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Hydrogeological Study for Residential Development at 1166, 1170, 1182, 1190, 1200, and 1204 Gordon Street, Guelph, ON

GMBP File: 121139

April 2023
Revision 02

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HYDROGEOLOGICAL STUDY FOR RESIDENTIAL DEVELOPMENT AT

1166, 1170, 1182, 1190, 1200 AND 1204 GORDON STREET, GUELPH, ON

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1. INTRODUCTION

GSD Development and Management Inc. (the Client) has retained GM BluePlan Engineering Limited (GMBP) to perform a hydrogeological study to support a proposal for zone change approval for a property comprising civic addresses 1166, 1170, 1182, 1190, 1200 and 1204 Gordon Street, Guelph, Ontario. The subject property (the Site) is approximately 1.27 hectares in size and is located in the southern portion of the City of Guelph (see Figure 1). The Site is also described as Part of Lot 5, Concession 8, Geographical Township of Puslinch.

The Site is currently under low-density residential land use. Each of the lots is developed with a single-detached residential house. At the time of writing, the zone change approval is understood to be associated with the consolidation of the residential lots and the proposed redevelopment consisting of three blocks of townhouses and two 6-storey apartment buildings with an associated parking lot. The proposed development is to be serviced by municipal water and sewer.

The following report presents the findings of the hydrogeological study, which gathered data from existing sources and project-specific site investigation to assess the potential for impacts that the proposed development may have on the local hydrogeological system and nearby receptors.

1.1 Purpose and Scope

The purpose of this study is to support the development process by providing hydrogeological information and assessments to satisfy the needs of the project, including those requested by the City of Guelph via pre-consultation, and those that will assist in the completion of other aspects of the project.

Objectives of this study are as follows:

- Identify seasonal groundwater levels;
- Characterize the hydrostratigraphy (i.e., geological materials) of the site;
- Assess the proposed development in its physical setting and regulatory context for potential impacts and for applicability in accordance with the Source Water Protection Policies in affect.

The following is brief outline of the scope of work that was undertaken to meet the objectives.

- Complete a desktop study including review of geological, topographic and physiographic maps; and sourcewater protection documentation
- Field investigation, including
    - Inspection of Site to visually assess drainage and surface water features.
    - Arranging a driller contractor to advance up to 5 boreholes on the property, each to a depth of approximately 6 m, and each including the installation of a monitoring well.
    - Observation, characterization and sampling of soil and groundwater conditions during drilling, and the preparation of borehole and monitoring well logs.

  - The installation of five datalogging pressure transducers to collect a continuous record of groundwater level data for a period of at least 12 months.
  - Collection and analysis of groundwater samples.
- Assessment, including:
  - Potential hydrogeological impacts concerning sourcewater protection, and ecological receptors.
  - Preliminary construction dewatering assessment.

A more detailed description of fieldwork activities is provided in Section 3.1 (Methodology).

2. BACKGROUND

For the purposes of this report, the term “north” shall be taken to mean the direction along Gordon Street toward Stone Road. The directions “west”, “east” and “south” are to be understood relative to “north” as defined above.

2.1 Site Location and Setting

The Site is situated in the southern portion of the City of Guelph at the civic addresses 1166, 1170, 1182, 1190, 1200, and 1204 Gordon Street, Guelph, and is located in Lot 5, Concession 8, Geographic Township of Puslinch. The Site is bounded by residential developments on the north and south sides, to the east by Landsdown Drive, and on the west side by Gordon Street. At the time of writing, the Site is occupied by six single-detached residences.

Figure 2 shows an aerial photograph of the Site (approximate boundaries marked) and nearby lands.

2.2 Proposed Development

The Client proposes to redevelop the Site for residential land use with increased density. The preliminary plans for the proposed development include:

- Two residential buildings featuring six (6) floors of apartments and one (1) level of underground parking garage
- Three (3) blocks of townhouses
- Surface parking areas

The development is proposed to utilize municipal (i.e., City of Guelph) water and sewage services. A preliminary conceptual plan is including in Appendix A.

2.3 Local Relief and Hydrology

The Site has low to moderate topographical relief: the topographic data available on the GRCA online interactive mapping tool indicates that ground elevation is lowest along the western boundary of the Site (i.e., the portion adjacent to Gordon Street). Elevations on-Site range from 344 masl to 341 masl. The slope of Gordon Street descends in the southerly direction but the topography across the north-south axis of the Site is relatively level. Because of this, the southern part of the Site (i.e., 1200 and 1204 Gordon Street) has greater topographic relief above, and a steeper slope toward, Gordon Street while the relief is less pronounced for the northern part of the Site.

The Site lies within the Hanlon Creek subcatchment (GRCA 2017). Based on the relative location of the Site within this subcatchment, this indicates general hydrological drainage toward the west.

The Site is surrounded by developed areas and so the primary surface drainage pathways near the Site are engineered facilities such as storm drains and roadway gutters located along Gordon Street.

The hydraulic gradient maps prepared by the Grand River Conservation Authority indicate that the Site lies within an area exhibiting a “downward” or “recharge” gradient (GRCA 2000). The estimated annual amount of groundwater recharge that occurs on-Site is approximately 122 mm/yr (GRCA 2021b): values of this magnitude in the Guelph area are typically indicative of coarse sediments associated with glaciofluvial deposits, or with hummocky till deposits with a large proportion of closed depressions.

2.4 Geology and Physiography

Geologically, the Site is located in the physiographic region known as the “Guelph Drumlin Field”, which is centred on the City of Guelph (Chapman and Putnam, 1984). The local soils in this area consist of stony tills and deep gravel terraces typical of drumlins and melt water spillways (Chapman and Putnam, 1984). Please refer to Figure 3a for a map showing the local physiography.

In terms of physiographic landforms, mapping from the Ontario Geological Survey (Chapman and Putnam 2007) indicates the Site is located on a drumlin landform and is located on higher ground in relation to the adjacent lands to the east and west of the Site – these low-lying areas are designated as glacial meltwater spillways. Figure 3b shows the physiographic landforms present in the vicinity of the Site.

Surficial geological mapping (Ontario Geological Survey 2010) indicates that the Site and areas to the north and south are underlain by the sandy silt till of the Wentworth Till deposit. Areas to the east and south of the Site appear to be underlain by lacustrine, kame, and outwash deposits. The land further west of the Site (i.e., the open green space) is reportedly underlain by swamp and bog deposits. Based on three available MECP well records attributed to the Site itself (MECP Well ID: 6702561, 6702562, 6702557), overburden deposits reportedly consist of clay and stones (i.e., till), overlying grey/brown limestone bedrock. In one of the wells on-site (MECP Well ID: 6702557), a deeper layer of gravel was encountered underlying the till and overlying the bedrock. The well records attributed to the Site are included in Appendix B and are illustrated in Figure 5. Figure 4 shows the reported distribution of surficial materials at the Site and surrounding lands.

Bedrock in the vicinity of the Site is of the Guelph Formation, which is a sedimentary formation composed of limestone, dolostone, sandstone and siltstone. Based on the water well records attributed to the Site (i.e., MECP Well ID: 6702561, 6702562, 6702557), the subcrop of the Guelph Formation below the Site ranges from 20 to 23 metres below ground surface (mbgs).

