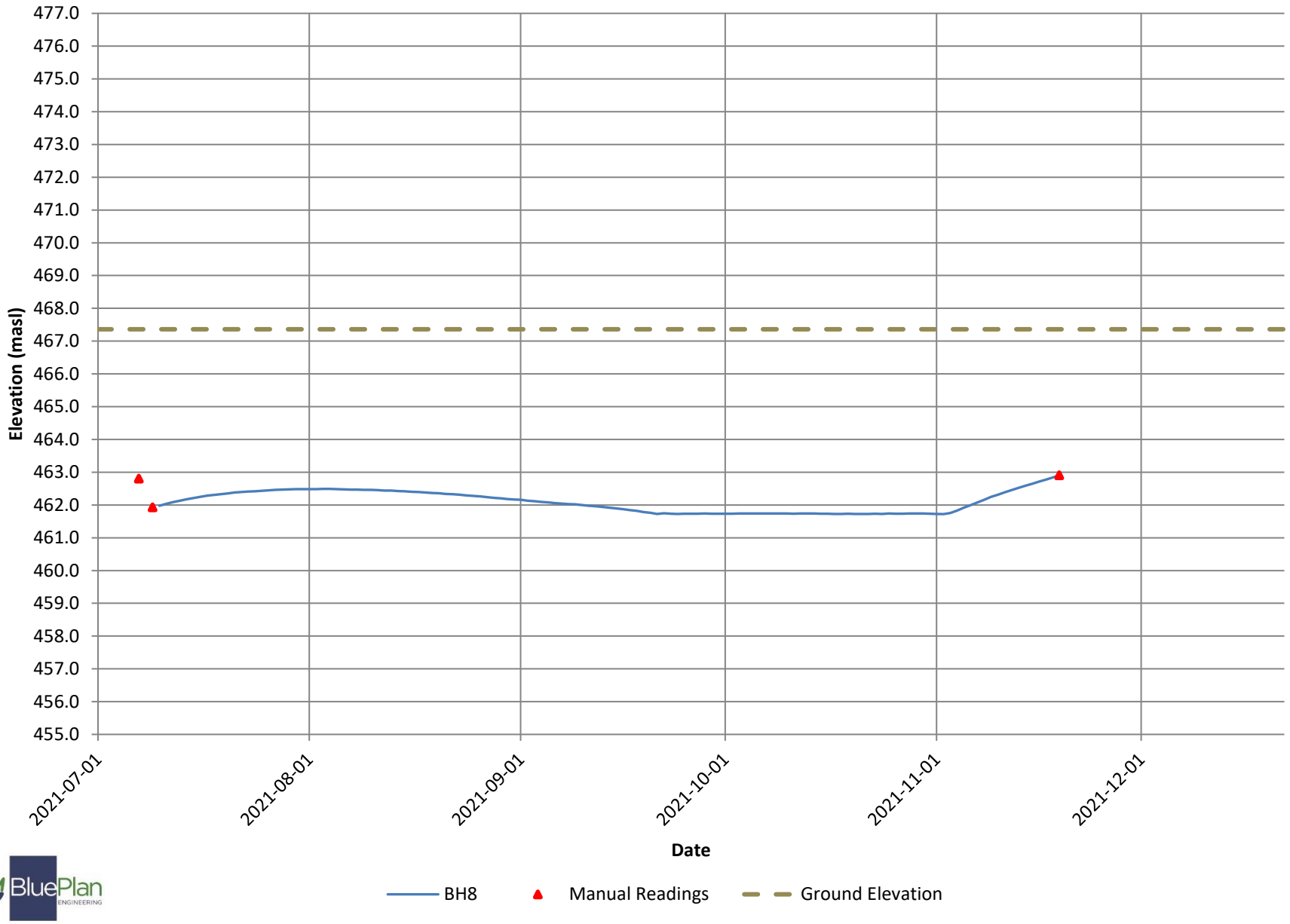
Groundwater Elevation: BH6



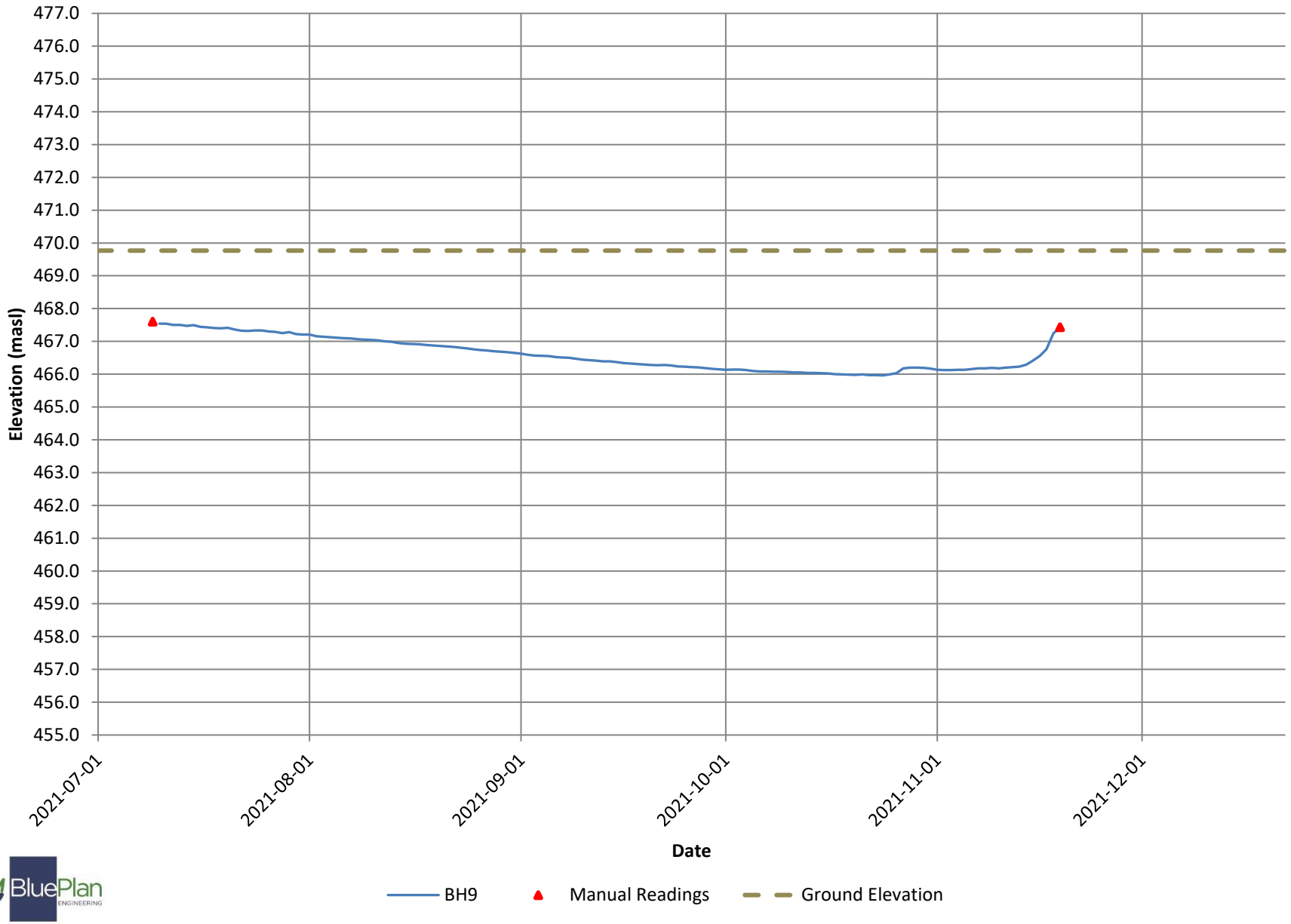
Groundwater Elevation: BH7



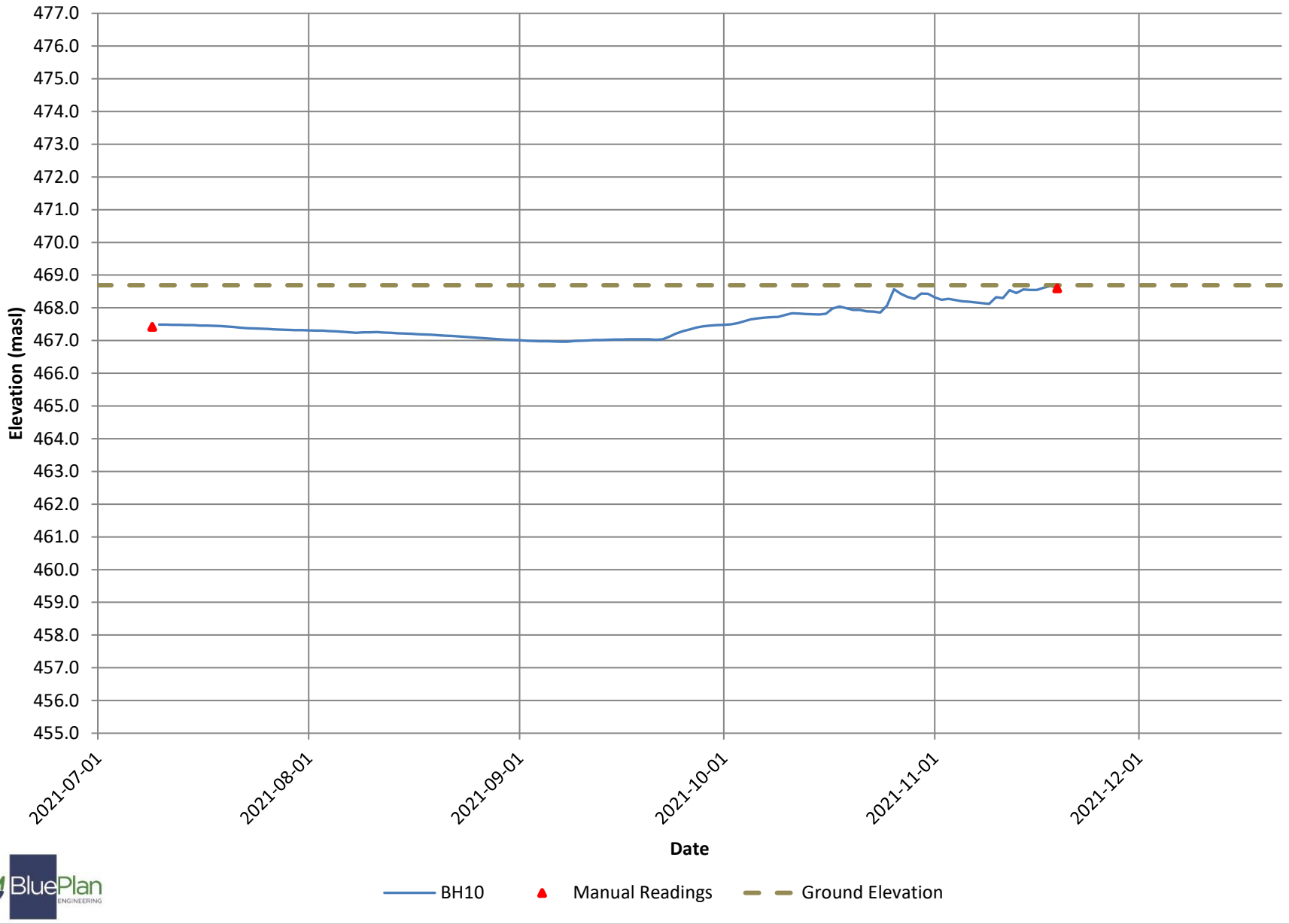
Groundwater Elevation: BH8



Groundwater Elevation: BH9



Groundwater Elevation: BH10



BluePlan ENGINEERING

APPENDIX A:
DRAFT PLAN

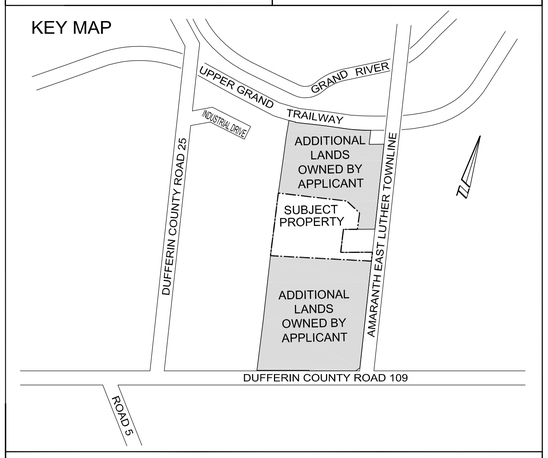
ASTRID J. CLOS
PLANNING CONSULTANTS

423 Woolwich Street, Suite 201
Guelph , Ontario N1H 3X3
Email: astrid.clos@ajcplanning.ca
Phone: (519) 836-7526 (836-PLAN)

THOMASFIELD HOMES LIMITED
DRAFT PLAN OF SUBDIVISION

DATE: DECEMBER 17, 2021	SCALE 1:2,000
PROJECT No. 2108	DRAWN BY: A.R.N.

KEY MAP



LEGAL DESCRIPTION

PART OF LOT 32, CONCESSION 1 (GEOGRAPHIC TOWNSHIP OF EAST LUTHER) TOWN OF GRAND VALLEY
COUNTY OF DUFFERIN

LAND USE SCHEDULE

DESCRIPTION	BLOCKS	AREA (hectares)
INDUSTRIAL	1-7	10.391
FUTURE DEVELOPMENT	8	0.184
STORMWATER MANAGEMENT	9	0.106
ROADS		2.605
TOTAL	9	13.286

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT)

INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and I ARE AS SHOWN ON THE DRAFT PLAN OF SUBDIVISION

h) municipal water supply
i) silty sand
k) municipal sanitary

OWNER'S CERTIFICATE

I AUTHORIZE ASTRID J. CLOS, PLANNING CONSULTANTS TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION.

TOM KRIZSAN
THOMASFIELD HOMES LIMITED

DECEMBER 21, 2021
DATE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

JAMES M. LAWS, O.L.S.
VAN HARTEN SURVEYING INC.

DECEMBER 21, 2021
DATE

APPENDIX B:
SOURCE PROTECTION MAPPING

Source Protection Map - Water Quality Layers

Legend

- Issue Contributing Areas
- WHPA Groundwater Under Direct Influence (WHPA-E)
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2
- Intake Protection Zone 3

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

Map Created: 7/22/2021
Map Center: 43.88357 N, -80.30251 W

Source Protection Map - SGRA and HVA Layers

Legend

- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
  - 0
  - 2
  - 4
  - 6

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

Map Created: 7/22/2021
Map Center: 43.88338 N, -80.29565 W

APPENDIX C:
MECP WATER WELL RECORDS

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

40 P 116 W

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

11 1702433 MUNICIP 17001 CON CON 10

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Amaranth	10	302

[redacted] RR 4 GRAND VALLEY

DATE COMPLETED DAY 05 MO 08 YR 78

UTM ZONE 17 | EASTING 59050 | NORTHING 5 | ELEVATION 1555 | ACCURACY 5 | BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Black	Top Soil			0	1
Brown	Clay			1	63
Brown	Clay	Gravel		63	96
	Clay	Sand		96	114
	Limestone			114	142

31 2001802 0063605 0096605111 0114 0528 0142 115

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0142	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
05 5½	1 ☒ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE	188	0	0117
05	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☒ OPEN HOLE		117	0142
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE GPM	DURATION OF PUMPING HOURS	MINS
1 ☐ PUMP 2 ☐ BAILER	0010	0	30

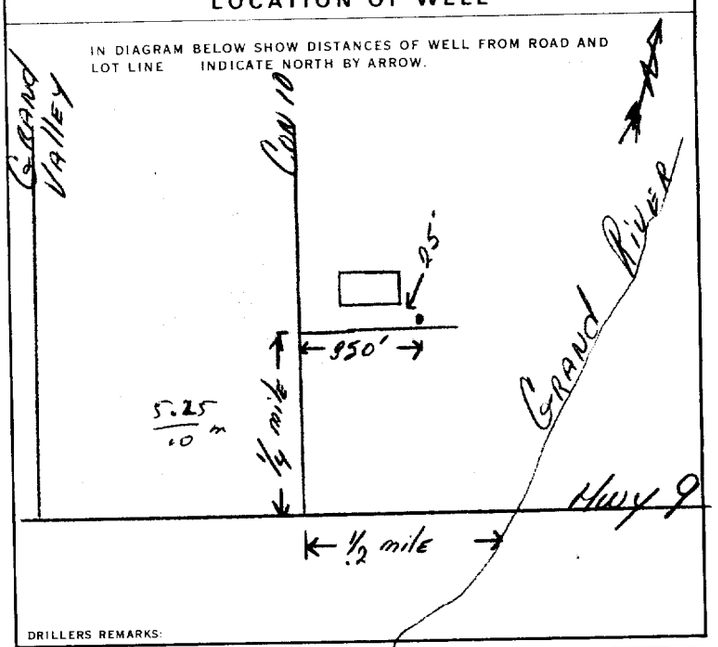
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
062 FEET	100 FEET		FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST 1 ☒ CLEAR 2 ☐ CLOUDY
	100	

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING FEET	RECOMMENDED PUMPING RATE GPM
☐ SHALLOW ☒ DEEP	100	0010

LOCATION OF WELL

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



DRILLERS REMARKS:

FINAL STATUS OF WELL

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

WATER USE 12

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

METHOD OF DRILLING 2

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Lunney Well Drilling — LICENCE NUMBER: 2341

ADDRESS: Bayview RR 2 Aurora Ont.

NAME OF DRILLER OR BORER: H. Gerrits — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE: DAY 6 MO 9 YR 78

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 2341 | DATE RECEIVED 280878

DATE OF INSPECTION August 1979 | INSPECTOR

REMARKS: CSS.S8

FORM NO. 0506—4—77

MINISTRY OF THE ENVIRONMENT COPY

40P/16

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 1702472 MUNICIP 17003 CON. CON 01

COUNTY OR DISTRICT [redacted] TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE (BOROUGH) EAST LUTHER CON., BLOCK, TRACT, SURVEY, ETC I LOT 032

ADDRESS OF WELL LOCATION (STREET AND NUMBER) GRAND VALLEY. ONT. DATE COMPLETED DAY 13 MO 11 YR 78

NORTHING 8859200 RC 5 ELEVATION 1350 RC 5 BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BROWN	CLAY			0	62
BROWN	CLAY	GRAVEL		62	78
	LIMESTONE			78	87
BROWN	SAND	GRAVEL		87	97

31 0106260505 0107860511 0108715 0109761811

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
008 87	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
5 1/8 05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	080
04"	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	62	087
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) #40 010 | DIAMETER 05000 INCHES | LENGTH 03 FEET

MATERIAL AND TYPE STAINLESS STEEL | DEPTH TO TOP OF SCREEN 0065 FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD 1 ☐ PUMP 2 ☒ BAILER | PUMPING RATE 0006 GPM | DURATION OF PUMPING 01 HOURS 15 MINS

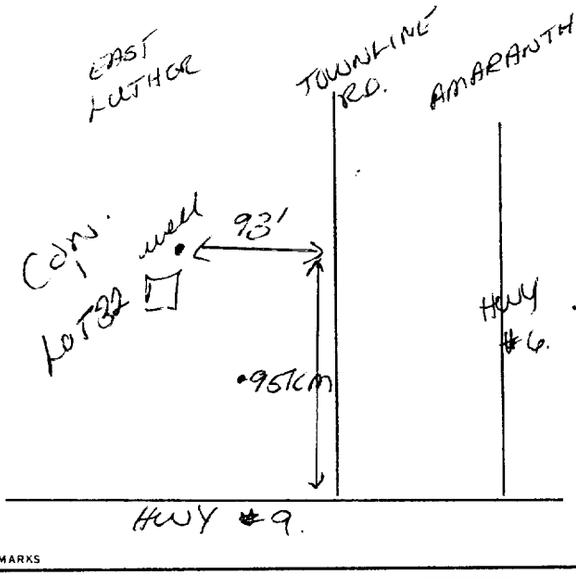
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (1 ☐ PUMPING 2 ☒ RECOVERY) 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
041 FEET	065 FEET	041 FEET	— FEET	— FEET	— FEET

IF FLOWING, GIVE RATE ____ GPM | PUMP INTAKE SET AT ____ FEET | WATER AT END OF TEST 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING 065 FEET | RECOMMENDED PUMPING RATE 0006 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

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

WATER USE 12 — 1 ☒ DOMESTIC 2 ☒ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING ☐ OTHER 9 ☐ NOT USED

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

CONTRACTOR

NAME OF WELL CONTRACTOR Lunney Well Drilling | LICENCE NUMBER 2341

ADDRESS Rayview RR 2 Aurora Ont.

NAME OF DRILLER OR BORER | LICENCE NUMBER

SIGNATURE OF CONTRACTOR | SUBMISSION DATE DAY 18 MO. 11 YR 78

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 2341 | DATE RECEIVED 051278

DATE OF INSPECTION June 18, 1980 | INSPECTOR

REMARKS: CSS.S8 P-GW

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 1703594 — MUNICIP 17003 — CON.

COUNTY OR DISTRICT: [redacted] — TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: E. LUTHER — CON. BLOCK, TRACT, SURVEY, ETC: 1 — LOT: 32

[redacted] 4 GRAND VALLEY — DATE COMPLETED: DAY 5 MO Nov. YR 87

RC — ELEVATION — RC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BLK.	Topsoil			0	1
Bz.	Clay	- Stones		1	16
Bz.	F. Gravel	- F. Sand		16	22
Gz.	Clay	- Rocks		22	107
Yellow	Rock	- Gz. Rock		107	120

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
119	1 ☑ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
5	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	110
5	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE 5 ☐ PLASTIC		110	120
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

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

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER — PUMPING RATE: 12 GPM — DURATION OF PUMPING: 1 HOURS 00 MINS

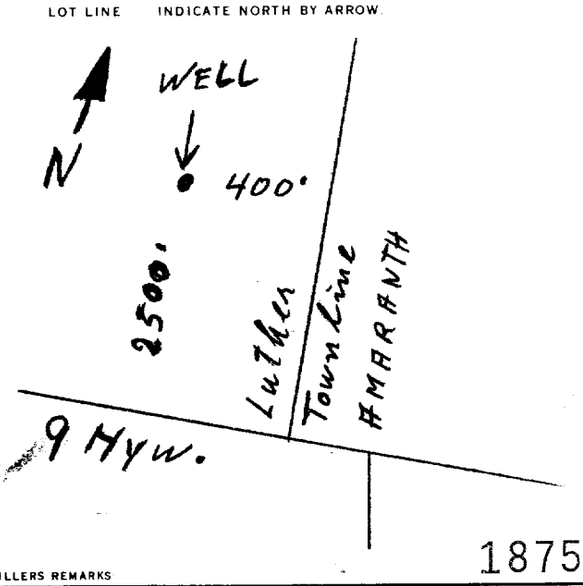
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☑ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
39 FEET	40 FEET	39 FEET	39 FEET	39 FEET	39 FEET

IF FLOWING GIVE RATE: GPM — PUMP INTAKE SET AT: 50 FEET — WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP — RECOMMENDED PUMP SETTING: 55 FEET — RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

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



DRILLERS REMARKS: 18755

FINAL STATUS OF WELL

1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 9 ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Rudy's Well Drilling — WELL CONTRACTOR'S LICENCE NUMBER: 2332

ADDRESS: RR1 Hillsburg.

NAME OF WELL TECHNICIAN: Rudy Garbotz — WELL TECHNICIAN'S LICENCE NUMBER: 0180

SIGNATURE OF TECHNICIAN/CONTRACTOR: Rudy Garbotz — SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR: 2332 — DATE RECEIVED: MAY 19 1988

DATE OF INSPECTION — INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

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

11 1705870 Municipality 1700 Con. CON 10

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
DUFFERIN	AMERANTH	10	2

Address: GRANDE VALLEY ONT

Date completed: 15 8 02 (day month year)

21 UTM Northing RC Elevation RC Basin Code ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	CLAY STONE			0	55
GRAY	CLAY STONE			55	113
GRAY	LIMESTONE			113	165
BROWN	LIMESTONE			165	215

31

32

41 WATER RECORD

Water found at - feet	Kind of water
172	1 [X] Fresh 2 [ ] Salty 3 [ ] Sulphur 4 [ ] Minerals 6 [ ] Gas
211	1 [X] Fresh 2 [ ] Salty 3 [ ] Sulphur 4 [ ] Minerals 6 [ ] Gas
	1 [ ] Fresh 2 [ ] Salty 3 [ ] Sulphur 4 [ ] Minerals 6 [ ] Gas
	1 [ ] Fresh 2 [ ] Salty 3 [ ] Sulphur 4 [ ] Minerals 6 [ ] Gas
	1 [ ] Fresh 2 [ ] Salty 3 [ ] Sulphur 4 [ ] Minerals 6 [ ] Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6¼	1 [X] Steel 2 [ ] Galvanized 3 [ ] Concrete 4 [ ] Open hole 5 [ ] Plastic	.188	0	116
6	1 [ ] Steel 2 [ ] Galvanized 3 [ ] Concrete 4 [X] Open hole 5 [ ] Plastic		116	215
	1 [ ] Steel 2 [ ] Galvanized 3 [ ] Concrete 4 [ ] Open hole 5 [ ] Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet

Material and type | Depth at top of screen feet

61 PLUGGING & SEALING RECORD

[X] Annular space [ ] Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	116	BENTONITE SLURRY
		DRILL CUTTINGS

71 PUMPING TEST

Pumping test method: 1 [ ] Pump 2 [ ] Bailer — air

Pumping rate: 16 GPM

Duration of pumping: 1 Hours 30 Mins

Static level: 70 feet

Water level end of pumping: 125 feet

Water levels during: 1 [ ] Pumping 2 [X] Recovery

15 minutes	30 minutes	45 minutes	60 minutes
81 feet	72 feet	70 feet	70 feet

If flowing give rate: GPM

Pump intake set at: feet

Water at end of test: [X] Clear [ ] Cloudy

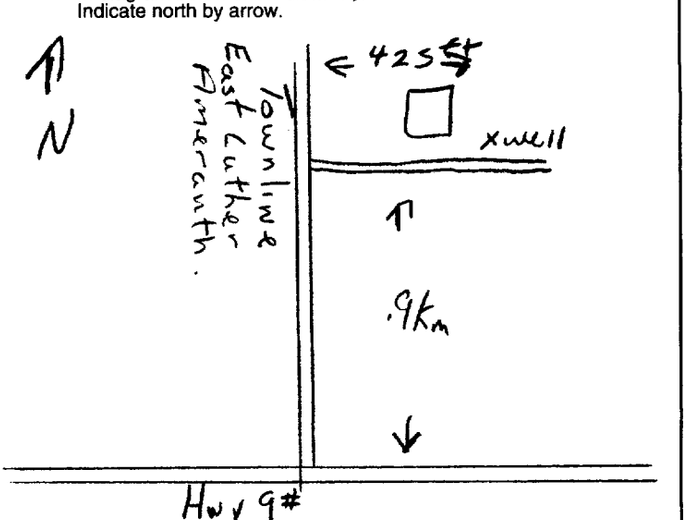
Recommended pump type: [ ] Shallow [X] Deep

Recommended pump setting: 145 feet

Recommended pump rate: 10 GPM

LOCATION OF WELL

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



245728

FINAL STATUS OF WELL

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

WATER USE

1 [X] Domestic 2 [ ] Stock 3 [ ] Irrigation 4 [ ] Industrial 5 [ ] Commercial 6 [ ] Municipal 7 [ ] Public supply 8 [ ] Cooling & air conditioning 9 [ ] Not use 10 [ ] Other

METHOD OF CONSTRUCTION

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

Name of Well Contractor	Well Contractor's Licence No.
KEITH LANG WELL DRILLING INC	7154

Address: 154 PARK ST GOERICH ONT

Name of Well Technician	Well Technician's Licence No.
KEITH LANG	T 446

Signature of Technician/Contractor: Keith Lang

Submission date: day mo yr

MINISTRY USE ONLY

Data source | Contractor: 7154 | Date received: AUG 22 2002

Date of inspection | Inspector

Remarks: CCS.E02

0506 (07/00) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below): #A006761

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only

MUN 17003 CON CON 09 LOT 32

Well Owner's Information and Location of Well Information

[redacted]

DUFFERIN	EAST LUTHER	32	2
RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.	

GPS Reading: NAD 83 | Zone 17 | Easting 556248 | Northing 4859826 | Unit Make/Model: MAGELEN | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify | UTM

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
BROWN	CLAY FILL			0	1.82
BROWN	SILTY PEET & SAND			1.82	3.65
GRAY	GRAVEL & STONES			3.65	14.63
GRAY	LIMESTONE			14.63	30.78

Hole Diameter

Depth From	Depth To	Diameter Centimetres
0	15.24	21.59
15.24	30.78	15.6

Water Record

Water found at ___ Metres	Kind of Water
30.17	☒ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To
15.8	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.47	0	15.24
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

Screen

Outside diam	Material	Slot No.	Depth From	Depth To
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

No Casing or Screen

☒ Open hole — 15.24 — 30.78

Test of Well Yield

Pumping test method: pump-air

Pump intake set at - (metres) 9.14

Pumping rate - (litres/min) 45

Duration of pumping 2 hrs + 0 min

Final water level end of pumping 4.87 metres

Recommended pump type. ☐ Shallow ☒ Deep

Recommended pump depth. 9 metres

Recommended pump rate. 45 (litres/min)

If flowing give rate - (litres/min)

If pumping discontinued, give reason.

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	G.L			
1	[redacted]		1	3.4
	1.21			
2	2.13		2	2.75
3	2.745		3	2.2
4	3.35		4	1.87
5	3.95		5	1.10
10	4.75		10	.65
15	4.87		15	.25
20			20	.05
25			25	G.L
30			30	
40			40	
50			50	
60	4.87		60	G.L

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - From	Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	15.24	BENTONITE SLURRY	

Method of Construction

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

Water Use

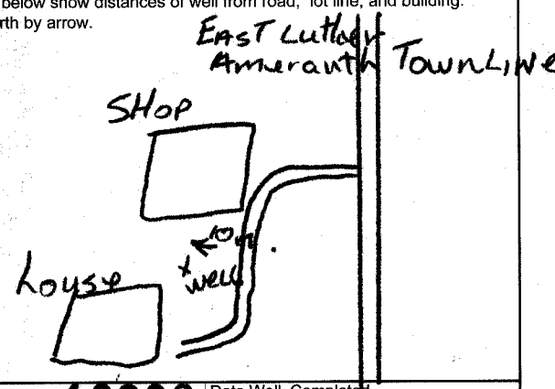
☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Location of Well

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



Audit No. Z 16999

Date Well Completed: 2004 (YYYY) 09 (MM) 02 (DD)

Was the well owner's information package delivered? ☒ Yes ☐ No

Date Delivered: YYYY MM DD

Well Contractor/Technician Information

Name of Well Contractor: KEITH LANG WELL DRILLING INC

Well Contractor's Licence No.: 7154

Business Address (street name, number, city etc.): 251 ELDON ST GODERICH ONT

Name of Well Technician (last name, first name): KEITH LANG

Well Technician's Licence No.: T 446

Signature of Technician/Contractor: Keith Lang

Date Submitted: YYYY MM DD

Ministry Use Only

Data Source

Contractor: 7154

Date Received: SEP 14 2004

Date of Inspection: YYYY MM DD

Remarks

Well Record Number: 1706266

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

Cette formule est disponible en français

Ontario Ministry of the Environment

Well A017462 number below)
A017462

Well Record
Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

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

Ministry Use Only
MUN 17003 CON LOT

Well Owner's Information and Location of Well Information

First Name	Last Name	Mailing Address (Street Number/Name, RR, Lot, Concession)
PAUL CO		94 NEWKIRK Rd.

County/District/Municipality	Township/City/Town/Village	Province	Postal Code	Telephone Number (include area code)
	RICHMOND HILL	Ontario	L4C-3G3	416-717-8701

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
EAST LUTHER			

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
193194 AMARANTH-EAST LUTHER TOWN-LINE	GRAND VALLEY	

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation
	83	17	556031	4860207	MAGELLAN	WAAS

Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
BROWN	SAND	GRAVEL	SAND & GRAVEL	0	3
GREY	SILT	SAND, GRAVEL	SANDY SILT TILL	3	9.5
GREY	LIMESTONE		BEDROCK.	9.5	34.5

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	9.5	35.6
9.5	34.5	14.0

Water Record

Water found at Metres	Kind of Water
[redacted] m	☒ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
____ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
____ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☐ Yes ☒ No

Construction Record

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
7.5	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	SCH40	31.5	0
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

Screen

Outside diam	Material	Slot No.	Depth From	Depth To (Metres)
2.9	☐ Steel ☐ Fibreglass ☒ Plastic ☐ Concrete ☐ Galvanized	10	34.5	31.5

No Casing or Screen

☐ Open hole

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping ____ hrs + ____ min	2		2	
Final water level end of pumping ____ metres	3	N/A.	3	
Recommended pump type. ☐ Shallow ☐ Deep	4		4	
Recommended pump depth. ____ metres	5		5	
Recommended pump rate. (litres/min)	10		10	
	15		15	
If flowing give rate - (litres/min)	20		20	
	25		25	
If pumping discontinued, give reason.	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
27	46.	BENTONITE- SLURRY	.45
.46	0	CONCRETE.	

Method of Construction

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

Water Use

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

Final Status of Well

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

Well Contractor/Technician Information

Name of Well Contractor	Well Contractor's Licence No.
STRATA DRILLING INC	6370.