2.5 Local Use of Groundwater and Sourcewater Protection

A search of the MECP Water Well Information System (MECP 2022) was conducted to gather records for water wells associated with on-Site and off-Site lands within 500 m of the Site. Figure 5 provides a map of the search area and identifies the water well records found within the search radius. A total of 122 water well records were obtained through the search and some of the available details from the records are summarized in Table 1.

Of the records identified, eight (8) were attributed to the Site, and their details are as follows:

- Three (3) domestic water supply well records
    - MECP Well IDs: 6702557, 6702561, 6702562
- Five (5) monitoring well records
    - MECP Well IDs: 7407906, 7407907, 7407908, 7407909, 7407910
    - These are the monitoring wells drilled as part of this hydrogeological investigation

The 114 well records identified off-site are described as:

- 37 domestic water supply records
- 2 commercial water supply records
- 50 abandonment records

- 7 not used well records
- 15 monitoring well records
- 1 dewatering well record
- 2 records of wells of unknown usage

The City of Guelph municipal water supply draws primarily from a network of groundwater wells. The nearest municipal well to the Site is the Burke Well, approximately 790 m to the northeast.

Due to the extent of the municipal water well network, essentially the entire City of Guelph is designated under the *Clean Water Act* (2006) Source Protection Plans as a Wellhead Protection Area (WHPA) of one level or another. Based on Source Protection Plan information available from the GRCA (2022, also see Appendix C), the Site lies:

- Within a WHPA-C
    - Most of the Site area carries vulnerability score of 6
    - A small portion of 1204 Gordon Street overlaps with vulnerability score 4

The Site does not intersect a surface water Intake Protection Zone (IPZ), an area of Groundwater Under the Direct Influence of Surface Water (GUDI), a significant groundwater recharge area, nor an Issue Contributing Area (ICA).

These designations under the Sourcewater Protection Plans 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.

3. FIELD INVESTIGATION

Site-specific information regarding soil stratigraphy and groundwater conditions was collected through a field investigation that was conducted by GM BluePlan in January 2022.

3.1 Methodology

The field investigation involved the following parts:

- Subsurface investigation which involved the advancement of five (5) boreholes.
- Installation of one monitoring well in each borehole.
- Measurement of groundwater levels, and topographic survey to obtain elevation data.
- Water quality sampling and analyses to characterize the shallow overburden groundwater quality.
- Complete single-well response testing at two monitoring wells to estimate the hydraulic conductivity of the soil
- Collection of groundwater samples for groundwater quality analysis.

Groundwater levels in the monitoring wells were measured to geodetic datum by surveying the top-of-casing and ground elevations of the monitoring wells and then measuring the depth to water using an electric water level tape manufactured by Solinst. Additional groundwater level measurements are scheduled on a quarterly basis.

Groundwater samples were collected from the each well in which water was observed following industry-accepted practices. Each well was first developed by purging at least three well-volumes of water or until dry, whichever occurred first. A dedicated bailer or Waterra tube inertial pump was used to withdraw water from the monitoring well for purging and for sample collection. Samples were then collected into laboratory-supplied bottles appropriate to the planned analyses. These sample bottles were then submitted to a laboratory accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL) for “RCAP”

analysis, which is a suite of analyses for various parameters including metals, inorganics, and nutrients. The Certificates of Analysis of these samples are provided in Appendix D.

3.2 Subsurface Investigation

On January 4 and 5, 2022, a total of five (5) boreholes were advanced, each equipped with a monitoring well installed by a licensed well drilling contractor (Aardvark Drilling Inc.). GMBP attended the site alongside Aardvark Drilling to supervise the drilling activities and document the encountered stratigraphy. All five boreholes were advanced to a depth of 6.1 mbgs; and during drilling, soil samples were retrieved by a split spoon sampler advanced by Standard Penetration Testing (SPT). The monitoring wells were constructed with 38 mm diameter PVC monitoring wells comprising of a 3 m long screen backfilled with well gravel and sealed with bentonite.

The soils encountered during the drilling options were generally soft to firm to depths of about 1.53 mbgs to 2.29 mbgs. and then stiff to very hard at greater depths.

Generally, the soils encountered were similar in all five boreholes and can be described as such:

- Topsoil ranging from 0.15 m to 0.61 m thick, overlying
- Silty Sand to Sandy Silt Till

Stratigraphic records and details of monitoring well construction is provided in the borehole logs in Appendix E. The layout of the monitoring well is provided in Figure 5.

The Silty Sand to Sandy Silt till layer was encountered in all five (5) boreholes and can be described as stiff to very hard, with some gravel and clay content. The till encountered was generally dry, however, wet material was encountered in BH-1 beginning at a depth of 5.34 mbgs.

3.3 Groundwater Levels

GM BluePlan visited the Site on January 25, 2022 to collect groundwater level measurements from the five monitoring wells on-Site. Figure 6 shoes the interpreted groundwater contour plan based the groundwater level observations.

The groundwater measurements are summarized in Table 2 and Figure 6 provides the interpreted groundwater level contours. The highest groundwater level was observed at MW -3, where the ground surface elevation is highest at the Site. There appears to be a hydrogeologic divide on-Site where groundwater north of MW-3 flows towards the west-northwest; and groundwater south of MW-3 flows towards the south. It is likely the groundwater flow regime within the till is being influenced by the local topography.

Water level data loggers were installed in all five monitoring wells (MW-1 to MW-5) to collect groundwater level measurements more frequently. A topographic survey was also completed on the monitoring well to translate the data recovered by the dataloggers into actual elevations (i.e., masl). The groundwater level data was collected beginning January 25, 2022, through to January 26, 2023.

Chart 1 through 5 provides hydrographs of the datalogger data collected from MW-1 to MW-5.

From the data collected, the following observations have been made regarding the trends in groundwater level:

- The groundwater level was observed to be highest during the spring months, drops through the summer and remains low during the fall and early winter. The water level was then observed to rise in the late winter.
- Throughout the monitoring period, the seasonal high groundwater level was observed to be 343.84 masl - observed in March 2022 at MW-3.

3.4 Single-Well Response Testing

On October 19, 2022, GMBP staff attended the Site to conduct single-well responses tests on monitoring wells MW-3 and MW-4 (which at the time, were the only wells on-site that contained sufficient water column to complete said tests). Both monitoring wells were completely screened within the Silty Sand / Sandy Silt Till.

A single well response test involves the measurement of the change in water level in a well after a rapid displacement (i.e., increase or decrease in level) of the water column. For this project, the rapid displacement was effected by withdrawing water with a dedicated bailer, thus resulting in a rising-head test. Water level measurements were collected electronically using a Solinst datalogging pressure transducer that was installed in the monitoring well before the start of the test (i.e., before the imposition of the displacement). The water level data was then assessed using analytical methods to determine the hydraulic conductivity of the surrounding soils.

The Bouwer-Rice (1976) method was used to determine the hydraulic conductivity from the water level data that was collected during the single well response test. Please refer to Appendix F for the calculations and plots of data collected during the single well response tests.