Business Address (street name, number, city etc.): 233 ST. CHARLES ST. W. R.R.#1 BRACEBRIDGE ON. P0B-1M0

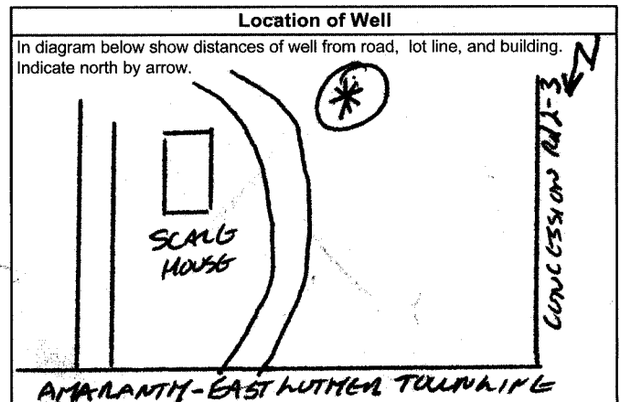
Name of Well Technician (last name, first name)	Well Technician's Licence No.
NOLL ROBERT	T-411

Signature of Technician/Contractor: x [signature]

Date Submitted: 2004 11 24

Location of Well

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



Audit No. Z 04198

Date Well Completed: YYYY MM DD

Was the well owner's information package delivered? ☐ Yes ☐ No

Date Delivered: YYYY MM DD

Ministry Use Only

Data Source

Contractor: 6370

Date Received: YYYY MM DD — NOV 29 2004

Date of Inspection: YYYY MM DD

Remarks: D.W.C. via Fax 2004/11/10

Well Record Number: 1706293

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐ *Cette formule est disponible en français*

Ontario Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)* A 084000

Well Record

Regulation 903 Ontario Water Resources Act

[redacted]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
202373 County Rd. 109, RR4	EAST LUTHER		

County/District/Municipality	City/Town/Village	Province	Postal Code
GRAND VALLEY ⟷	DUFFERIN	Ontario	L0N1G0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	561063	4776508		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
light brown	sand	trace stones/gravel	dry.	0	5'
light brown	silty clay	" "	moist	5'	15'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0		Bentonite Slurry	
	15	Silica Sand	

Method of Construction

- [ ] Cable Tool
- [ ] Diamond
- [ ] Rotary (Conventional)
- [ ] Jetting
- [ ] Rotary (Reverse)
- [ ] Driving
- [X] Boring
- [ ] Digging
- [ ] Air percussion
- [ ] Other, *specify* _____

Well Use

- [ ] Public
- [ ] Commercial
- [ ] Not used
- [ ] Domestic
- [ ] Municipal
- [ ] Dewatering
- [ ] Livestock
- [ ] Test Hole
- [X] Monitoring
- [ ] Irrigation
- [ ] Cooling & Air Conditioning
- [ ] Industrial
- [ ] Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
5.1	Plastic		0	

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
5.9	Plastic	.101		15

Status of Well

- [ ] Water Supply
- [ ] Replacement Well
- [ ] Test Hole
- [ ] Recharge Well
- [ ] Dewatering Well
- [X] Observation and/or Monitoring Hole
- [ ] Alteration (Construction)
- [ ] Abandoned, Insufficient Supply
- [ ] Abandoned, Poor Water Quality
- [ ] Abandoned, other, *specify*
- [ ] Other, *specify*

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*	0	15	6
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
B.U.O. Environmental Services Ltd	7305

Business Address (Street Number/Name)	Municipality
4644 Gladstone Drive	Mossley

Province	Postal Code	Business E-mail Address
Ont	N0L1V0	buoenviro@gmail.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
519 269 1106	URLIN BRENT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3211		2010 02 18

Results of Well Yield Testing

After test of well yield, water was:
- [ ] Clear and sand free
- [ ] Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

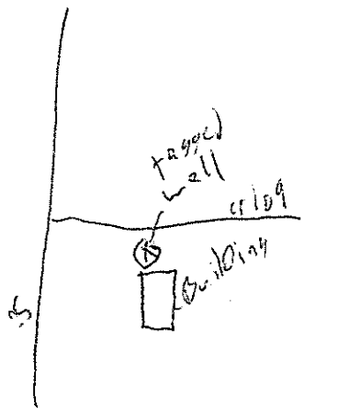
Well production *(l/min / GPM)*

Disinfected?
- [ ] Yes
- [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well owner's information package delivered
- [ ] Yes
- [X] No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2010 02 18

Ministry Use Only

Audit No. Z 097573

Received MAR 0 1 2010

11-0092-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Place Sticker and/or Print Below) **A114009**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Sherk Halal Farms Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
12 Stephway Boulevard, Unit 18	Etobicoke	ON	M9W6M5	9058885857

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
193064 Amaranth-East Luther Townline	East Luther		

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin.	Grand Valley.	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556379	4859187		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown.	Sand	Silt.	Sand.	0	10.

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	Sched 40	0	5

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	10	5	10

Status of Well

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

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	10	8"

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc.	7238

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
25 Lewis Road-Unit C	Guelph	ON	N1H1E9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198269340	Mazzone Pasquale	3157		2011 0627

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

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2011 0627

Ministry Use Only

Audit No. z130726

Received JUL 12 2011

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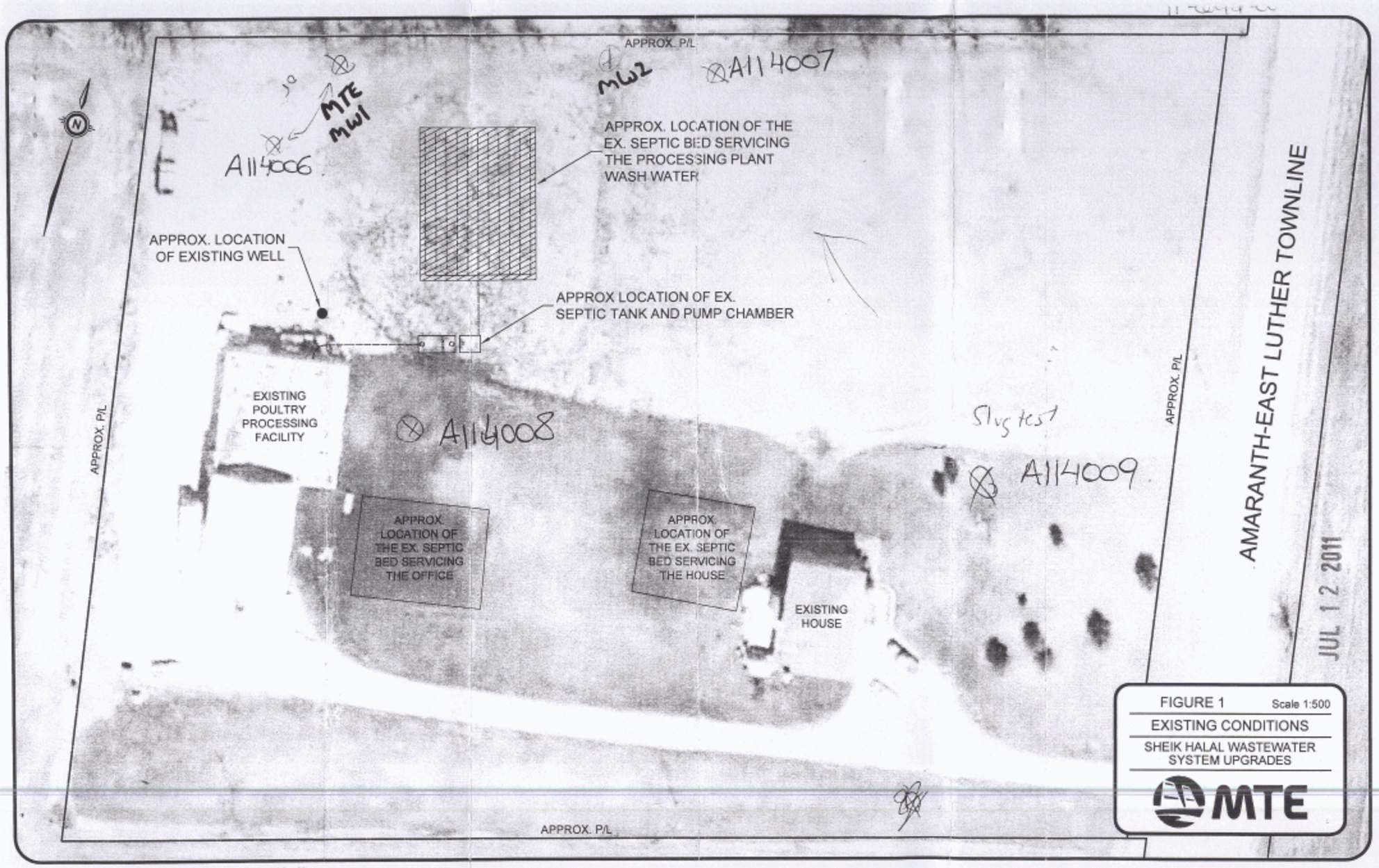

DWG PATH:P:\P\33828\MU\33828-100-GF1.dwg
March 23, 2011 – 10:02 a.m. – Plotted By: brobo

C-7238
21307

11-0092-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* **A114008**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Sheik Halal Farms Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
12 Stephway Boulevard, Unit 18	Etobicoke	ON	M9W6M5	9058828858857

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
193064 Amaranth East Luther Townline	East Luther		

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin.	Grand Valley	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556291	4859149		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown.	Sand.	Silt.	Sand.	0	12.

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	2	Cement.	
2	5	Hole plug.	

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	SCH 40	0	7

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	10	7	12

Status of Well

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

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	12	8"

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc.	7238

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
25 Lewis Road - Unit C	Guelph	ON	N1H1E9	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198269340	Mazzaro Pasquale	3157		2011/06/27

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

Date Package Delivered: ____

Date Work Completed: 2011/06/27

Ministry Use Only

Audit No. z130724

JUL 12 2011 Received

Ministry's Copy

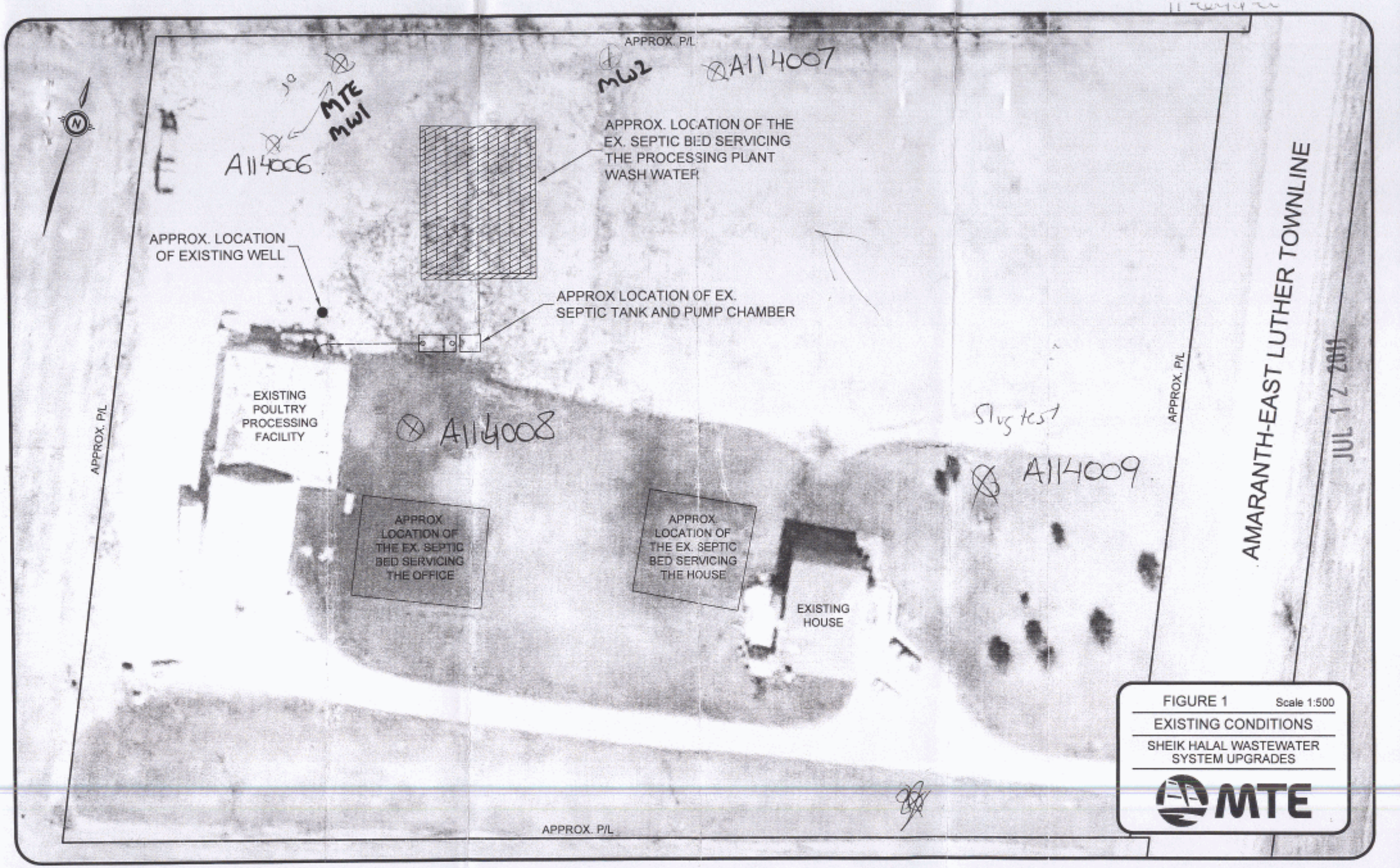

FIGURE 1 Scale 1:500

EXISTING CONDITIONS

SHEIK HALAL WASTEWATER SYSTEM UPGRADES

MTE

DWG PATH: P:\P\33828\MU\33828-100-GP1.dwg
March 23, 2011 — 10:02 a.m. — Plotted By: bradd

C-7238
213024

11-0092-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* **A114007**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Sheik Halal Farms Inc.			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
12 Stephway Boulevard, Unit 18	Etobicoke	ON	M9W6M5	9058285857

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
193064 Amaranth-East Luther Townline	East Luther		

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin.	Grand Valley.	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556316	4859202.		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown.	Sand.	Silt.	Sand.	0	10.

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	2.	Cement.	
2	3	Hole plug.	

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	Sched 40	0	5.

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	10	5.	10

Status of Well

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

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☑ Untested ☐ Other, specify
6		
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	10	8"

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping hrs + min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc.	7238

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
25 Lewis Road - Unit C	Guelph	ON	N1H1E9	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198269340	Marzano Pasquale	3157		2011/06/27

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☑ No		2011/06/27

Ministry Use Only

Audit No. z130727

Received JUL 12 2011

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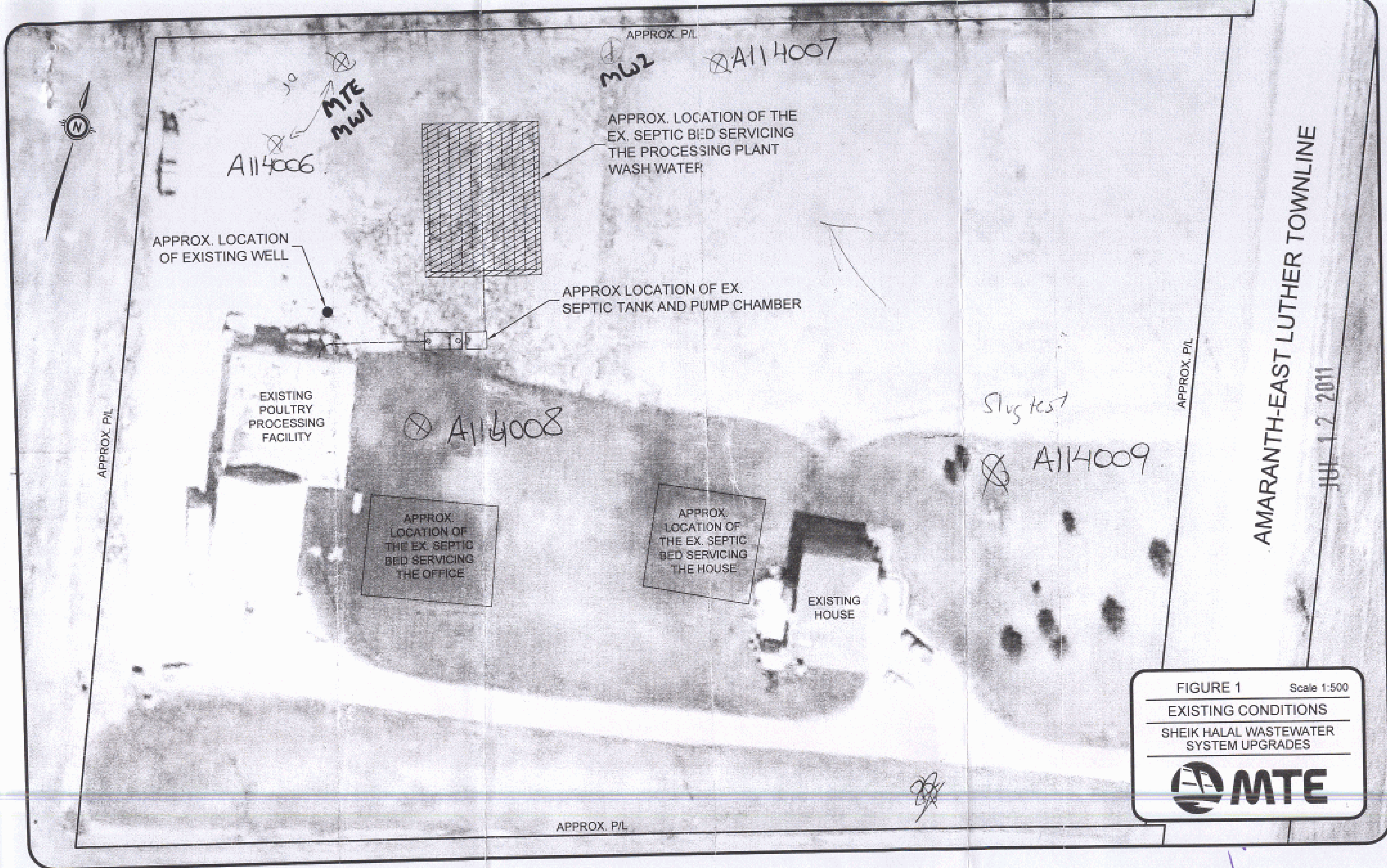

FIGURE 1 Scale 1:500
EXISTING CONDITIONS
SHEIK HALAL WASTEWATER SYSTEM UPGRADES

DWG PATH:P:\P\33828\MU\33828-100-GF.dwg
March 23, 2011 — 10:02 a.m — Plotted By: brobb

C77238
Z130727

11-0092-00

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Please Print Below): A114006

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Sheik Halal Farms	Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
12 Stefnway Boulevard, Unit 18	Etobicoke	ON	M9W6M5	9058285857

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
193064 Amaranth-East Luther Townline	East Luther		

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin	Grand Valley	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556255	4859186		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sand	Silt	Sand	0	10
Brown	Clay	fill	Sand, gravel	10	40

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	2	Cement	
2	28	Hole plug	

Method of Construction

☐ Cable Tool ☑ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, specify

☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use

☐ Public ☐ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify

☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning

☐ Not used ☐ Dewatering ☑ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
2"	Plastic	sched 40	0	30

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
2"	plastic	10	30	40

Status of Well

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

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	40	8"

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.

Please see attached map.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Aardvark Drilling Inc.	7238

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
25 Lewis Road - Unit C	Guelph	ON	N1H1E9	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
5198269340	Mazzano Pasquale	3157		2011 06 27

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

Date Package Delivered: ____

Date Work Completed: 2011 06 27

Ministry Use Only

Audit No. Z 130725

Received JUL 12 2011

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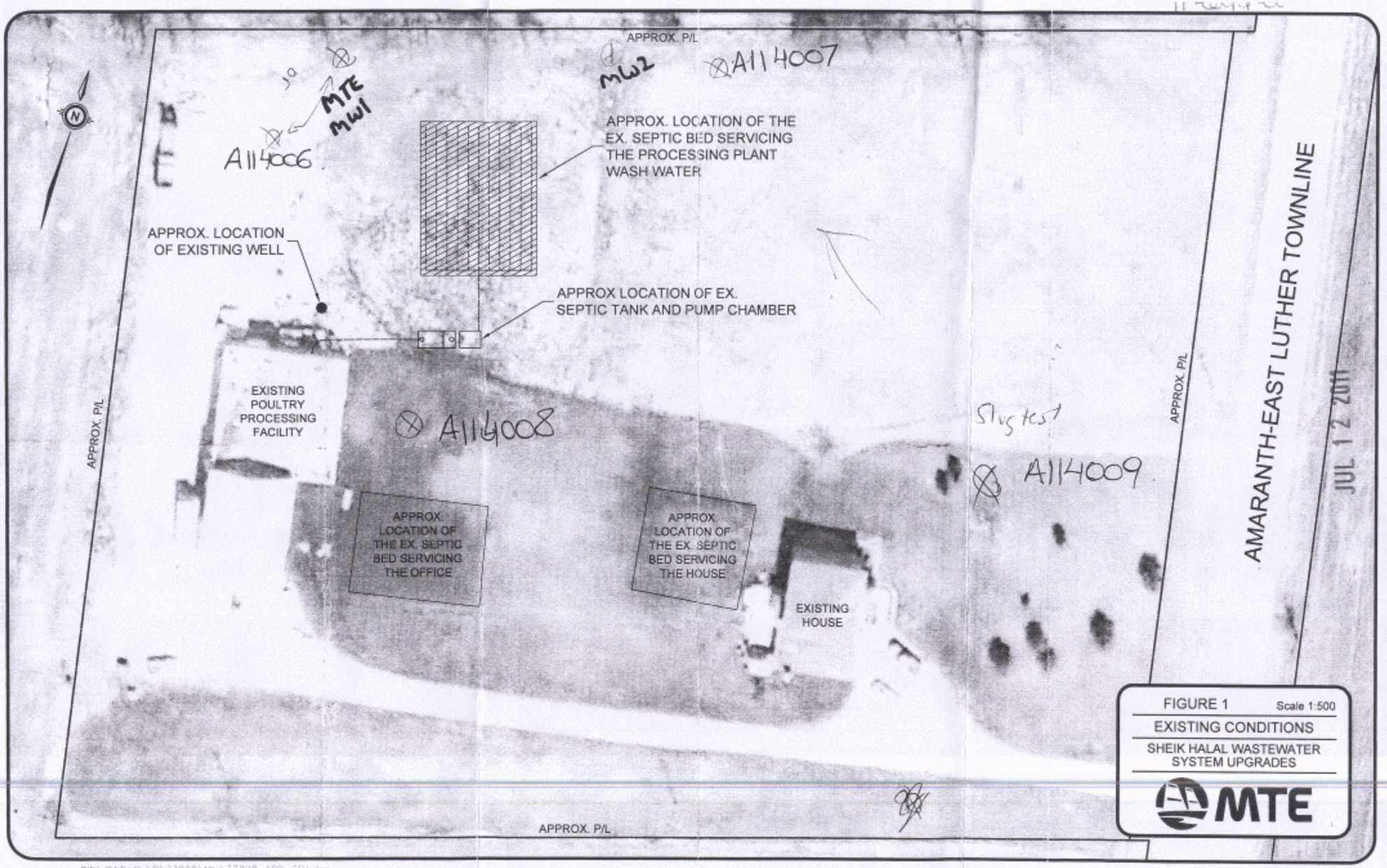


FIGURE 1 Scale 1:500

EXISTING CONDITIONS

SHEIK HALAL WASTEWATER SYSTEM UPGRADES

MTE

DWG PATH:P:\P\33828\MU\33828-100-GP1.dwg

March 23, 2011 – 10:02 a.m. – Plotted By: brabb

D-7238
21307

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: Tag #: A165384

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
Sheik Halal Farms	Inc		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
193064 Amaranth East Luther Townline	Grand Valley	ON	L0N1G0	6474622470

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
193064 Amaranth East Luther Townline	East Luther	32	1

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin		Ontario	L0N1G0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556292	4859119		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay silt &	Sand		0	3.65
Grey	Clay & stones			3.65	34.44
Grey	limestone			34.44	40.23

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	8	Bentonite Grout	.80

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.8	steel	.48	+.76	35.81
15.4	open hole		35.81	40.23

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Other, specify
6.1	[ ] Fresh [X] Untested [ ] Gas	
40	[ ] Fresh [X] Untested [ ] Gas	
	[ ] Fresh [ ] Untested [ ] Gas	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	35.66	22.86
35.66	40.23	15.4

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 30

Pumping rate (l/min / GPM): 113.5

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 19.64

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 30

Recommended pump rate (l/min / GPM): 113.5

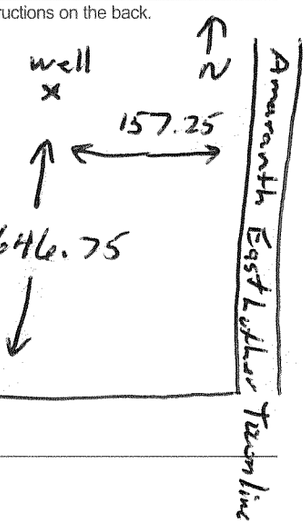
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	18.67		19.64
1	19.11	1	19.11
2	19.14	2	19.08
3	19.18	3	19.04
4	19.21	4	19.00
5	19.24	5	18.98
10	19.38	10	18.90
15	19.38	15	18.84
20	19.44	20	18.80
25	19.48	25	18.77
30	19.51	30	18.77
40	19.58	40	18.71
50	19.62	50	18.68
60	19.64	60	18.68

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Well Initiatives	7211

Business Address (Street Number/Name)	Municipality
15 Townline	Orangeville

Province	Postal Code	Business E-mail Address
ON	L9W3R4	info@wellinitiatives.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5198468289	Losch Kim

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
7927	Kim Losch	2015 11 30

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [ ] No		2015 11 20

Ministry Use Only

Audit No. Z221712

Received DEC 08 2015

Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

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

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

[redacted]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
#201 Water St.	East Luther	#30	#2

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin	Grand Valley	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	555467	4859817		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clean Gravel			0'	4'
	Holeplug			4'	5'5
Brown	Clean Gravel			5'5	10'

Well abandoned in lower level of home because it was no longer used and was creating a potential safety hazard.

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
36"	Concrete		+2'	10'

Construction Record - Screen

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

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☑ Abandoned, other, *specify* not used
☐ Other, *specify*

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

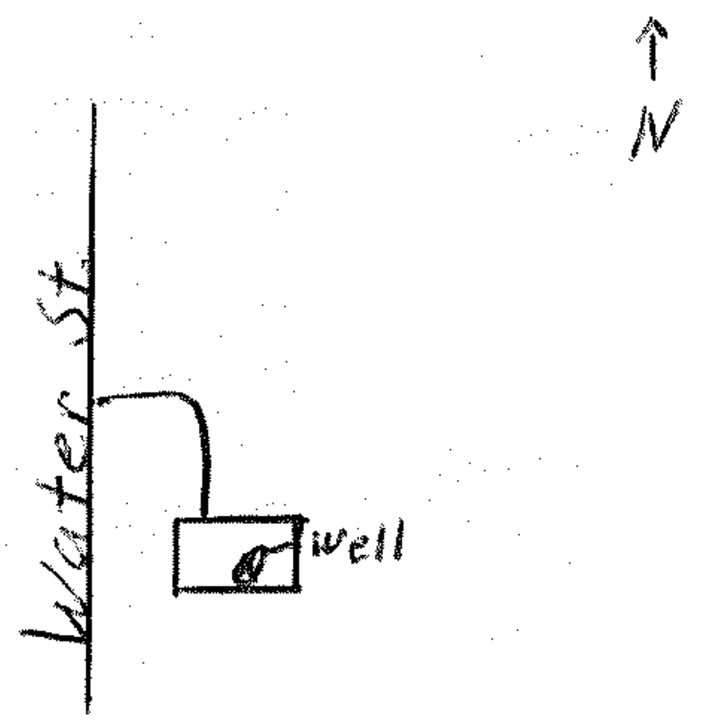
Well production *(l/min / GPM)*

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	16		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Water Details

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

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Highland Water Wells	2576

Business Address (Street Number/Name)	Municipality
Box 141, Durham	Grey

Province	Postal Code	Business E-mail Address
Ont	N0G 1R0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5199096303	Wilson, Clint

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3456	Clint Wilson	20151127

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

Date Package Delivered: YYYY MM DD

Date Work Completed: 20151126

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Audit No. Z223144

Received: JAN 13 2016

506E (2014/11)

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Ontario — Ministry of the Environment and Climate Change

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

V A076919 (Print Below) A076919

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	Well Constructed by Well Owner
	Delany Homes Ltd		[ ]

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
197 544 2nd Line NE	Melancthon	ON	L9N 1H4	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	East Luther	32	1

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	556262	4859105		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Black	Loam			0	0.30
Brown	Clay	Trace Gravel		0.30	5.18
Brown	Clay	Gravel & Sand		5.18	15.54
Brown	Sand	Silt		15.54	18.29
Brown	Clay			18.29	20.73
Brown	Gravel / Sand			20.73	28.96
Grey	Limestone			28.96	35.05

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	6.1	Bentonite	0.19

Results of Well Yield Testing

After test of well yield, water was: [X] Clear and sand free [ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 28.96

Pumping rate (l/min / GPM): 45.4

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 17.17

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

Recommended pump depth (m/ft): 25.0

Recommended pump rate (l/min / GPM): 45.4

Well production (l/min / GPM): ok

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.12		
1	15.36	1	15.79
2	15.92	2	15.12
3	16.24	3	14.84
4	16.41	4	14.70
5	16.52	5	14.63
10	16.74	10	14.51
15	16.83	15	14.45
20	16.91	20	14.41
25	16.95	25	14.38
30	16.99	30	
40	17.06	40	
50	17.13	50	
60	17.17	60	

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.24	Steel	0.477	+0.45	29.57

Status of Well

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

Construction Record - Screen

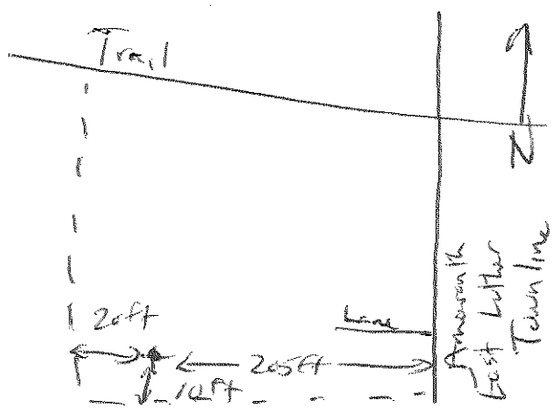
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
35.05 (m/ft) [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify	0	6.1	25.4
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	6.1	29.57	16.04
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	29.57	35.05	15.24

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Geo-Tech Drilling 2014 Inc	7016

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
215154 Con. 4 Line	Amaranth	ON	L9W 6C9	

Business Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
	Liam Franklin

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3594		2017/05/23

Well owner's information package delivered: [X] Yes [ ] No

Date Package Delivered: 2017/05/23

Date Work Completed: 2017/05/23

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Audit No. Z228618

MAR 15 2018

Received

06E (2014/11)

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APPENDIX D:
GEOTECHNICAL BOREHOLE LOGS AND GRAIN-SIZE ANALYSES

REFERENCE No: G4411-21-5

MONITORING WELL No: 1

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 2

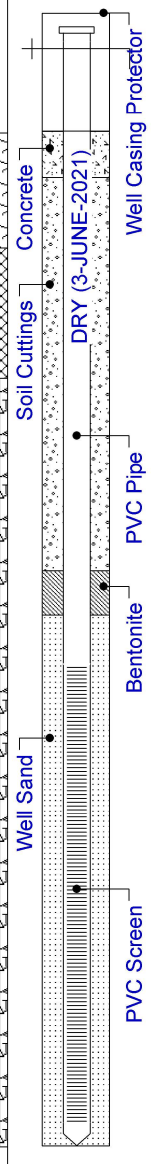
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	470.8								
0.8	760mm Topsoil	470.1								
1.6	mottled grey/brown, very loose Clayey Silt FILL moist	469.2			1	SS	2			
	mottled grey/brown, stiff to hard CLAYEY SILT TILL trace sand, trace gravel moist				2	SS	13			
	Grey @ 2.3m				3	AS	25			
					4	SS	20			
					5	AS	36			
6.7		464.1			6	SS	25			
	End of Borehole									



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: May 31, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 2

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 3

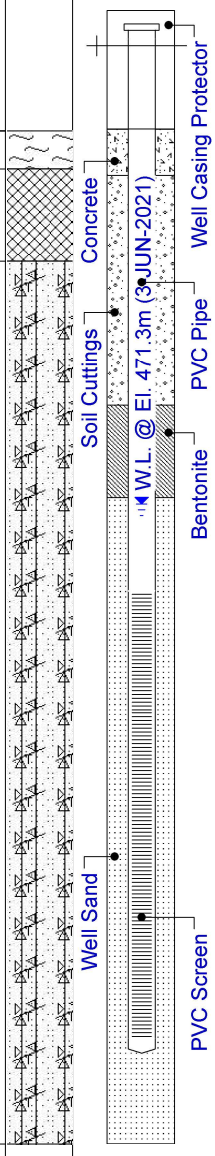
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	473.8								
0.3	250mm Topsoil	473.6								
0.9	brown, compact Sandy Silt FILL some gravel moist	473.0								
	grey, very stiff to hard CLAYEY SILT TILL trace sand, trace gravel, moist				1	SS	20			
					2	SS	18			
					3	AS	23			
					4	SS	27			
					5	AS	51			
					6	SS	55			
6.7	End of Borehole	467.1								



DRILLED BY: London Soil Test Ltd.

DRILL METHOD: Solid Stem Auger

DRILL DATE: May 31, 2021

HOLE DIAMETER: 200mm

DATUM: Geodetic

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 3

CLIENT: Thomasfield Homes Ltd

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 4

LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	474.3								
0.3	250mm Topsoil	474.1								
0.8	mottled grey/brown, compact Sandy Silt FILL moist	473.5								
	brown, compact to very dense SANDY SILT TILL some gravel, some clay moist				1	SS	17	Rock		
					2	SS	42	Rock		
					3	AS	50	Rock		
3.0		471.3								
	brown, very dense SILT AND SAND TILL some clay, trace gravel, occ. cobbles and/or boulders, moist				4	SS	50	Rock		
					5	SS	50	Rock		
5.2		469.1								
	Refusal on Probable Boulder									

Concrete
Bentonite
Well Sand
PVC Pipe
Soil Cuttings
Well Casing Protector
PVC Screen
W.L @ El. 470.7m (3-JUN-2021)

DRILLED BY: London Soil Test Ltd.

DRILL METHOD: Solid Stem Auger

DRILL DATE: May 31, 2021

HOLE DIAMETER: 200mm

DATUM: Geodetic

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 4

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 5

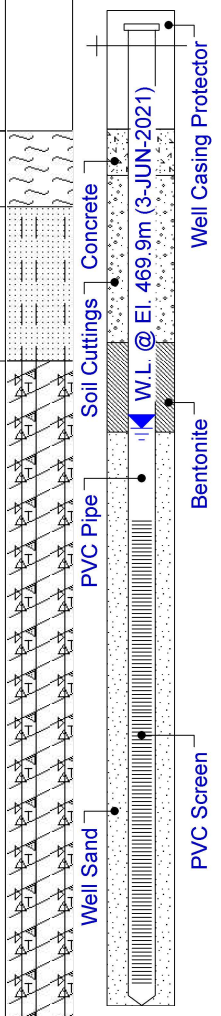
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	471.9								
0.5	500mm Topsoil	471.4								
1.5	brown, compact SILTY SAND moist	470.4			1	SS	20			
					2	SS	22			
					3	SS	30			
					4	SS/AS	24			
					5	SS	18			
6.4	grey/brown, very stiff to hard CLAYEY SILT TILL trace sand, trace gravel, occ.cobbles and/or boulders moist	465.5			6	SS	50	Rock		
	End of Borehole									



DRILLED BY: London Soil Test Ltd.