The results of both analyses provided a hydraulic conductivity of approximately $2x10^{-8}$ m/s for the Silty Sand / Sandy Silt Till – indicative of low permeability soils.

3.5 Groundwater Quality

A groundwater quality sample was collected from each monitoring well (i.e., MW-1 to MW-5) on January 25, 2022 and were submitted to an accredited laboratory (BV Labs) for general groundwater chemistry parameters. The results were tabulated and are presented in Table 3a and 3b.

The results were compared to the Ontario Provincial Water Quality Objectives (PWQO) standard. The PWQO was set forth by the government of Ontario and is utilized to assess the chemical and physical indicators of surface water and groundwater that is to be discharged to the surface. These criteria were established to protect the aquatic life and all aspects of the aquatic life cycles during indefinite exposure to the water (Ontario, 1994).

The reported results were generally consistent with groundwater characteristics in the Guelph Area: the groundwater is moderately mineralized, with elevated concentrations of calcium and magnesium owing to the prevalence of carbonate-minerals (e.g., dolomite) in the local geological materials.

Sodium and chloride concentrations were reported at elevated levels (ranging from 110–890 mg/L and 30-160 mg/L respectively), which indicates some influence from anthropogenic activity, such as road salting.

However, there is a reported exceedance of the PWQO standard for the dissolved metals cobalt and copper at monitoring well MW-4. The reported concentrations of cobalt and copper only slightly exceeded the PWQO standards (i.e., 2.2 µg/L vs. 0.9 µg/L, and 5.1 µg/L vs. 5 µg/L respectively). Given the land use and history of the Site, it is interpreted that these concentrations are indicative of naturally-occurring copper and cobalt in the shallow groundwater on-Site.

It is noted that the proposed development will be serviced by municipal water supply. Consequently, any existing drinking water wells and monitoring wells on-Site are recommended to be decommissioned as per Ontario Regulation 903 following receipt of approval to proceed with construction or when no longer in use.

The laboratory Certificate of Analysis is included in Appendix D.

3.5.1 Groundwater Discharge Suitability Assessment

GM BluePlan staff retuned to the Site on October 19, 2022, to collect groundwater samples from the monitoring wells on-site to assess the suitability of groundwater to be discharged to either City of Guelph sanitary sewers or storm sewers during potential construction dewatering activities. The certificates of analysis for the test results of these samples are also included in Appendix D.

At this time of visit, only two monitoring wells (MW-3 and MW-4) were observed to have sufficient water column in order to collect the samples. Prior to sampling, each well was first developed by purging at least three well-volumes of water or until dry, whichever occurred first. A dedicated bailer or Waterra tube inertial pump was used to withdraw water from the monitoring well for purging and for sample collection. Samples were then collected into laboratory-supplied bottles appropriate to the planned analyses. These sample bottles were then submitted to an accredited laboratory for analyses of the suite of parameters outlined in the City of Guelph Sanitary Sewer Bylaw (1996-15202) and Storm Sewer Bylaw (1996-15202). The results were tabulated and are presented in Table 4a and 4b.

The reported results indicate the samples collected do not exceed the criteria set forth in the Guelph Sanitary Sewer Bylaw, making nearby sanitary sewers an eligible receiver of groundwater discharge during construction.

The results did indicate that the parameters total suspended solids (TSS), copper and zinc exceeded the criteria in the Guelph Storm Sewer Bylaw. However, it is noted that these samples were not field-filtered and are representative of total metals in water. If additional sediment capture methods are implemented (e.g., use of geotextile filter bag or strawbale check dams) during construction dewatering activities to control the TSS in the discharge water, the sediment-bound metals concentrations may be lowered sufficiently enough to meet the Storm Sewer Bylaw criteria. This is supported by the results of the dissolved metals samples collected from all five the monitoring wells in January 2022 which were reported to all be below the Storm Sewer Bylaw.

3.6 Site Reconnaissance

GM BluePlan attended the Site in advance of drilling to lay out the monitoring well locations, as well as during drilling to observe soil conditions first-hand.

During the time on-Site, a brief reconnaissance of the Site was conducted and found no apparent surface water features or sensitive ecological features on-site or adjacent to the Site.

Two water wells were identified at the Site during reconnaissance, one at 1182 Gordon Street and one at 1204 Gordon Street. Due to the low level of detail included on the well records attributed to the Site (i.e., Well ID 6702557, 6702561, 6702562) it is not certain which well records are associated with which of these water wells. Both wells were observed to be constructed with concrete tile, though it is uncertain whether these wells are large-diameter dug wells (in which the tile forms the “casing” of the well) or if the well is a drilled well (in which the tile forms a well pit over the drilled well).

4. HYDROGEOLOGICAL CONCEPTUAL MODEL

A hydrogeological conceptual model describes the key hydrogeological features and functions of the Site and also provides a basis for evaluation of potential impacts to the Site. The conceptual model is synthesized from the data and information collected during desktop study and field investigation.

Topographically, the Site is located at a higher elevation than surrounding lands with low-lying wetland areas existing further east and west of the Site. This is consistent with the available physiographic mapping which indicates that the Site is located on a Drumlin landform and is bounded by glacial meltwater spillways to the east and west.

The soils encountered during the Site investigation were observed as sandy silt to silty sand till, with some gravel and clay content. The groundwater levels measured on-Site ranged from 2.6 mbgs to 5.1 mbgs and the distribution of piezometric head (i.e., groundwater contours) appears to mimic the topography of the ground surface.

The till material encountered on-Site has been determined to have a relatively low hydraulic conductivity (i.e., on the order of 10^{-8} m/s, provided by the single-well response testing), generally impeding the rate of groundwater flow. Like most upland Sites overlying the till aquitard in the Guelph area, it is expected that the hydraulic gradient is predominantly downward, though from the measured groundwater levels it appears that there is also a lateral component to flow that conveys water easterly and westerly to the low-lying wetland areas. The coarse soils and flat topography associated with those wetland areas indicates increased potential for groundwater recharge in those areas. However, it is emphasized that due to the low hydraulic conductivity of the till soils on-Site, the overall rate of groundwater flow is very low and the actual contribution of flow to the wetlands via on-Site recharge is likely very limited.

In the vicinity of the Site, the subcrop of the Guelph Formation below the Site is reported to lie at approximately 20 to 23 mbgs. Due to the thickness and consistency of the till layer that overlies the bedrock, it is interpreted that there is a significant degree of separation between the surface and the bedrock.

5. IMPACT ASSESSMENT

In terms of hydrogeological impacts, there are generally two types of impacts (i.e., to groundwater quality, to groundwater quantity) and two types of receptors (i.e., ecological, anthropogenic) that may be affected by those impacts. The rubric below provides a list of activities which may have the potential to cause hydrogeological impacts. Each of these activities will be discussed in the sections to follow.