DRILL METHOD: Solid Stem Auger

DRILL DATE: May 31, 2021

HOLE DIAMETER: 200mm

DATUM: Geodetic

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 5

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 6

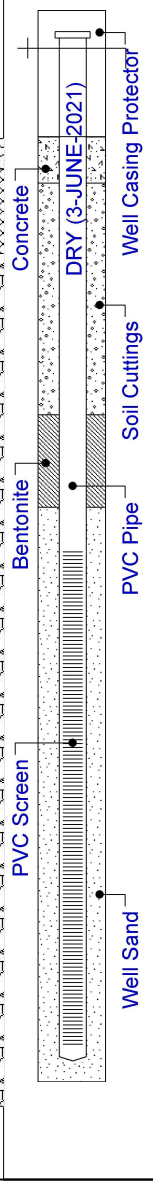
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20 40 60 80	5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	468.5								
0.2	200mm Topsoil	468.3								
0.8	brown, compact Silty Sand and Gravel FILL moist	467.8								
	mottled brown/grey, stiff to hard CLAYEY SILT TILL trace sand, trace gravel, occ. cobbles and/or boulders moist				1	SS	11			
					2	SS	21			
					3	SS	27			
					4	SS	30			
					5	SS	12			
					6	SS	52			
6.4	End of Borehole	462.1								



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

DATUM: Geodetic

DRILL DATE: May 31, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 6

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 7

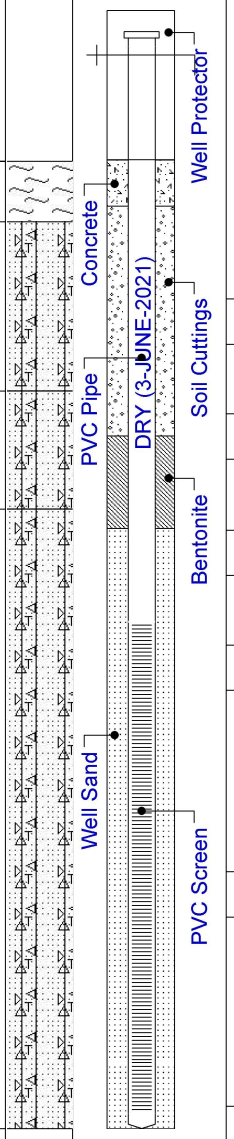
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	462.4								
0.4	400mm Topsoil	462.0								
1.5	brown, loose to very dense, SANDY SILT TILL some gravel, some clay, occ. cobbles and/or boulders moist	460.9			1	SS	11			
2.3	moist to saturated	460.1			2	SS	8			
6.4	moist	456.0			3	SS	27			
					4	SS	24			
					5	SS	52			
	End of Borehole				6	SS	50	100mm		



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

DATUM: Geodetic

DRILL DATE: June 1, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 7

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 8

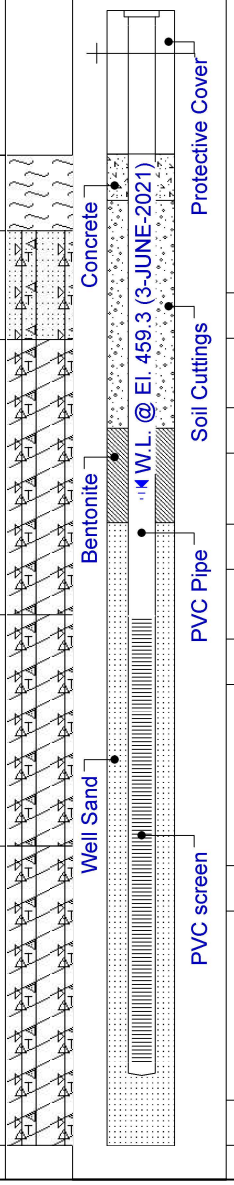
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	461.5								
0.5	500mm Topsoil	461.0								
1.2	brown, compact, SANDY SILT TILL some gravel, some clay, moist to saturated	460.3			1	SS	20			
3.0	brown, very stiff to hard CLAYEY SILT TILL trace sand, trace gravel, moist	458.4			2	SS	23			
					3	SS	31			
4.6	saturated to wet	456.9			4	SS	13			
6.5	grey, wet	454.9			5	SS	8			
					6	SS	10			
	End of Borehole									



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

DATUM: Geodetic

DRILL DATE: June 1, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 8

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 9

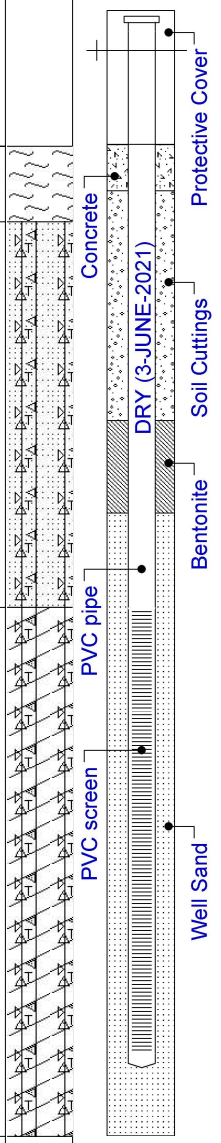
LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	467.4								
0.5	500mm topsoil	466.9								
	brown, compact SANDY SILT TILL some gravel, some clay, moist				1	SS	16			
					2	SS	11			
					3	SS	28			
3.0		464.3								
	grey, stiff to very stiff CLAYEY SILT TILL trace sand, trace gravel, moist				4	SS	24			
					5	SS	30			
6.5		460.8			6	SS	14			
	End of Borehole									



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

DATUM: Geodetic

DRILL DATE: June 1, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 9

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 10

LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20 40 60 80	5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	469.8		Concrete; Well Protector						
0.5	500mm Topsoil	469.3		W.L. @ El. 468.5m (3-JUN-2021)						
	brown, loose to compact, SANDY SILT TILL some gravel, some clay, moist			Soil Cuttings	1	SS	9			
					2	SS	18			
				Bentonite; PVC Pipe	3	SS	22			
3.0		466.7								
	grey, very stiff to hard, CLAYEY SILT TILL trace sand, trace gravel, saturated to wet			Well Sand	4	SS	32			
				PVC Screen	5	SS	23			
6.5		463.2			6	SS	16			
	End of Borehole									

DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

DATUM: Geodetic

DRILL DATE: June 1, 2021

SHEET: 1 of 1

REFERENCE No: G4411-21-5

MONITORING WELL No: 10

CLIENT: Thomasfield Homes Ltd.

PROJECT: Grand Valley Employment Lands

ENCLOSURE No: 11

LOCATION: Pt. Lot 32, Con 1, Grand Valley, ON

SUPERVISOR: MO

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

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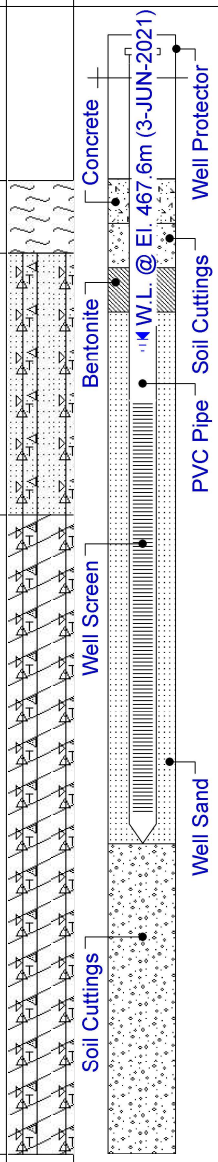
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE					
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	PENETRATION RESISTANCE 20 40 60 80	WATER CONTENT % 5 10 15 20 25	UNIT WEIGHT
0.0	Ground Surface	468.7								
0.5	500mm Topsoil	468.2								
2.3	brown, compact, SANDY SILT TILL some gravel, some clay moist	466.4			1	SS	18			
					2	SS	23			
	grey, very stiff to hard CLAYEY SILT TILL trace sand, trace gravel, occ. cobbles and/or boulders wet				3	AS	50	Rock		
					4	SS	23			
					5	SS	36			
6.7		462.0			6	SS	39			
	End of Borehole									



DRILLED BY: London Soil Test Ltd.

HOLE DIAMETER: 200mm

DRILL METHOD: Solid Stem Auger

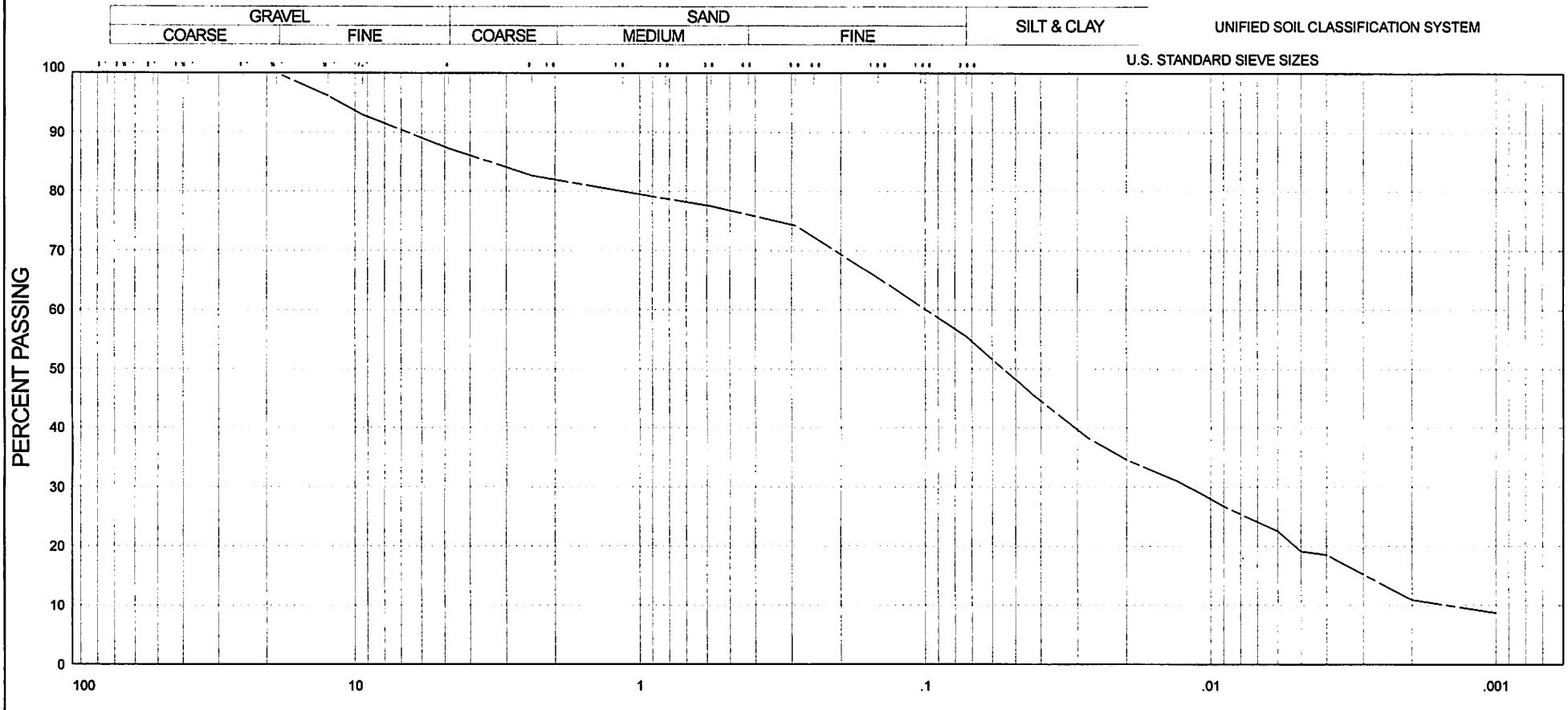
DATUM: Geodetic

DRILL DATE: June 1, 2021

SHEET: 1 of 1

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4411-21-5



PROJECT: Grand Valley Employment Lands

LOCATION: Pt of Lot 32, Con. 1, Grand Valley, ON

BOREHOLE N°: 6

SAMPLE N°: 3

DEPTH: 2.3 - 2.7m±

ELEVATION: 460.1 - 459.7m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SANDY SILT TILL, some gravel, some clay (CL-ML)

PLASTIC PROPERTIES

LIQUID LIMIT	% = 18.0
PLASTIC LIMIT	% = 13.6
PLASTICITY INDEX	% = 4.4
MOISTURE CONTENT	% = 10.2

ENCLOSURE N° 12

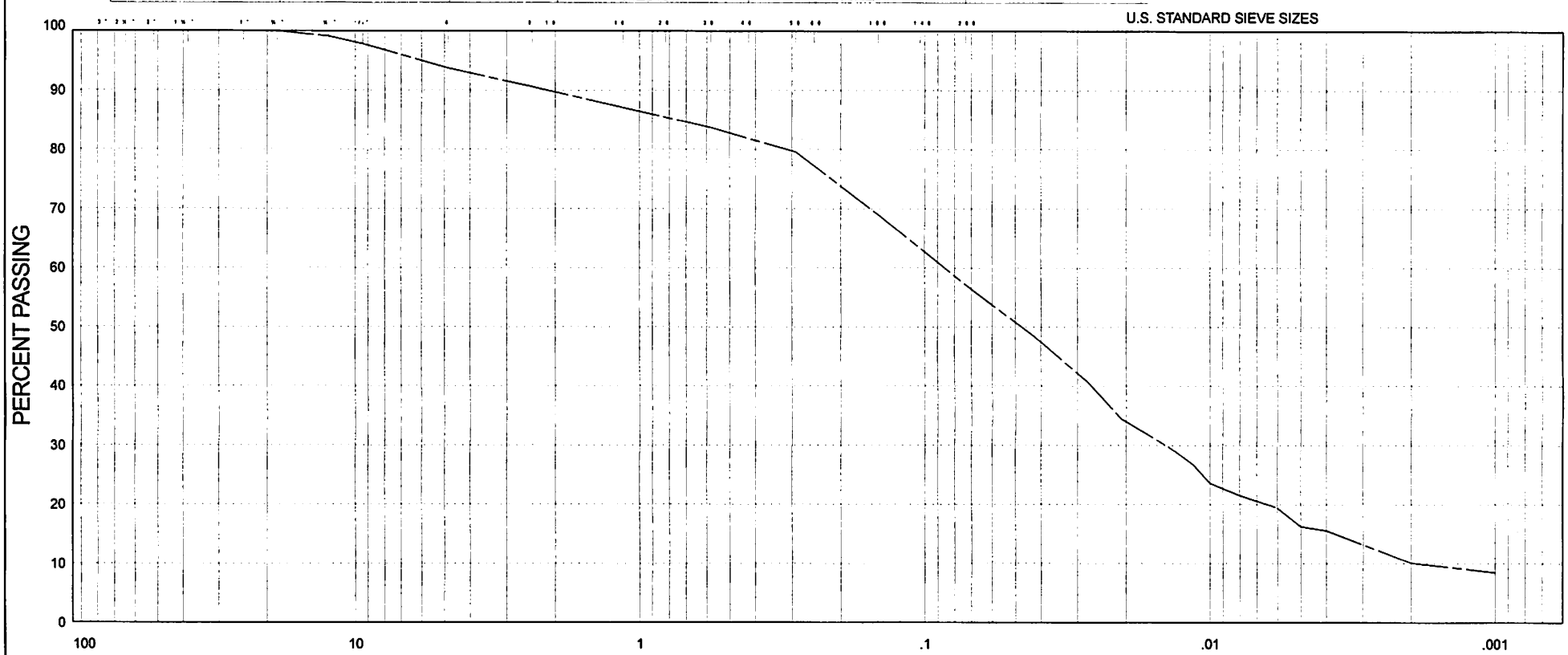
V. A. WOOD (GUELPH) INCORPORATED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4411-21-5

UNIFIED SOIL CLASSIFICATION SYSTEM

U.S. STANDARD SIEVE SIZES



PROJECT: Grand Valley Employment Lands

LOCATION: Pt. of Lot 32, Con. 1, Grand Valley, ON

BOREHOLE N°: 3

SAMPLE N°: 5

DEPTH: 4.6 - 5.0m±

ELEVATION: 469.7 - 469.3m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILT AND SAND TILL, some clay, trace gravel (CL-ML)

PLASTIC PROPERTIES

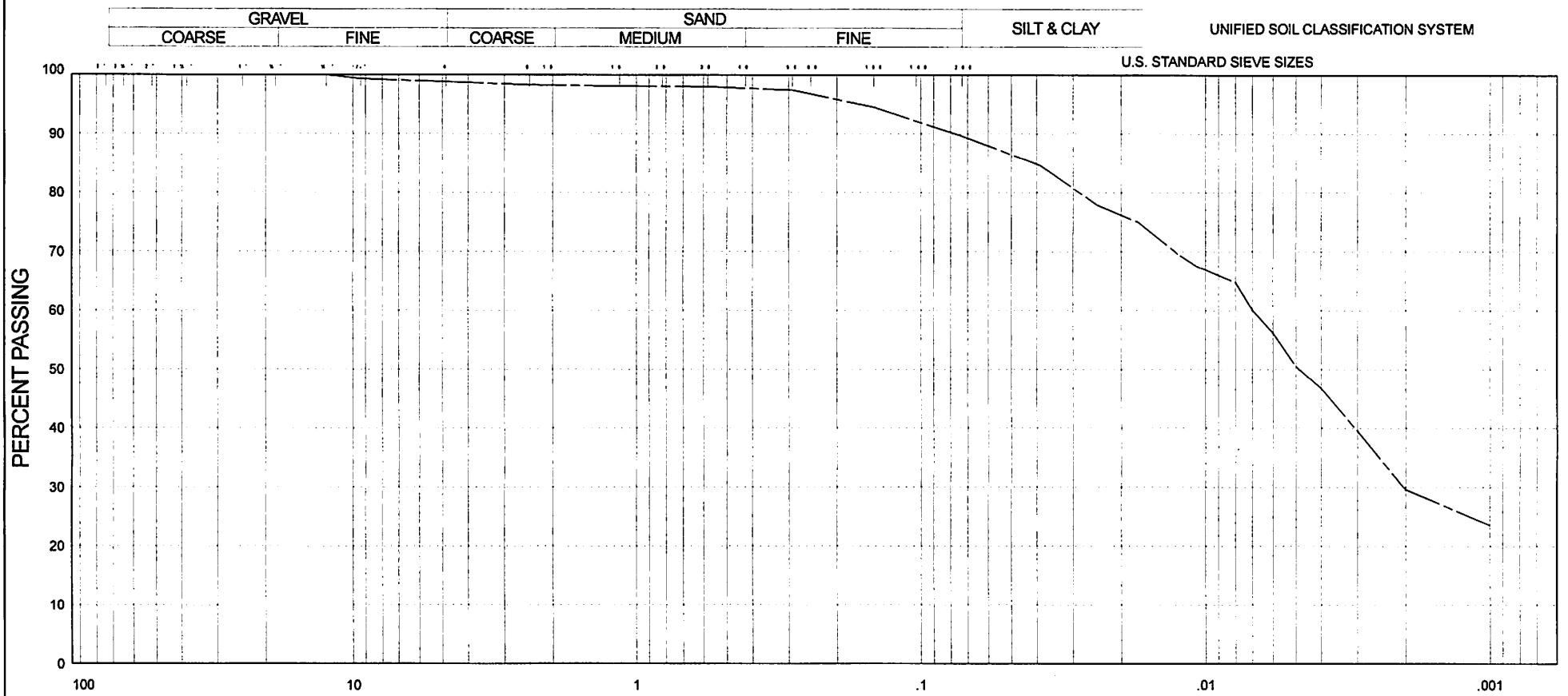
LIQUID LIMIT	% = 17.0
PLASTIC LIMIT	% = 12.7
PLASTICITY INDEX	% = 4.3
MOISTURE CONTENT	% = 4.9

ENCLOSURE N° 13

V. A. WOOD (GUELPH) INCORPORATED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4411-21-5



PROJECT: Grand Valley Employment Lands

LOCATION: Pt. of Lot 32, Con. 1, Grand Valley, ON

BOREHOLE N°: 1

SAMPLE N°: 6

DEPTH: 6.1 - 6.6m±

ELEVATION: 464.7 - 464.2m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

CLAYEY SILT TILL, trace sand, trace gravel (CL)

PLASTIC PROPERTIES

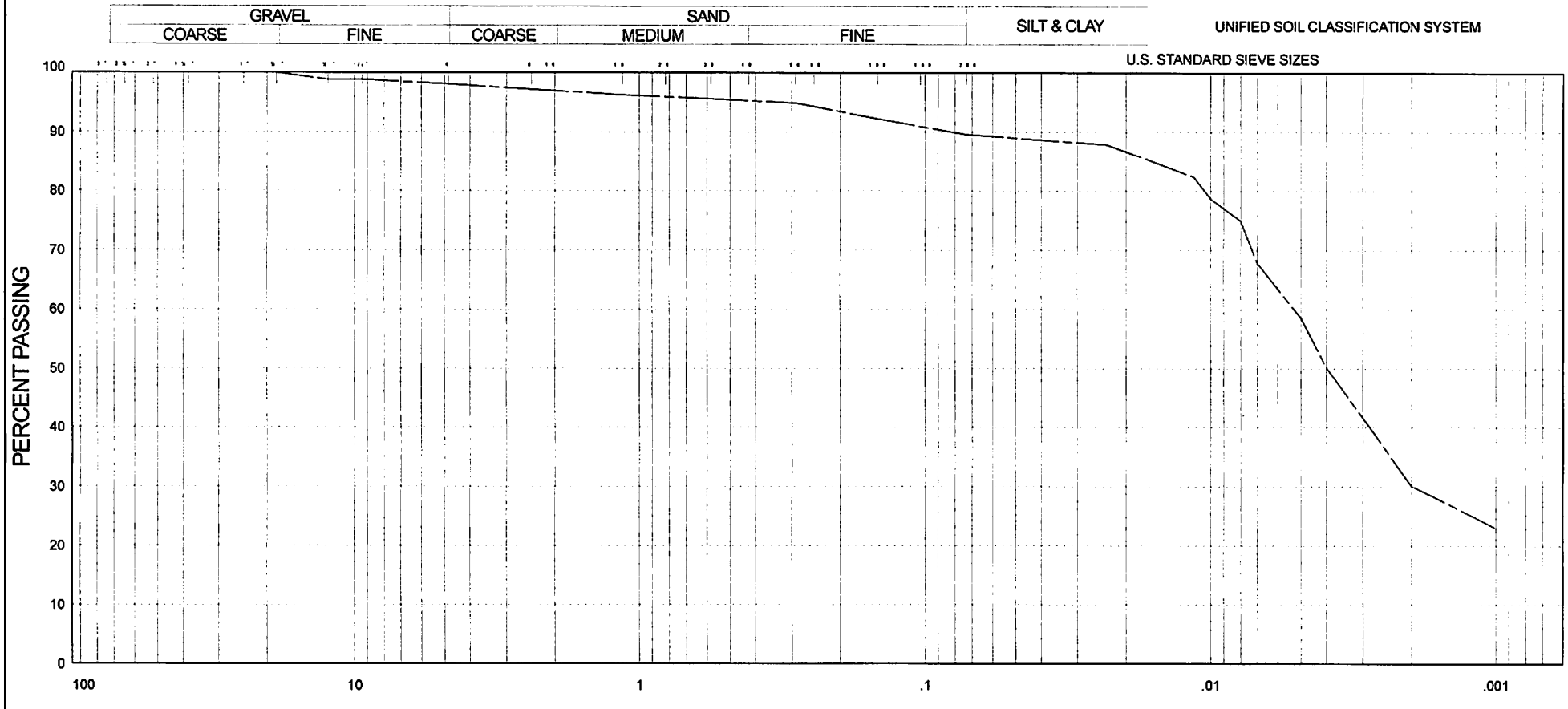
LIQUID LIMIT	% = 29.2
PLASTIC LIMIT	% = 16.8
PLASTICITY INDEX	% = 12.4
MOISTURE CONTENT	% = 13.3

ENCLOSURE N° 14

V. A. WOOD (GUELPH) INCORPORATED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4411-21-5



PROJECT: Grand Valley Employment Lands

LOCATION: Pt. of Lot 32, Con. 1, Grand Valley, ON

BOREHOLE N°: 10

SAMPLE N°: 4

DEPTH: 3.0 - 3.5m±

ELEVATION: 465.7 - 465.2m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

CLAYEY SILT TILL, trace sand, trace gravel (CL)

PLASTIC PROPERTIES

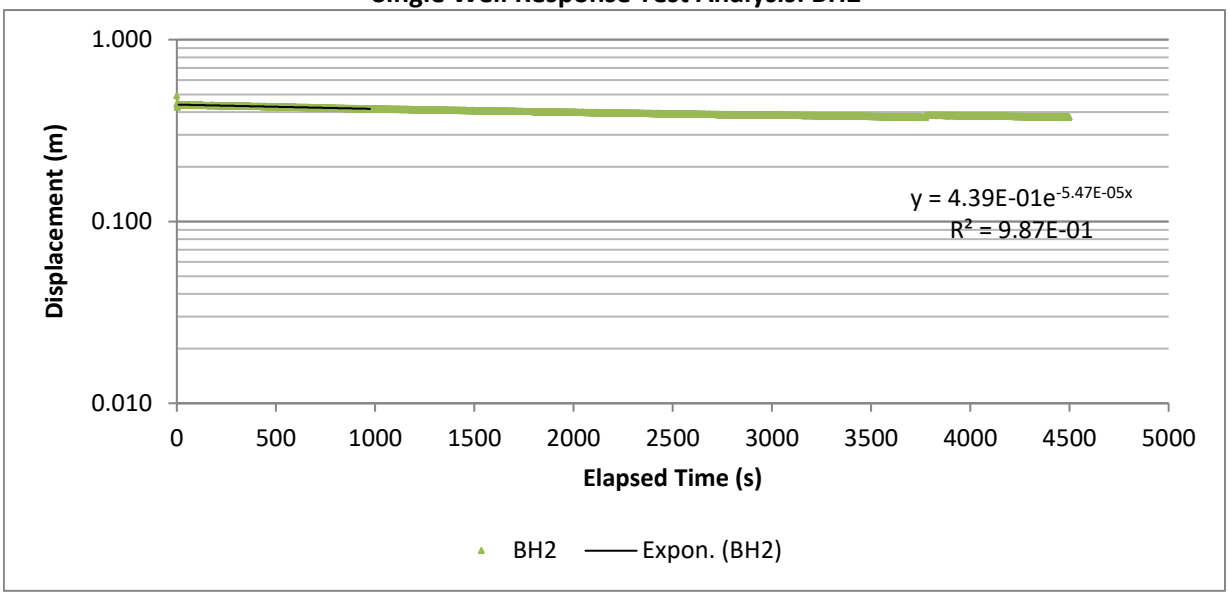
LIQUID LIMIT	% = 24.8
PLASTIC LIMIT	% = 10.4
PLASTICITY INDEX	% = 14.4
MOISTURE CONTENT	% = 19.7

ENCLOSURE N° 15

V. A. WOOD (GUELPH) INCORPORATED

APPENDIX E:
SLUG TEST ANALYSES

Single Well Response Test Analysis: BH2



Bouwer-Rice Analysis

Governing Equation:

$$k = \frac{r_c^2 ln\left(\frac{R_e}{r_w}\right)\left(\frac{1}{t}\right) ln\left(\frac{y_o}{y_t}\right)}{2L}$$

$(1/t)(\ln(y_o/y_t))=$	5.47E-05	(from slope of data)
L =	4.747	(Saturated Length of Screen)
$r_w=$	0.1	(radius of filter pack)
$L/r_w=$	47.5	(ratio)
A =	3.00	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.45	(from shape factor curves in Bouwer and Rice, 1976)
C =	2.6	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.943	(from shape factor equation in Bouwer and Rice, 1976)
D =	4.747	(Saturated Thickness of Geologic Unit)
H =	4.747	(Height of water column above bottom of well)
$r_c=$	0.025	(radius of well casing)
k =	1.1E-08	m/s

Hydraulic Conductivity of Clayey Silt Till is 1.1E-08 m/s

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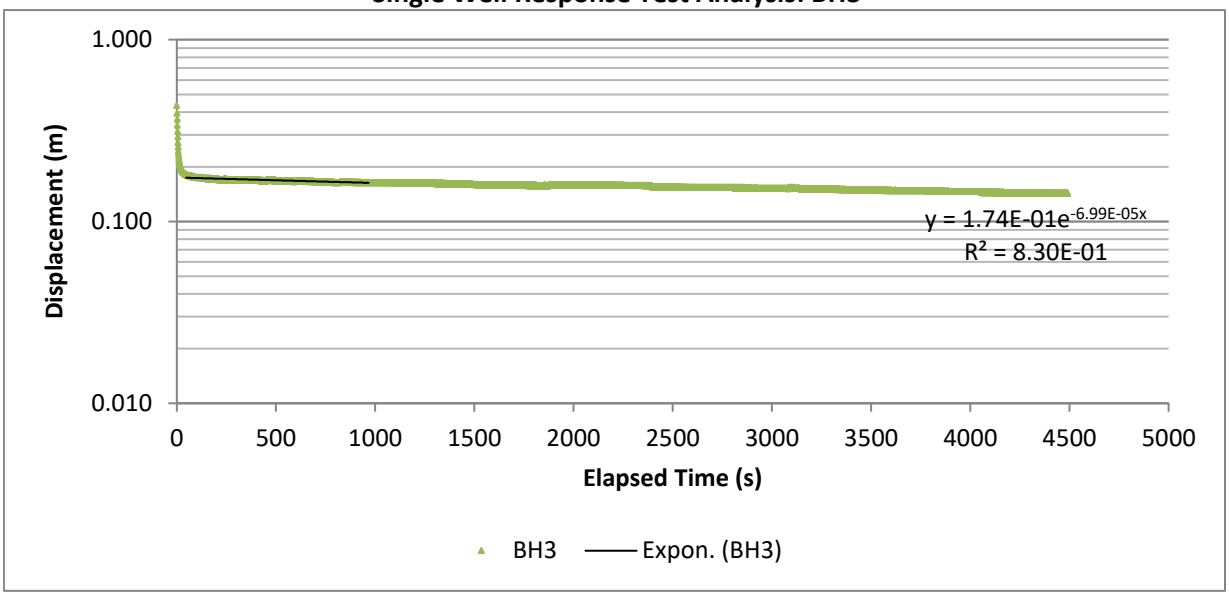
Single Well Response Test Analysis: BH3



Bouwer-Rice Analysis

Governing Equation:

$$k = \frac{r_c^2 ln\left(\frac{R_e}{r_w}\right)\left(\frac{1}{t}\right) ln\left(\frac{y_o}{y_t}\right)}{2L}$$

$(1/t)(\ln(y_o/y_t))=$	6.99E-05	(from slope of data)
L =	2.089	(Saturated Length of Screen)
$r_w=$	0.1	(radius of filter pack)
$L/r_w=$	20.9	(ratio)
A =	2.10	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.25	(from shape factor curves in Bouwer and Rice, 1976)
C =	1.7	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.256	(from shape factor equation in Bouwer and Rice, 1976)
D =	2.089	(Saturated Thickness of Geologic Unit)
H =	2.089	(Height of water column above bottom of well)
$r_c=$	0.059	(effective radius of well casing)
k =	1.3E-07	m/s

Hydraulic Conductivity of Silt and Sand Till is 1.3E-07 m/s

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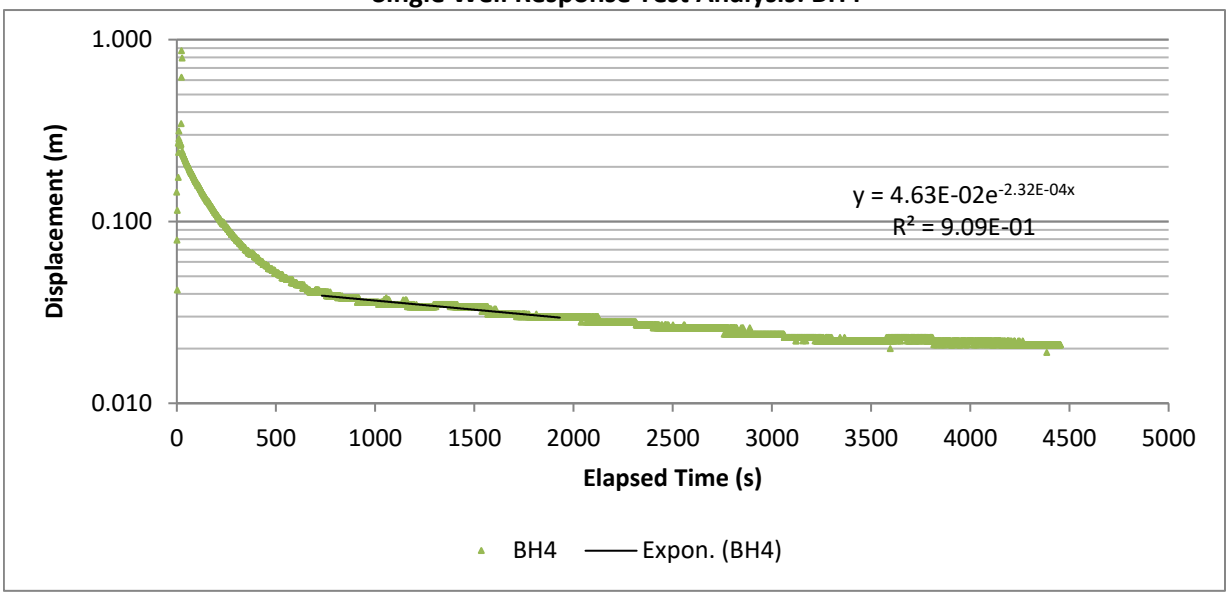
Single Well Response Test Analysis: BH4



Bouwer-Rice Analysis

Governing Equation:

$$k = \frac{r_c^2 ln\left(\frac{R_e}{r_w}\right)\left(\frac{1}{t}\right) ln\left(\frac{y_o}{y_t}\right)}{2L}$$

$(1/t)(\ln(y_o/y_t))=$	2.32E-04	(from slope of data)
L =	3.518	(Saturated Length of Screen)
$r_w=$	0.1	(radius of filter pack)
$L/r_w=$	35.2	(ratio)
A =	2.50	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.7	(from shape factor curves in Bouwer and Rice, 1976)
C =	2.2	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.692	(from shape factor equation in Bouwer and Rice, 1976)
D =	3.518	(Saturated Thickness of Geologic Unit)
H =	3.518	(Height of water column above bottom of well)
$r_c=$	0.059	(effective radius of well casing)
k =	3.1E-07	m/s

Hydraulic Conductivity of Clayey Silt Till is 3.1E-07 m/s

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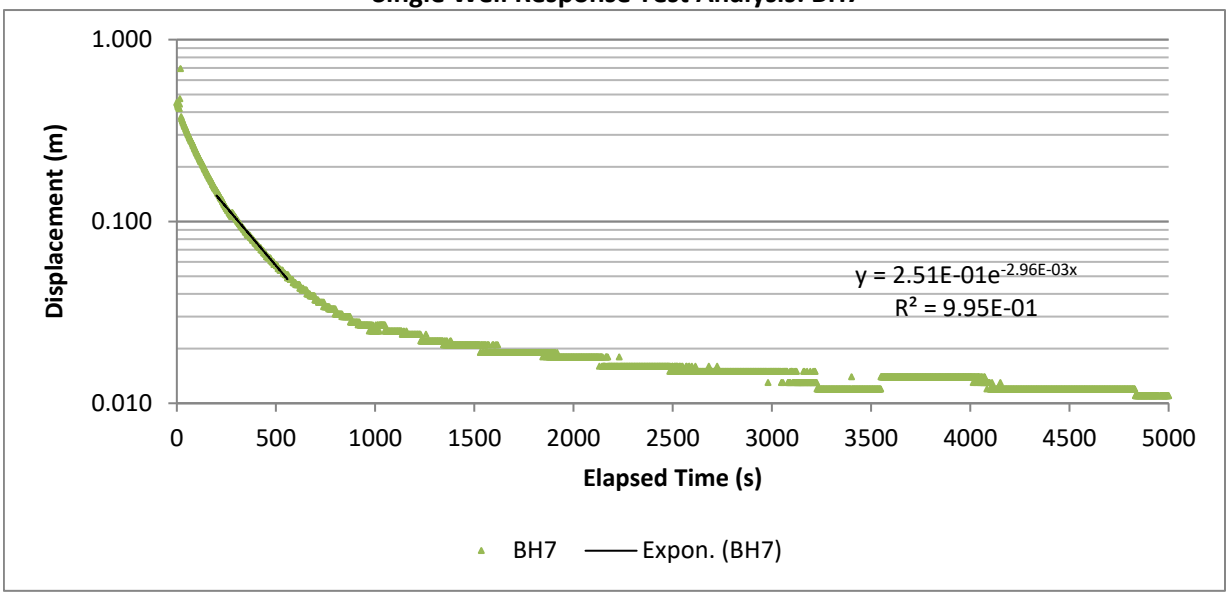
Single Well Response Test Analysis: BH7