Screening Assessment Rubric for Potential Hydrogeological Impacts

Activity	Potential Impacts Related to		Potential Receptors
	Water Quantity	Water Quality	
Construction Dewatering	■	■	Municipal Sewers (Storm and Sanitary) Nearby Water Well Users
Source Protection		■	The Site overlaps with a Wellhead Protection Area with respect to source water quality. A review of potential drinking water threats is to be conducted.
Stormwater Management	■	■	Source Protection General Ecology/Water Balance
General Land-Use/ Activities On-Site Post-Development	■		Drainage for occupiable subsurface structures (Quantity)

5.1 Construction Dewatering

Groundwater control is a key factor to consider when entering the construction phase on any project, as it can result in unforeseen project delays and substantial costs if not adequately addressed. The proposed development will involve the construction of two 6-storey apartment buildings that will share a one-level underground parking lot. The proposed footprint of the underground parking area will cover an area of approximately 5,224 m^2, with the anticipated base of the underground parking area extending to an elevation of 340.80 masl. The proposed development will also include the construction of three blocks of townhouses that will be constructed with basement elevations 3.05 m below finished floor elevation (e.g., basement elevation about 342.2 masl for townhouse Block 1).

Based on groundwater level data collected on-Site over the period of one year, excavations are expected to extend below groundwater: some form of construction dewatering is likely to be required to facilitate the construction process.

5.1.1 Dewatering Discharge Estimates

The quantity of dewatering discharge can be estimated based on the observed groundwater levels, the estimated hydraulic conductivity of the subsurface materials, and the anticipated dimensions of the proposed excavations. Contracts and permits are generally concerned with maximum and typical dewatering rates, so these will be the focus of this assessment.

The dewatering estimates were calculated in two parts: the contribution of flows from the construction of the underground parking area, and the contribution from the construction of the three townhouse block basements.

The following assumptions were made when calculating the estimated dewatering rates:

- The excavation of the underground parking area will occur concurrently with the excavation of all three townhouse block basements.
- The highest recorded groundwater level observed on-site was at MW-3 with an elevation of 343.84 masl. This groundwater level was assumed to occur over the full area of the proposed underground parking area and basements for the townhouse blocks, enabling a more conservative estimate
- The groundwater table coincides with the underlying sandy silt/ silty sand till, which has been characterized (through the completion of single-well response testing) to have a hydraulic conductivity ranging from $1.7x10^{-8}$ m/s to $1.6x10^{-8}$ m/s. For the purposes of the dewatering calculations, the geometric mean of the two field-tested hydraulic conductivities is used, $1.65x10^{-8}$ m/s.
- For the construction of the underground parking area, a drawdown of 4.0 m is calculated based on the assumption that the target groundwater level is to be 1.0 m below the depth of excavation
- 7For the construction of the townhouse basement, a drawdown of 2.7 m is assumed based on the assumption that the target groundwater level is to be 1.0 m below the depth of excavation
- The excavations were modelled as flow to a well of equivalent perimeter in an unconfined aquifer condition.

The calculation sheets for the dewatering estimates are provided in Appendix G. Based on the above assumptions and model setup, the total expected rate of groundwater flow entering into open excavations is estimated to be less than 15,000 L/d. Based on the nature of the subsurface materials (i.e. sandy silt/ silty sand till), it is noted that dewatering rates are likely to be even less than the estimate after the initial stages of dewatering once groundwater storage is depleted from the till overburden.

When also taking into consideration wet weather flows which may be substantial due to the potential for precipitation to flow into the excavation through overland flow or direct precipitation, an extreme weather event that involves 25 mm of precipitation can introduce approximately 173,200 L of water into the open excavations.

Adding this to the contribution from groundwater seepage (i.e., 15,000 L/d) would result in a maximum total discharge volume of 188,200 L/d in order to achieve dewatering targets.

Since this estimated maximum volume of discharge is less than 400,000 L/d but greater than 50,000 L/d, a water taking approval shall be acquired in the form of an Environmental Activity and Sector Registry (EASR) to complete the construction of the proposed underground parking area and townhouse basements.

5.1.2 Municipal Sewers

The primary receptors of water quality impacts due to construction dewatering are expected to be the municipal storm and/or sanitary sewer systems, as these are the most likely candidates to receive the discharge from the dewatering activities.

Groundwater quality samples were collected from MW-3 and MW-4 and were analyzed for parameters outlined in the City of Guelph Sanitary and Storm sewer bylaws. The results indicated that groundwater on-site is suitable for discharge to City of Guelph sanitary sewers. If sediment capture techniques are implemented during construction dewatering to lower the concentrations of total suspended solids (TSS) prior to discharge to the sewer (e.g., use of filter bags and/or check dams), then the discharge would also be suitable for release to City of Guelph storm sewers.

The City of Guelph Sewer-Use By-Law states the following limits for TSS:

- 15 mg/L for discharge to storm sewers
- 350 mg/L for discharge to sanitary sewers.

5.1.3 Nearby Water Well Users

A potential receptor of water quantity impacts related to construction dewatering activities are nearby private water well users. A review of the MECP Water Well Information System identified 37 domestic water supply well records within 500 m of the subject Site. Although the City of Guelph has seen increased development with more and more properties having access to municipal water supply, especially in the City's core, some of the identified domestic water supply wells may still be in use.

Based on the dewatering estimates described in Section 5.1.1., the zone of influence during dewatering activities was calculated to extend less than 2.0 m from the edge of excavation. These zones of influence do not extend beyond the Site boundaries and therefore the dewatering activities are not expected to influence the groundwater quantity available to nearby water wells.

Furthermore, the identified domestic well records were all reported to be installed within the bedrock. The dewatering activities occurring on-site are not expected to impact groundwater quality at nearby wells due to the presence of the till overburden which provides substantial hydraulic separation between surface activities and the bedrock aquifer.

5.1.4 Municipal Wells

Municipal wells are located at a significant distance from the Site. The nearest municipal well is Burke Well, approximately 790 m away from the Site.

Due to the prevalence of soils of low hydraulic conductivity, the radius of influence of dewatering is limited (estimated to be less than 2 m, see Appendix G). The anticipated construction dewatering activities are not expected to influence local municipal supply wells.

5.2 Source Protection

Potential Water Quality Impacts

Due to the proposed land-use being residential, the activities associated with that land-use are generally considered to be low-risk with respect to potential impacts to groundwater quality. In any case, potential Source Protection impacts are assessed herein with respect to the Source Water Protection framework as per the *Clean Water Act* (2006).

The Site has been identified as being within

- a WHPA-C area with vulnerability as high as 6 (most of the Site); and
- a WHPA-C with a vulnerability score of 4 (a small portion of 1204 Gordon Street).

Mapping available from the GRCA confirms the designation of the Wellhead Protection Areas and their associated vulnerability scores on Site and is provided in Appendix C.

This assessment assumes that the entire site is subject to the area of highest vulnerability (i.e., WHPA-C(6)).

Under the *Tables of Drinking Water Threats*, the only "Significant" drinking water threat activities associated with the WHPA-C(6) area are the handling and storage of dense non-aqueous phase liquids (DNAPLs).

The 2021 Technical Rules (MECP 2021) indicates that the handling and storage of DNAPL is intended to address potential industrial or commercial uses of DNAPL. Furthermore, DNAPLs are rarely used in household applications. As such, it does not appear that the Site will host a "Significant" drinking water threat and therefore is not expected to require a Risk Management Plan.