Bouwer-Rice Analysis

Governing Equation:

$$k = \frac{r_c^2 ln\left(\frac{R_e}{r_w}\right)\left(\frac{1}{t}\right) ln\left(\frac{y_o}{y_t}\right)}{2L}$$

$(1/t)(\ln(y_o/y_t))=$	2.96E-03	(from slope of data)
L =	4.2	(Saturated Length of Screen)
$r_w=$	0.1	(radius of filter pack)
$L/r_w=$	42.0	(ratio)
A =	2.70	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.45	(from shape factor curves in Bouwer and Rice, 1976)
C =	2.4	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.845	(from shape factor equation in Bouwer and Rice, 1976)
D =	4.2	(Saturated Thickness of Geologic Unit)
H =	4.2	(Height of water column above bottom of well)
$r_c=$	0.059	(effective radius of well casing)
k =	3.5E-06	m/s

Hydraulic Conductivity of Clayey Silt Till is 3.5E-06 m/s

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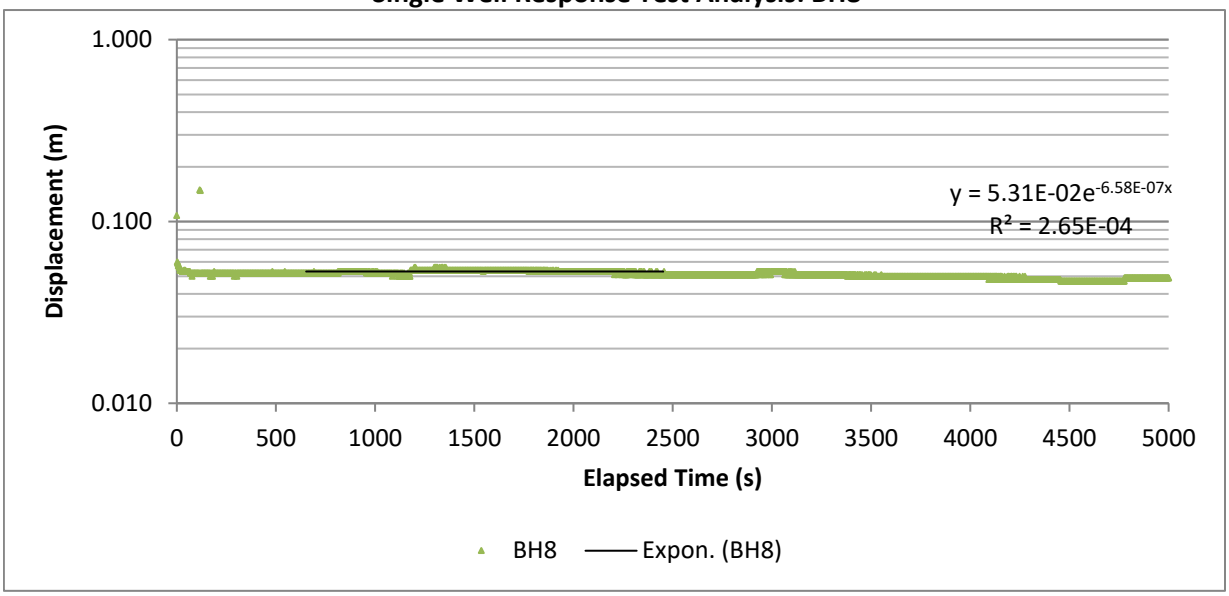
Single Well Response Test Analysis: BH8



Bouwer-Rice Analysis

Governing Equation:

$$k = \frac{r_c^2 ln\left(\frac{R_e}{r_w}\right)\left(\frac{1}{t}\right) ln\left(\frac{y_o}{y_t}\right)}{2L}$$

$(1/t)(\ln(y_o/y_t))=$	6.58E-07	(from slope of data)
L =	1.13	(Saturated Length of Screen)
$r_w=$	0.1	(radius of filter pack)
$L/r_w=$	11.3	(ratio)
A =	1.90	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.25	(from shape factor curves in Bouwer and Rice, 1976)
C =	1.25	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	1.772	(from shape factor equation in Bouwer and Rice, 1976)
D =	1.13	(Saturated Thickness of Geologic Unit)
H =	1.13	(Height of water column above bottom of well)
$r_c=$	0.059	(effective radius of well casing)
k =	1.8E-09	m/s

Hydraulic Conductivity of Clayey Silt Till is 1.8E-09 m/s

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APPENDIX F:
CERTIFICATE OF ANALYSES

Your P.O. #: 117184-1
Your Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your C.O.C. #: 828245-01-01

Attention: Joanna Olesiuk

GM BluePlan Engineering Limited
650 Woodlawn Rd W
Block C, Unit 2
Guelph, ON
CANADA N1K 1B8

Report Date: 2021/07/15
Report #: R6720000
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1J1393
Received: 2021/07/09, 16:21

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	4	N/A	2021/07/13	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	4	N/A	2021/07/13	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	4	N/A	2021/07/13	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	4	N/A	2021/07/13	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2021/07/13	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	4	N/A	2021/07/15	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	4	N/A	2021/07/14	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	4	N/A	2021/07/15		
Anion and Cation Sum	4	N/A	2021/07/15		
Total Ammonia-N	4	N/A	2021/07/13	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2021/07/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2021/07/14	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	4	2021/07/13	2021/07/13	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	4	N/A	2021/07/13	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	4	N/A	2021/07/15		Auto Calc
Sat. pH and Langelier Index (@ 4C)	4	N/A	2021/07/15		Auto Calc
Sulphate by Automated Colourimetry	4	N/A	2021/07/13	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	4	N/A	2021/07/15		Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or

Your P.O. #: 117184-1
Your Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your C.O.C. #: 828245-01-01

Attention: Joanna Olesiuk

GM BluePlan Engineering Limited
650 Woodlawn Rd W
Block C, Unit 2
Guelph, ON
CANADA N1K 1B8

Report Date: 2021/07/15
Report #: R6720000
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1J1393
Received: 2021/07/09, 16:21

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1J1393
Report Date: 2021/07/15

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

RCAP - COMPREHENSIVE (WATER)

BV Labs ID		QBE858	QBE859		QBE860			QBE861		
Sampling Date		2021/07/07 16:00	2021/07/07 15:30		2021/07/07 18:30			2021/07/07 17:30		
COC Number		828245-01-01	828245-01-01		828245-01-01			828245-01-01		
	UNITS	BH8	BH7	RDL	BH3	RDL	QC Batch	BH4	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	5.23	6.89	N/A	8.31	N/A	7455631	6.88	N/A	7455631
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	190	250	1.0	210	1.0	7455629	240	1.0	7455629
Calculated TDS	mg/L	280	370	1.0	420	1.0	7455635	370	1.0	7455635
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.9	1.6	1.0	2.1	1.0	7455629	2.2	1.0	7455629
Cation Sum	me/L	5.20	6.77	N/A	8.53	N/A	7455631	6.90	N/A	7455631
Hardness (CaCO3)	mg/L	220	320	1.0	390	1.0	7455632	320	1.0	7455632
Ion Balance (% Difference)	%	0.290	0.870	N/A	1.35	N/A	7455630	0.170	N/A	7455630
Langelier Index (@ 20C)	N/A	0.544	0.759		0.684		7455633	0.830		7455633
Langelier Index (@ 4C)	N/A	0.295	0.511		0.436		7455634	0.581		7455634
Saturation pH (@ 20C)	N/A	7.48	7.08		7.35		7455633	7.15		7455633
Saturation pH (@ 4C)	N/A	7.73	7.33		7.60		7455634	7.40		7455634
Inorganics										
Total Ammonia-N	mg/L	0.24	<0.050	0.050	0.076	0.050	7457663	0.16	0.050	7457663
Conductivity	umho/cm	490	640	1.0	870	1.0	7458806	640	1.0	7458806
Dissolved Organic Carbon	mg/L	2.8	0.96	0.40	1.3	0.40	7457212	1.0	0.40	7457212
Orthophosphate (P)	mg/L	<0.010	<0.010	0.010	0.056	0.010	7456137	<0.010	0.010	7456137
pH	pH	8.03	7.84		8.04		7458805	7.98		7458805
Dissolved Sulphate (SO4)	mg/L	51	12	1.0	18	1.0	7456142	16	1.0	7456142
Alkalinity (Total as CaCO3)	mg/L	190	250	1.0	210	1.0	7458801	240	1.0	7458801
Dissolved Chloride (Cl-)	mg/L	12	34	1.0	130	2.0	7456139	38	1.0	7456139
Nitrite (N)	mg/L	<0.010	0.011	0.010	<0.010	0.010	7458182	0.019	0.010	7460387
Nitrate (N)	mg/L	0.13	9.73	0.10	<0.10	0.10	7458182	8.08	0.10	7460387
Nitrate + Nitrite (N)	mg/L	0.13	9.74	0.10	<0.10	0.10	7458182	8.10	0.10	7460387
Metals										
Dissolved Aluminum (Al)	ug/L	5.8	<4.9	4.9	8.6	4.9	7457841	6.4	4.9	7457841
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	7457841	<0.50	0.50	7457841
Dissolved Arsenic (As)	ug/L	1.5	<1.0	1.0	<1.0	1.0	7457841	<1.0	1.0	7457841
Dissolved Barium (Ba)	ug/L	64	65	2.0	61	2.0	7457841	70	2.0	7457841
Dissolved Beryllium (Be)	ug/L	<0.40	<0.40	0.40	<0.40	0.40	7457841	<0.40	0.40	7457841
Dissolved Boron (B)	ug/L	55	17	10	55	10	7457841	18	10	7457841
Dissolved Cadmium (Cd)	ug/L	<0.090	<0.090	0.090	<0.090	0.090	7457841	<0.090	0.090	7457841
Dissolved Calcium (Ca)	ug/L	45000	91000	200	61000	200	7457841	80000	200	7457841

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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BV Labs Job #: C1J1393
Report Date: 2021/07/15

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

RCAP - COMPREHENSIVE (WATER)

BV Labs ID		QBE858	QBE859		QBE860			QBE861		
Sampling Date		2021/07/07 16:00	2021/07/07 15:30		2021/07/07 18:30			2021/07/07 17:30		
COC Number		828245-01-01	828245-01-01		828245-01-01			828245-01-01		
	UNITS	BH8	BH7	RDL	BH3	RDL	QC Batch	BH4	RDL	QC Batch
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	7457841	<5.0	5.0	7457841
Dissolved Cobalt (Co)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	7457841	<0.50	0.50	7457841
Dissolved Copper (Cu)	ug/L	1.7	<0.90	0.90	<0.90	0.90	7457841	<0.90	0.90	7457841
Dissolved Iron (Fe)	ug/L	<100	<100	100	<100	100	7457841	<100	100	7457841
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	<0.50	0.50	7457841	<0.50	0.50	7457841
Dissolved Magnesium (Mg)	ug/L	27000	23000	50	58000	50	7457841	28000	50	7457841
Dissolved Manganese (Mn)	ug/L	57	17	2.0	63	2.0	7457841	7.7	2.0	7457841
Dissolved Molybdenum (Mo)	ug/L	8.2	0.78	0.50	19	0.50	7457841	3.3	0.50	7457841
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	2.1	1.0	7457841	<1.0	1.0	7457841
Dissolved Phosphorus (P)	ug/L	<100	<100	100	<100	100	7457841	<100	100	7457841
Dissolved Potassium (K)	ug/L	4000	1000	200	6200	200	7457841	2400	200	7457841
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	2.0	<2.0	2.0	7457841	<2.0	2.0	7457841
Dissolved Silicon (Si)	ug/L	4400	3700	50	4200	50	7457841	5500	50	7457841
Dissolved Silver (Ag)	ug/L	<0.090	<0.090	0.090	<0.090	0.090	7457841	<0.090	0.090	7457841
Dissolved Sodium (Na)	ug/L	15000	7300	100	14000	100	7457841	12000	100	7457841
Dissolved Strontium (Sr)	ug/L	370	250	1.0	240	1.0	7457841	260	1.0	7457841
Dissolved Thallium (Tl)	ug/L	<0.050	<0.050	0.050	<0.050	0.050	7457841	<0.050	0.050	7457841
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	7457841	<5.0	5.0	7457841
Dissolved Uranium (U)	ug/L	2.1	0.66	0.10	0.92	0.10	7457841	1.1	0.10	7457841
Dissolved Vanadium (V)	ug/L	1.9	<0.50	0.50	0.60	0.50	7457841	0.68	0.50	7457841
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	<5.0	5.0	7457841	<5.0	5.0	7457841

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: C1J1393
Report Date: 2021/07/15

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

TEST SUMMARY

BV Labs ID: QBE858
Sample ID: BH8
Matrix: Water

Collected: 2021/07/07
Shipped:
Received: 2021/07/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7458801	N/A	2021/07/13	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7455629	N/A	2021/07/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	7456139	N/A	2021/07/13	Avneet Kour Sudan
Conductivity	AT	7458806	N/A	2021/07/13	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7457212	N/A	2021/07/13	Nimarta Singh
Hardness (calculated as CaCO3)		7455632	N/A	2021/07/15	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7457841	N/A	2021/07/14	Prempal Bhatti
Ion Balance (% Difference)	CALC	7455630	N/A	2021/07/15	Automated Statchk
Anion and Cation Sum	CALC	7455631	N/A	2021/07/15	Automated Statchk
Total Ammonia-N	LACH/NH4	7457663	N/A	2021/07/13	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7458182	N/A	2021/07/13	Chandra Nandlal
pH	AT	7458805	2021/07/13	2021/07/13	Surinder Rai
Orthophosphate	KONE	7456137	N/A	2021/07/13	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7455633	N/A	2021/07/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7455634	N/A	2021/07/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7456142	N/A	2021/07/13	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7455635	N/A	2021/07/15	Automated Statchk

BV Labs ID: QBE859
Sample ID: BH7
Matrix: Water

Collected: 2021/07/07
Shipped:
Received: 2021/07/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7458801	N/A	2021/07/13	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7455629	N/A	2021/07/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	7456139	N/A	2021/07/13	Avneet Kour Sudan
Conductivity	AT	7458806	N/A	2021/07/13	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7457212	N/A	2021/07/13	Nimarta Singh
Hardness (calculated as CaCO3)		7455632	N/A	2021/07/15	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7457841	N/A	2021/07/14	Prempal Bhatti
Ion Balance (% Difference)	CALC	7455630	N/A	2021/07/15	Automated Statchk
Anion and Cation Sum	CALC	7455631	N/A	2021/07/15	Automated Statchk
Total Ammonia-N	LACH/NH4	7457663	N/A	2021/07/13	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7458182	N/A	2021/07/13	Chandra Nandlal
pH	AT	7458805	2021/07/13	2021/07/13	Surinder Rai
Orthophosphate	KONE	7456137	N/A	2021/07/13	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7455633	N/A	2021/07/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7455634	N/A	2021/07/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7456142	N/A	2021/07/13	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7455635	N/A	2021/07/15	Automated Statchk

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BV Labs Job #: C1J1393
Report Date: 2021/07/15

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

TEST SUMMARY

BV Labs ID: QBE860
Sample ID: BH3
Matrix: Water

Collected: 2021/07/07
Shipped:
Received: 2021/07/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7458801	N/A	2021/07/13	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7455629	N/A	2021/07/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	7456139	N/A	2021/07/13	Avneet Kour Sudan
Conductivity	AT	7458806	N/A	2021/07/13	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7457212	N/A	2021/07/13	Nimarta Singh
Hardness (calculated as CaCO3)		7455632	N/A	2021/07/15	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7457841	N/A	2021/07/14	Prempal Bhatti
Ion Balance (% Difference)	CALC	7455630	N/A	2021/07/15	Automated Statchk
Anion and Cation Sum	CALC	7455631	N/A	2021/07/15	Automated Statchk
Total Ammonia-N	LACH/NH4	7457663	N/A	2021/07/13	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7458182	N/A	2021/07/13	Chandra Nandlal
pH	AT	7458805	2021/07/13	2021/07/13	Surinder Rai
Orthophosphate	KONE	7456137	N/A	2021/07/13	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7455633	N/A	2021/07/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7455634	N/A	2021/07/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7456142	N/A	2021/07/13	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7455635	N/A	2021/07/15	Automated Statchk

BV Labs ID: QBE861
Sample ID: BH4
Matrix: Water

Collected: 2021/07/07
Shipped:
Received: 2021/07/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7458801	N/A	2021/07/13	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7455629	N/A	2021/07/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	7456139	N/A	2021/07/13	Avneet Kour Sudan
Conductivity	AT	7458806	N/A	2021/07/13	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7457212	N/A	2021/07/13	Nimarta Singh
Hardness (calculated as CaCO3)		7455632	N/A	2021/07/15	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7457841	N/A	2021/07/14	Prempal Bhatti
Ion Balance (% Difference)	CALC	7455630	N/A	2021/07/15	Automated Statchk
Anion and Cation Sum	CALC	7455631	N/A	2021/07/15	Automated Statchk
Total Ammonia-N	LACH/NH4	7457663	N/A	2021/07/13	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7460387	N/A	2021/07/14	Chandra Nandlal
pH	AT	7458805	2021/07/13	2021/07/13	Surinder Rai
Orthophosphate	KONE	7456137	N/A	2021/07/13	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7455633	N/A	2021/07/15	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7455634	N/A	2021/07/15	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7456142	N/A	2021/07/13	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7455635	N/A	2021/07/15	Automated Statchk

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BV Labs Job #: C1J1393
Report Date: 2021/07/15

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7456137	Orthophosphate (P)	2021/07/13	106	75 - 125	99	80 - 120	<0.010	mg/L	NC	25
7456139	Dissolved Chloride (Cl-)	2021/07/13	NC	80 - 120	101	80 - 120	<1.0	mg/L	1.6	20
7456142	Dissolved Sulphate (SO4)	2021/07/13	102	75 - 125	105	80 - 120	<1.0	mg/L	1.3	20
7457212	Dissolved Organic Carbon	2021/07/13	95	80 - 120	98	80 - 120	<0.40	mg/L	4.3	20
7457663	Total Ammonia-N	2021/07/13	99	75 - 125	101	80 - 120	<0.050	mg/L	1.8	20
7457841	Dissolved Aluminum (Al)	2021/07/14	104	80 - 120	98	80 - 120	<4.9	ug/L		
7457841	Dissolved Antimony (Sb)	2021/07/14	110	80 - 120	101	80 - 120	<0.50	ug/L	NC	20
7457841	Dissolved Arsenic (As)	2021/07/14	103	80 - 120	99	80 - 120	<1.0	ug/L	6.6	20
7457841	Dissolved Barium (Ba)	2021/07/14	105	80 - 120	99	80 - 120	<2.0	ug/L	1.6	20
7457841	Dissolved Beryllium (Be)	2021/07/14	107	80 - 120	100	80 - 120	<0.40	ug/L	NC	20
7457841	Dissolved Boron (B)	2021/07/14	101	80 - 120	97	80 - 120	<10	ug/L	1.4	20
7457841	Dissolved Cadmium (Cd)	2021/07/14	105	80 - 120	98	80 - 120	<0.090	ug/L	NC	20
7457841	Dissolved Calcium (Ca)	2021/07/14	NC	80 - 120	101	80 - 120	<200	ug/L		
7457841	Dissolved Chromium (Cr)	2021/07/14	103	80 - 120	98	80 - 120	<5.0	ug/L	NC	20
7457841	Dissolved Cobalt (Co)	2021/07/14	105	80 - 120	100	80 - 120	<0.50	ug/L	4.9	20
7457841	Dissolved Copper (Cu)	2021/07/14	105	80 - 120	99	80 - 120	<0.90	ug/L	0.53	20
7457841	Dissolved Iron (Fe)	2021/07/14	102	80 - 120	97	80 - 120	<100	ug/L		
7457841	Dissolved Lead (Pb)	2021/07/14	102	80 - 120	96	80 - 120	<0.50	ug/L	NC	20
7457841	Dissolved Magnesium (Mg)	2021/07/14	NC	80 - 120	100	80 - 120	<50	ug/L		
7457841	Dissolved Manganese (Mn)	2021/07/14	NC	80 - 120	96	80 - 120	<2.0	ug/L		
7457841	Dissolved Molybdenum (Mo)	2021/07/14	112	80 - 120	101	80 - 120	<0.50	ug/L	4.8	20
7457841	Dissolved Nickel (Ni)	2021/07/14	96	80 - 120	95	80 - 120	<1.0	ug/L	6.7	20
7457841	Dissolved Phosphorus (P)	2021/07/14	118	80 - 120	111	80 - 120	<100	ug/L		
7457841	Dissolved Potassium (K)	2021/07/14	105	80 - 120	99	80 - 120	<200	ug/L		
7457841	Dissolved Selenium (Se)	2021/07/14	109	80 - 120	103	80 - 120	<2.0	ug/L	NC	20
7457841	Dissolved Silicon (Si)	2021/07/14	111	80 - 120	104	80 - 120	<50	ug/L		
7457841	Dissolved Silver (Ag)	2021/07/14	71 (1)	80 - 120	97	80 - 120	<0.090	ug/L	NC	20
7457841	Dissolved Sodium (Na)	2021/07/14	NC	80 - 120	98	80 - 120	<100	ug/L	1.9	20
7457841	Dissolved Strontium (Sr)	2021/07/14	NC	80 - 120	94	80 - 120	<1.0	ug/L		
7457841	Dissolved Thallium (Tl)	2021/07/14	105	80 - 120	97	80 - 120	<0.050	ug/L	NC	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7457841	Dissolved Titanium (Ti)	2021/07/14	108	80 - 120	102	80 - 120	<5.0	ug/L		
7457841	Dissolved Uranium (U)	2021/07/14	105	80 - 120	97	80 - 120	<0.10	ug/L	0.45	20
7457841	Dissolved Vanadium (V)	2021/07/14	100	80 - 120	95	80 - 120	<0.50	ug/L	14	20
7457841	Dissolved Zinc (Zn)	2021/07/14	102	80 - 120	100	80 - 120	<5.0	ug/L	NC	20
7458182	Nitrate (N)	2021/07/13	102	80 - 120	99	80 - 120	<0.10	mg/L	NC	20
7458182	Nitrite (N)	2021/07/13	108	80 - 120	104	80 - 120	<0.010	mg/L	NC	20
7458801	Alkalinity (Total as CaCO3)	2021/07/13			97	85 - 115	<1.0	mg/L	0.078	20
7458805	pH	2021/07/13			102	98 - 103			0.028	N/A
7458806	Conductivity	2021/07/13			102	85 - 115	<1.0	umho/cm	0	25
7460387	Nitrate (N)	2021/07/14	102	80 - 120	100	80 - 120	<0.10	mg/L	NC	20
7460387	Nitrite (N)	2021/07/14	108	80 - 120	104	80 - 120	<0.010	mg/L	NC	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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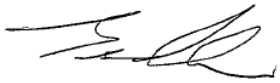
GM BluePlan Engineering Limited
Client Project #: 117184-1
Site Location: GRAND VALLEY / EMPLOYMENT LANDS
Your P.O. #: 117184-1
Sampler Initials: JO

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

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BOD

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#1067 GM BluePlan Engineering Limited	Company Name:		Quotation #:	B47865	BV Labs Job #:	Bottle Order #:
Attention:	Joe Rotondi	Attention:	Joanna Olesiuk	P.O. #:	117124-1		828245
Address:	650 Woodlawn Rd W Block C, Unit 2 Guelph ON N1K 1B8	Address:		Project:	Employment Lands	COC #:	Project Manager:
Tel:	(519) 824-8150 Fax: (519) 824-8089	Tel:	(519) 824-8150 Ext: 253 Fax:	Project Name:	Grand valley	C#828245-01-01	Ashton Gibson
Email:	joe.rotondi@gmblueplan.ca, info@gmblueplan.ca	Email:	joanna.olesiuk@gmblueplan.ca, cory.young@gmbluepla	Site #:	117184-1		
				Sampled By:	J.O.		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): O Reg 153 VOCs by HS (Soil)	RCAP comp								# of Bottles	Comments
1		BH8	21/07/07	16:00	GW	Yes		V								5	
2		BH7	"	15:30	"	Yes		V								"	
3		BH3	"	18:30	"	Yes		V								"	
4		BH4	"	17:30	"	Yes		V								"	
5																	
6																	
7																	
8																	
9																	
10																	

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

09-Jul-21 16:21
Ashton Gibson
C1J1393
ATM ENV-1325

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only				
Joanna Olesiuk	21/07/07	10:00	[illegible]	21/07/09	16:21		Time Sensitive	Temperature (°C) on Recei 4/6/4	Custody Seal	Yes	No
									Present	✓	
									Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

APPENDIX G:
CONSTRUCTION DEWATERING ESTIMATES

Hydrogeological Calculations for Dewatering Estimates

Project: Grand Valley Employment Lands

Project Number: 117184-1 **Engineer/Technician:** MRL

Description of Project: Subdivision Servicing and Stormwater Management Pond

Description of Conceptual Model for Dewatering Estimation:

1) Servicing
Unconfined Flow to Trench

Length of trench = 30 m
Width of trench = 2.5 m
Static Groundwater Level = 0.0 mbgs
Target Groundwater Level = 3.5 mbgs
Drawdown = 3.5 mbgs
"Base" of System = Static GWL + 1.5*Drawdown
= 0 + 1.5*3.5 mbgs = 5.3 mbgs
Typical Initial height of water column (H) = 5.3 mbgs
Target height of water column (h) = 1.7 mbgs
Hydraulic Conductivity (k) = $3.5x10^{-6}$ m/s (clayey silt till)

2) SWM Pond "A"
Unconfined Flow to One-Sided Trench

Static Groundwater Level = 1.0 mbgs
Target Groundwater Level = 5.7 mbgs
Drawdown = 4.7 mbgs
"Base" of System = Static GWL + 1.5*Drawdown
= 1.0 + 1.5*4.7 mbgs = 8.1 mbgs
Typical Initial height of water column (H) = 7.1 mbgs
Target height of water column (h) = 2.4 mbgs
Hydraulic Conductivity (k) = $3.5x10^{-6}$ m/s (clayey silt till)

3) SWM Pond "B"
Unconfined Flow to Equivalent Well

Static Groundwater Level = 0.0 mbgs
Target Groundwater Level = 1.0 mbgs
Drawdown = 1.0 mbgs
"Base" of System = Static GWL + 1.5*Drawdown
= 0.0 + 1.5*1.0 mbgs = 1.5 mbgs
Typical Initial height of water column (H) = 1.5 mbgs
Target height of water column (h) = 0.5 mbgs

Hydrogeological Calculations for Dewatering Estimates

Project: Grand Valley Employment Lands
Project Number: 117184-1 **Engineer/Technician:** MRL

1) SERVICING

Radius of Influence

Sichart (Unconfined)

$$R_o = 3000(H - h)\sqrt{k}$$

R_0 =	20.2	m (Radius of Influence)
H=	5.3	m (Initial Head)
h=	1.7	m (Head at Drawdown)
k=	3.50E-06	m/s (Hydraulic Conductivity)

Flow Estimate

Aquifer Type: Unconfined (Water Table)

Calculation Approach: Flow to Finite Trench

Governing Equation:

$$Q = \pi k \frac{(H^2 - h^2)}{ln\frac{R_o}{r_w}} + xk\frac{(H^2 - h^2)}{L}$$

Q=	11,315	L/d (Dewatering Flow)
x=	30	m (Length of Trench)
k=	3.50E-06	m/s (Hydraulic Conductivity)
H=	5.3	m (Initial Head)
h=	1.7	m (Head at Drawdown)
L=	20.2	m (Distance to "Source")
R_0 =	20.2	m (Radius of Influence)
r_w=	1.25	m (Radius of Well or System)

1)

Hydrogeological Calculations for Dewatering Estimates

Project: Grand Valley Employment Lands
Project Number: 117184-1 **Engineer/Technician:** MRL

2) SWM POND "A"
Radius of Influence
Sichart (Unconfined)

$$R_o = 3000(H - h)\sqrt{k}$$

R_0 =	26.4	m (Radius of Influence)
H=	7.1	m (Initial Head)
h=	2.4	m (Head at Drawdown)
k=	3.50E-06	m/s (Hydraulic Conductivity)

Aquifer Type: Unconfined (Water Table)
Calculation Approach: Flow to One-Sided Trench (chosen because the location is situated on a slope)
Governing Equation:

$$Q = xk\frac{(H^2 - h^2)}{2L}$$

Q=	179,151	L/d (Dewatering Flow)
x=	350	m (Length of Trench)
k=	3.50E-06	m/s (Hydraulic Conductivity)
H=	7.1	m (Initial Head)
h=	2.4	m (Head at Drawdown)
L=	13.2	m (Distance to "Source")

2)

Hydrogeological Calculations for Dewatering Estimates

Project: Grand Valley Employment Lands
Project Number: 117184-1 **Engineer/Technician:** MRL

3) SWM POND "B"

Radius of Influence

Sichart (Unconfined)

$$R_o = 3000(H - h)\sqrt{k}$$

R_0 =	2.8	m (Radius of Influence)
H=	1.5	m (Initial Head)
h=	1	m (Head at Drawdown)
k=	3.50E-06	m/s (Hydraulic Conductivity)

Aquifer Type: Unconfined (Water Table)

Calculation Approach: Flow to Well

Governing Equation:

$$Q = \pi k \frac{(H^2 - h^2)}{ln\frac{R_o}{r_w}}$$

Q=	8,498	L/d (Dewatering Flow)	3)
k=	3.50E-06	m/s (Hydraulic Conductivity)	
H=	1.5	m (Initial Head)	
h=	1	m (Head at Drawdown)	
R_0 =	21.5	m (Radius of Influence)	
r_w=	18.7	m (Radius of Well or System, based on equivalent area)	

SUMMARY

Estimated Typical Dewatering Flow =	12,000 L/d	Rounded	1)
Estimated Maximum Dewatering Flow =	199,000 L/d	Rounded	1)+2)+3)

GM BluePlan Engineering Ltd.
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
650 Woodlawn Rd. W. Block C, Unit 2, Guelph, ON N1K 1B8
www.GMBluePlan.ca

APPENDIX H:
WELL SURVEY PACKAGE

July 6, 2021
Our File: 117184

Re: Door-to-Door Water Well Survey: Part of Lot 32, Concession 1, Township of East Luther

Dear Well Owner or Resident,

On behalf of Thomasfield Homes Ltd., GM BluePlan Engineering (GM BluePlan) are requesting your cooperation in completing the attached survey regarding your private water supply. This information is being requested in order to support the municipal approvals process for a proposed development of an employment area located within Part of Lot 32, Concession 1 in the Geographic Township of East Luther (the Site). The proposed development will be municipally serviced for water and sewage and will include a stormwater management facility.

The purpose of the well survey is to collect data on the existence and usage of private water wells in the vicinity of the proposed project Site. The information received will be reviewed as part of a larger hydrogeological assessment which will provide recommendations for groundwater monitoring and protection of groundwater supply during construction, as applicable. At this time, we would greatly appreciate your assistance in the program so that we can more accurately determine the extent and locations of groundwater usage near the project Site.

Information obtained from this local well survey is requested to assess the potential for the proposed development to influence the water quality in nearby water supply wells. We ask that you please complete the enclosed form, to the best of your knowledge, and return it to GM BluePlan using the self-addressed and postage-paid envelope enclosed. If you would prefer to email your response, please do so to matt.long@gmblueplan.ca. We would appreciate if the enclosed questionnaire form is completed and returned to us by **July 31, 2021**.

Personal information collected through this process will only be used by GM BluePlan for the assessment purposes stated above and may involve submission to municipalities (e.g. the County of Dufferin, Town of Grand Valley) or regulators (e.g. Ministry of the Environment, Conservation and Parks) for their review. Received questionnaires may be included as part of the required submissions to approval agencies but will be redacted to obscure the well owner's name, email address, and phone number (physical addresses will remain for the purposes of establishing well locations). By providing us with your personal information for the purposes listed above, you consent to our collection, use, and disclosure of the information or the above-mentioned purposes only. We will not collect, use, or disclose your personal information for any other purpose without your consent. You may refuse or withdraw your consent at any time by contacting the undersigned.

On behalf of Thomasfield Homes Ltd., we thank you for your time and co-operation. If you have any questions, please contact us by e-mail (matt.long@gmblueplan.ca) or by phone at 519-824-8150.

Sincerely,
GM BLUEPLAN ENGINEERING LIMITED
Per:

Matthew Long, M.Eng., P.Eng.

WELL USE QUESTIONNAIRE

Project: Employment Lands
Part of Lot 32, Concession 1, Geographic Township of East Luther

Please complete these sections to the best of your ability and return to:
Matthew Long, P.Eng., matt.long@gmblueplan.ca (mailing address at bottom)

User Information

Name of Well Owner: _____
Phone Number of Well Owner: _____
Lot/Concession: _____
Fire Number (if applicable): _____
Lived at this location since (YYYY/MM): _____/____.

Well Usage

Do you use your well? Yes ☐ No ☐
…for drinking water? Yes ☐ No ☐
…for other purposes? (please list) _____

Has your well ever run dry? Yes ☐ No ☐
If so, please describe when and/or how: _____

Water Quality

Has your well water ever been tested for quality? Yes ☐ No ☐
If yes, when/how often? _____
Were any water quality problems identified? Yes ☐ No ☐
If yes, please describe them: _____

Please describe the following aspects of your well water:
Appearance (colour, clarity) _____
Odour _____
Taste _____
Staining on Fixtures (colour, texture) _____

(CONTINUED ON REVERSE)

Well Construction Details

Type of Well: ☐ Dug or ☐ Drilled
☐ Bedrock or ☐ Overburden

Depth to Water: _____ Depth to Bottom: _____

Well Diameter: _____ Casing Material: _____

Screen Depth: _____ Screen Length: _____

Elevation (m): _____ Casing Stickup (m) _____

UTM Coordinate (N): _____ UTM Coordinate (E): _____

Company Name/Date Drilled: _____

Visible Condition of Well: _____

Please provide a sketch of general well location here:

Well and Water Equipment

No pump ☐
Submersible pump ☐
Jet (shallow) pump ☐
Jet (deep) pump ☐
Piston pump ☐
Other type of pump: _____

Depth of Pump Intake: _____
Pumping Rate (gpm): _____
Storage Tank ☐ Size (gal): _____
Pressure Tank ☐ Size (gal): _____
Disinfection Unit ☐ Type: _____
Filter Unit ☐ Type: _____
Other Treatment: _____

Do you have a tap/faucet that is located before any/all treatment units? (i.e. produces raw water) Yes ☐ No ☐

Other Comments _____