Because the Site lies within a Wellhead Protection Area, the City of Guelph requires a Section 59 Policy Applicability Review Form to be completed and submitted with any application concerning the proposed development (e.g., Official Plan Amendment, Zoning By-Law Amendment, Site Plan Approval). A copy of the completed Section 59 Applicability Review Form is included in Appendix H. A signed copy of this document has been submitted directly to the office of the City of Guelph Risk Management Official.

Through the completion of the Section 59 Policy Applicability Review Form, the following threat activities were identified to occur on-Site post-development and are considered as threats to drinking water:

- Application of Road Salt (Threat #12)
- Storage of Snow (Threat #14)

Neither of these activities are expected to constitute a "Significant" drinking water threat in the context of the applicable vulnerable areas on-Site (e.g., WHPA-C(6)). However, other City of Guelph policies may apply to these activities. For example, it is likely that the City of Guelph will request a Salt Management Plan to support the site plan application for the proposed development.

The purpose of a Salt Management Plan is to employ best management practices in design and operations of new developments to minimize the potential release of sodium and chloride from road salt sources while maintaining safe conditions for pedestrians and vehicles.

It is recognized that there are several wells on-Site: five monitoring wells (installed as part of this study) and two pre-existing water wells located at 1182 and 1204 Gordon Street. Recognizing that these water wells may constitute a transport pathway by which impacts could enter the local groundwater system, it is recommended that they be decommissioned prior to construction of the proposed development or, if feasible, prior to demolition of the existing buildings.

5.3 Stormwater Management

Potential Water Quantity Impacts

Though a Tier 3 Water Budget and Risk Assessment has been completed and identifies the City of Guelph as being within a WHPA-Q (i.e., a wellhead protection area susceptible to threats to groundwater quantity), the WHPA-Q designation is understood to remain in "draft" and no corresponding policies have been put in force. However, Section 5.7.6 of the City of Guelph Development Engineering Manual requires that all developments be subject to water balance analysis to maintain pre-development recharge rate and volume.

With respect to stormwater management and potential water quantity impacts, the primary item of interest is the water balance.

A water balance analysis has been prepared by GMBP and is submitted under separate cover as part of the Functional Servicing Report (GMBP, 2023). The results of the water balance analysis indicate that the post-development condition will nearly match the existing condition in terms of groundwater recharge: annual recharge under post-development conditions is estimated to be about 7% less than it is under existing conditions.

The post-development recharge estimate accounts for enhanced recharge via an infiltration gallery proposed for the northeasterly portion of the Site. The slight loss of recharge is noted to be due not to the infiltration gallery being undersized but rather due to there being insufficient "clean" surfaces (e.g., rooftops) to supply the infiltration gallery (GMBP, 2023).

The slight decrease in estimated recharge is not expected to cause an impact to local groundwater resources. This is partly because the change is relatively small but also because the Site occupies a till deposit (i.e., aquitard) which, in the greater context of the watershed, limits its significance as a recharge area due to the limited capacity for these soils to admit recharge and conduct groundwater seepage.

Potential Water Quality Impacts

The potential for water quality impacts due to stormwater management will be mitigated using appropriate means depending on the destination of the stormwater.

Runoff water that will be discharged from the Site to the existing municipal stormwater system will pass through an oil/grit separator to achieve the enhanced treatment level specified by the MECP Stormwater Management Planning and Design Manual. This will assist in protecting downgradient surface water features in the environment.

Stormwater that will be managed via the proposed infiltration gallery will be sourced only from "clean" runoff sources (i.e., rooftops). This design approach will limit the potential for various contaminants, such as those that might be present in runoff from paved surfaces (e.g., oil, grease, salt), to enter the groundwater.

The proposed conceptual design for stormwater management is therefore expected to provide suitable mitigation to potential impacts on environmental water quality.

5.4 General Land-Use Activities Post-Development

Occupiable Subsurface Structures

The encroachment of groundwater levels upon subsurface structures is considered to be a potential groundwater quantity impact. It is an impact that may affect both the project/ development and the environment because 1) the groundwater may result in property damage or impairment of the structure itself and 2) the provision of drainage to protect the structure may result in negative impacts to the water balance of the Site.

In order to counteract these potential impacts, the City of Guelph Development Engineering Manual indicates that building basements should be of waterproof construction if they are to be set at an elevation below 0.5 m clearance above the seasonal high groundwater level.

Based on readings to-date, the highest recorded groundwater level is 343.84 masl. The proposed foundation elevation for the underground parking area and townhouse basement (340.80 masl and 341.85 masl, respectively) are below this groundwater level.

As such, it is expected that the underground parking structure and townhouse basements will be required to be of waterproof construction. This will mitigate potential for impacts to groundwater levels because the waterproof construction will reduce or eliminate the need to rely on long-term dewatering by foundation drainage.

6. SUMMARY OF CONCLUSIONS

A hydrogeological study has been undertaken to support the proposed development of residential apartment buildings and townhouses on a Site encompassing current civic addresses 1166, 1170, 1182, 1190, 1200 and 1204 Gordon Street, Guelph. The hydrogeological system and regulatory framework have been characterized and a hydrogeological risk assessment has been completed. A summary of findings is as follows

- The Site lies in the southern portion of the City of Guelph at elevations ranging from about 344 masl (near center of Site) to 341 masl (adjacent to Gordon Street).
- The Site bears Source Protection designations as follows:
    - WHPA-C with vulnerability scores 6 and 4
- The stratigraphy of the Site is summarized as follows:
    - Topsoil (up to 610 mm thick) overlying
    - Silty Sand to Sandy Silt Till
- Bedrock (Guelph Formation) is understood to subcrop at a depth of approximately 20 mbgs.
- Groundwater levels on-site were monitored for a period of one year and the highest recorded groundwater level was observed to be 343.84 masl (measured at MW-3 in March 2022).
- Groundwater quality at the Site is typical of the Guelph area, however an exceedance of the PWQO standard for the parameters cobalt and copper were noted.
- Groundwater quality was reported to be suitable for discharge to City of Guelph sanitary sewers, and even potentially discharge to storm sewers if sediment capture methods are deployed during dewatering operations.
- Single-well response tests were conducted, and the hydraulic conductivity of the sandy silt / silty sand till was determined to be in the range of $1.7x10^{-8}$ m/s to $1.6x10^{-8}$ m/s
- Two pre-existing water supply wells were identified on-Site during reconnaissance. One located at 1182 Gordon Street and one located at 1204 Gordon Street.
- Interpreted groundwater gradients for the Site indicate vertical groundwater seepage in the downward direction; lateral gradients vary, indicating seepage mainly in the southerly and westerly directions.
- Based on conservative estimates, construction dewatering flow may reach up to 188,200 L/d, the vast majority of which is due to potential stormwater/ precipitation.
- The City of Guelph requires basements to be set at least 0.5 m above the seasonal high groundwater level unless provided with waterproofing. The foundation for the proposed underground parking garage and townhouse basements are proposed to be below the highest groundwater level recorded on-site. Structures below the water table are recommended to be waterproofed.
- The water balance (calculations provided under separate cover in the functional servicing report) indicates that estimated annual groundwater recharge quantities may decrease slightly due to the proposed development, though this is not expected to cause impacts to the local groundwater system.

- The functional servicing of the Site will include appropriate controls to mitigate potential impacts on environmental waters. This includes the provision of oil/grit separators to treat runoff as well as excluding paved surfaces from feeding into the infiltration gallery.
- With respect to Source Protection: due to the nature of the proposed development (residential) and the vulnerable area designations, no "Significant" drinking water threats are expected to occur at the Site in the post-development condition. However, the City may require a Salt Management Plan to be developed for Site Plan approval.

7. RECOMMENDATIONS

A hydrogeological study has been completed for the site comprising 1166, 1170, 1182, 1190, 1200 and 1204 Gordon Street, Guelph. Based on the information collected to date, the hydrogeological impact assessment of the Site indicates that there are no major obstacles to the development of the Site.

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

- Based on groundwater levels collected over a 12-month monitoring period, it has been determined that the underground parking level and townhouse basements intersect the seasonal high groundwater level. Per the City of Guelph Development Engineering Manual, these structures are expected to require waterproofing to minimize reliance on drainage.
- Minor construction dewatering is expected: it is recommended that an EASR registration for construction dewatering be obtained.
- Where construction dewatering is required, the discharge shall be managed in accordance with a water-taking and discharge plan, to be prepared by a Qualified Person as required by O.Reg. 63/16 for EASR-registered dewatering. The plan should include appropriate erosion and sediment control measures to meet the applicable standard for the receiving structure (e.g., City of Guelph Sewer Use By-Law for discharge to storm sewer).
    - For the purposes of preparing an EASR registration, the following values are recommended:
        - Maximum daily dewatering volume: 188,200 L/d
        - Typical daily dewatering volume: 15,000 L/d
- It is recommended that all wells on-Site, including the monitoring wells installed as part of this study and the pre-existing water wells located at 1182 Gordon Street and 1204 Gordon Street, be decommissioned in accordance with O.Reg. 903 by a licensed water well contractor before construction begins for the proposed development. If feasible, the wells should be decommissioned prior to demolition of the existing houses.
- It is recommended that a future application submission for site plan approval contain a Salt Management Plan. It is anticipated that this would be prepared and submitted under separate cover (e.g., Salt Management Plan as a standalone document).

8. STATEMENT OF LIMITATIONS

The information in this report is intended for the sole use of GSD Development and Management Inc. 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.

The results of this investigation are believed to be representative of the Site as of January 26, 2023.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

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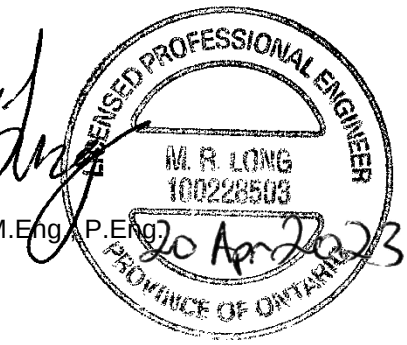
Matt Long, M.Eng., P.Eng.



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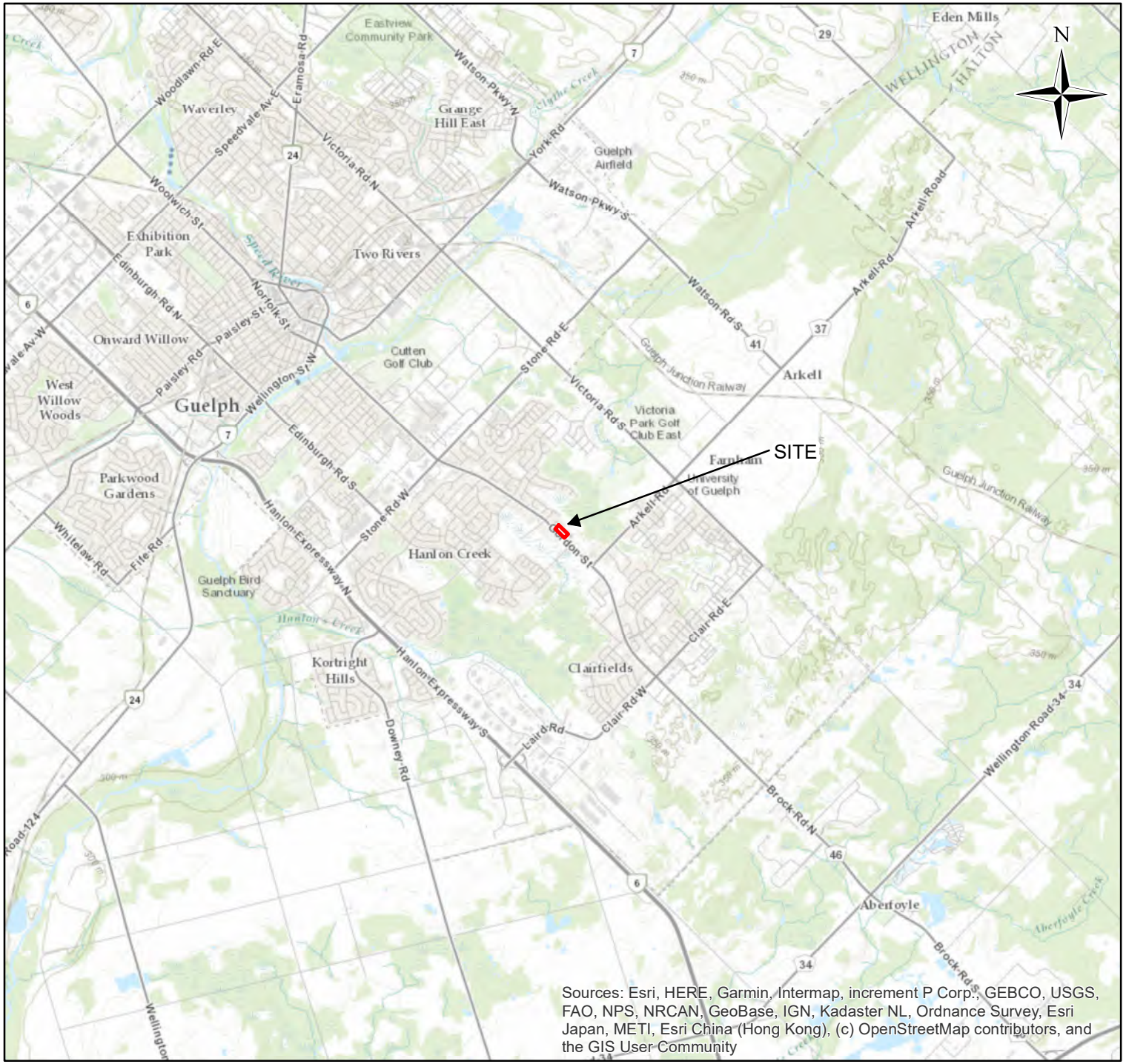
FIGURES



Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

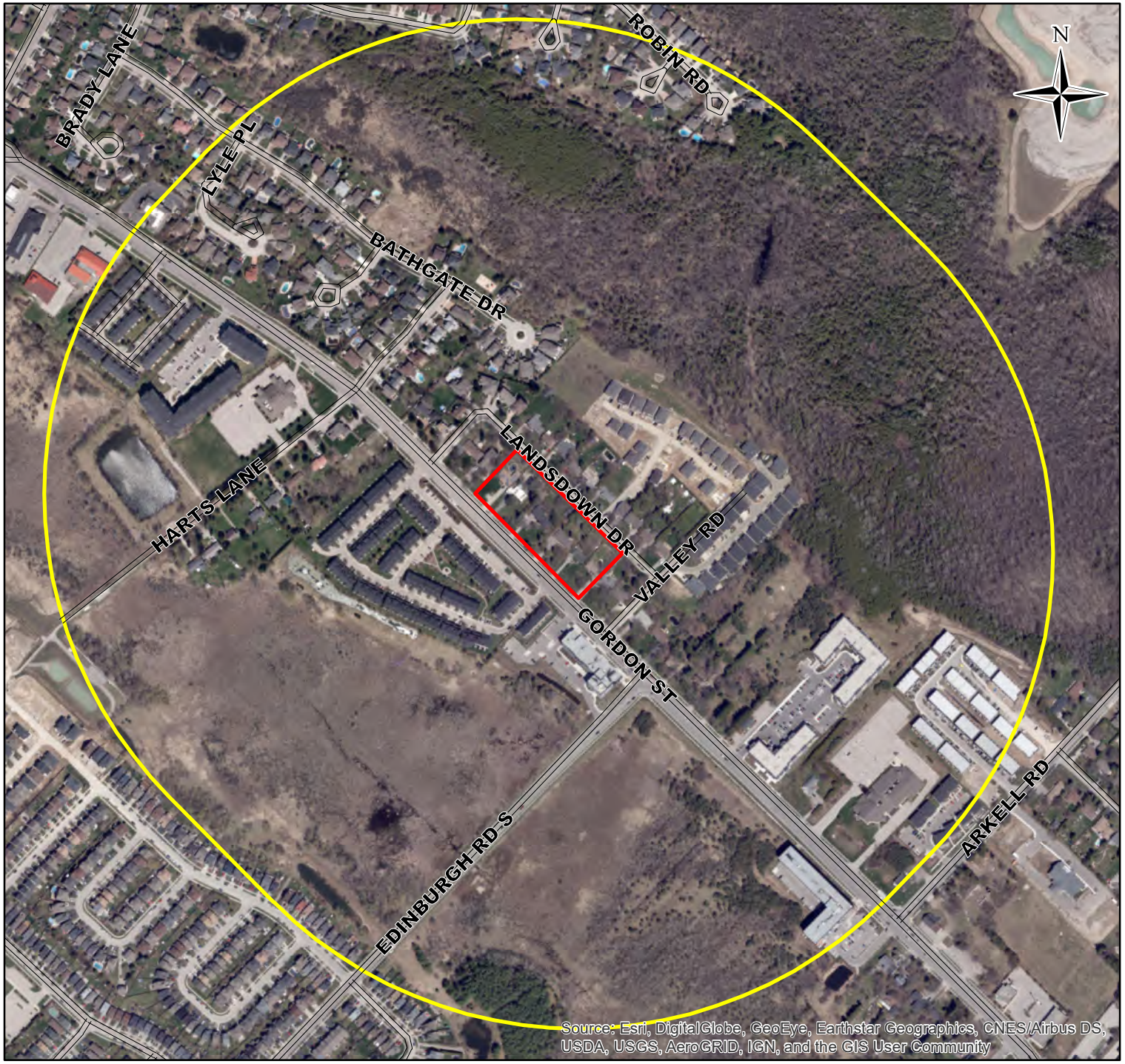
Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

Site Boundary

Scale: 1: 75,000
February 2022

Figure 1:
Site Location

BluePlan ENGINEERING



Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

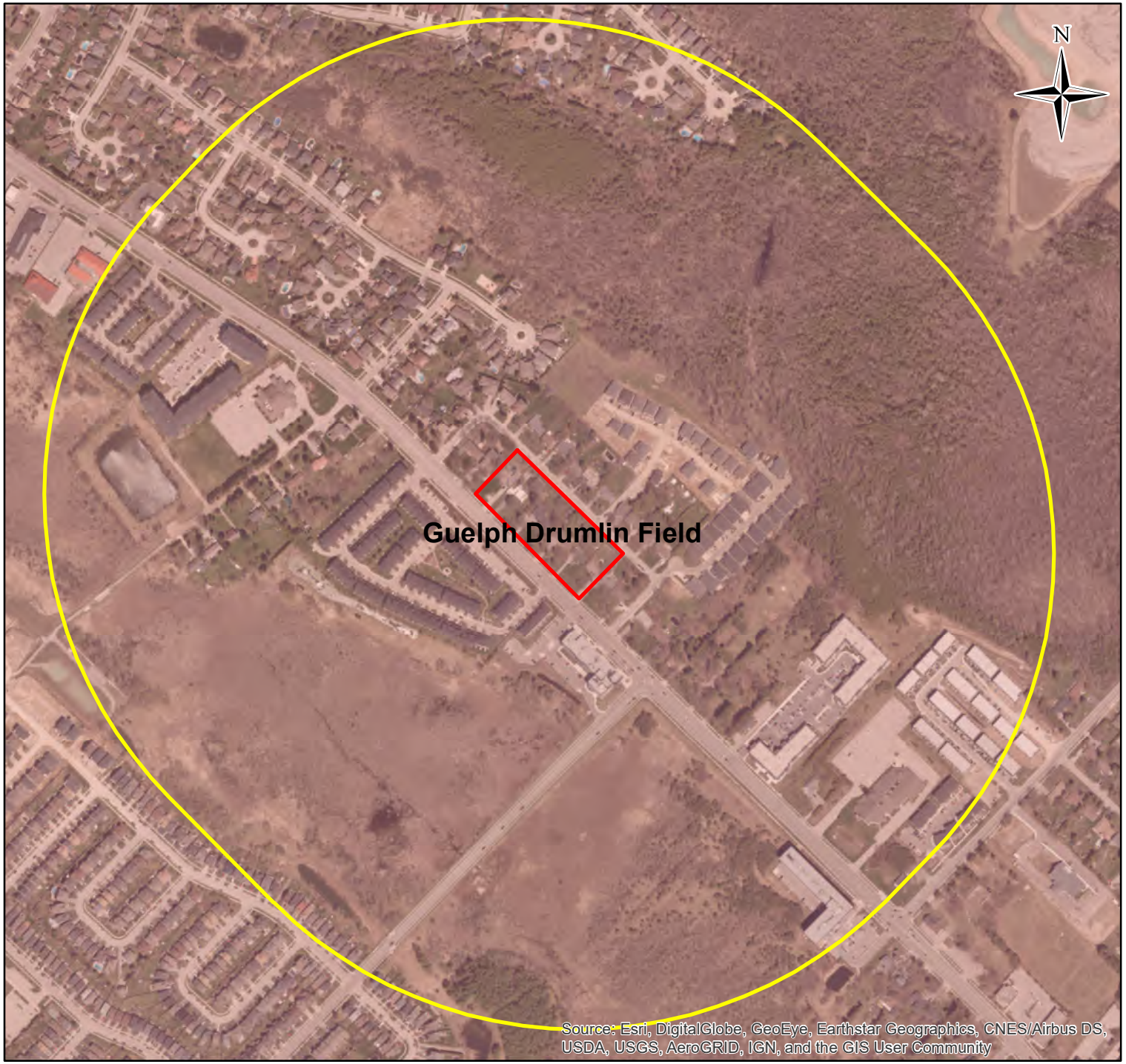
Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

Roads
Site Boundary
Study Area (500m)

Scale: 1: 6,500
February 2022

Figure 2:
Study Area Layout

BluePlan ENGINEERING



Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

Site Boundary
Study Area (500m)

Physiographic Regions

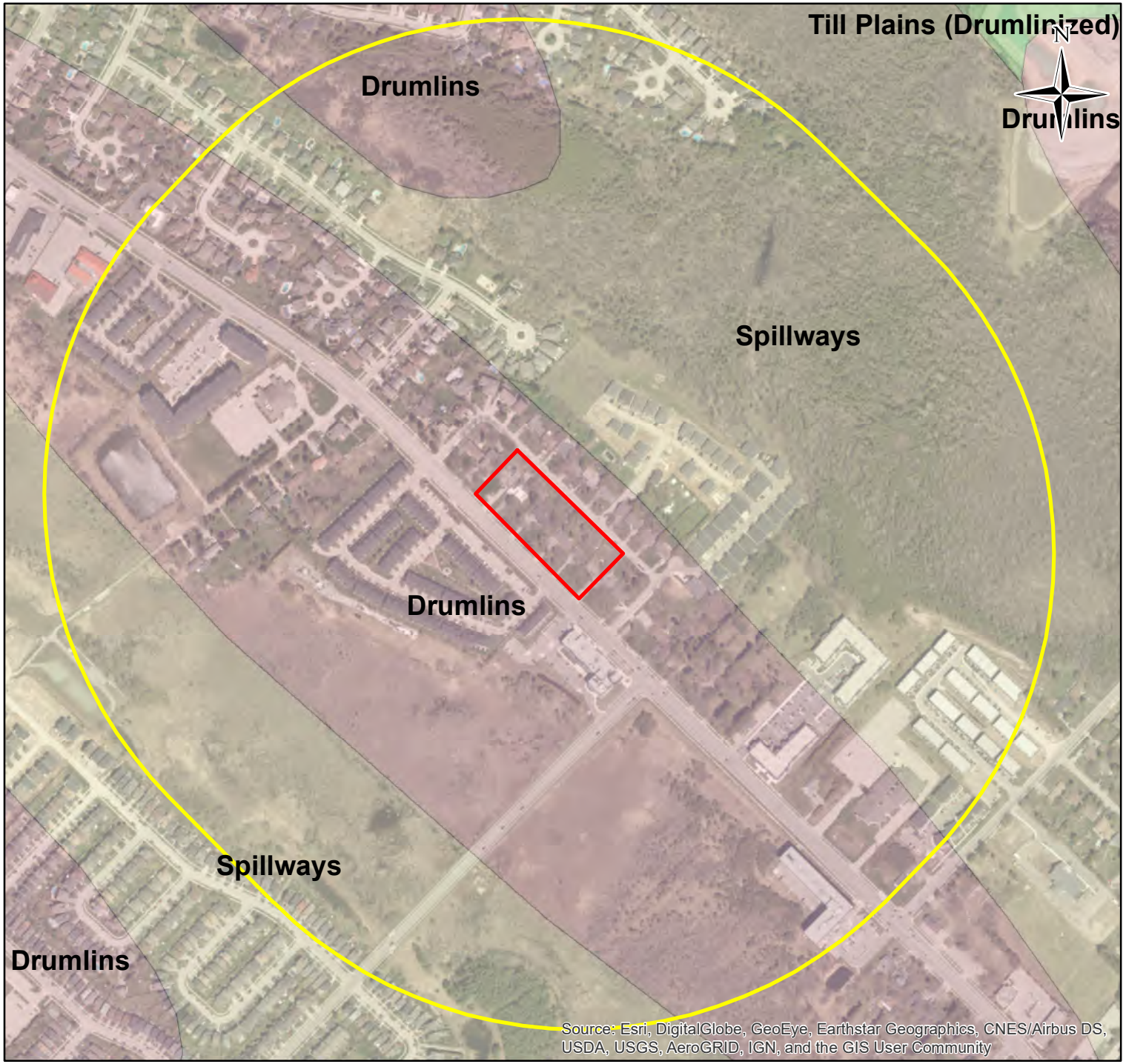
UNIT, REGION

11, Guelph Drumlin Field

Scale: 1: 6,500
February 2022

Figure 3a:
Physiographic Region

BluePlan ENGINEERING



Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

Site Boundary
Study Area (500m)

Physiography of Southern Ontario

Drumlins
Spillways
Till Plains (Drumlinized)

Scale: 1: 6,500
February 2022

Figure 3b:
Physiographic Landforms

BluePlan ENGINEERING

Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

Site Boundary
Study Area (500m)

Surficial Geology of Ontario

- Kames and eskers
- Lacustrine, kame, and outwash
- Outwash
- Swamps and bogs
- Wentworth Till

Scale: 1: 6,500
February 2022

Figure 4:
Surficial Geology

BluePlan ENGINEERING

Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

MECP Water Well Records
Monitoring Wells
Site Boundary

Scale: 1: 1,250
October 2022

Figure 5:
Monitoring Well Location Plan

BluePlan ENGINEERING

Project: 121139
Hydrogeological Study
1166-1204 Gordon Street
Guelph, ON

Part of Lot 5,
Concession 8,
Geo. Twp. of Puslinch

	Water Level	
Well ID	Depth	Elev.
(--)	(mbTOC)	(masl)
Date Measured:	25-Jan-22	
MW-1	4.07	340.79
MW-2	5.21	339.29
MW-3	2.66	342.16
MW-4	3.63	340.77
MW-5	6.19	339.27

Monitoring Wells
Groundwater Contours
Site Boundary

Scale: 1: 1,500
February 2022

Figure 6:
Interpreted Groundwater Contour Plan

BluePlan ENGINEERING

TABLES

Table 1: Summary of Water Well Records

MECP Well ID	Township	Well Use	Bedrock/ Overburden	Depth to Bedrock (m)	Total Depth of Well (m)	Static Water Level (m)	Year Drilled	Notes
Wells Located On-Site								
6702557	Guelph	Domestic	Bedrock	22.3	41.5	10.40	6/24/1954	Attributed to 1166 Gordon Street
6702561	Guelph	Domestic	Bedrock	23.5	30.8	11.00	10/16/1954	Attributed to 1204 Gordon Street
6702562	Guelph	Domestic	Bedrock	20.4	38.1	10.40	12/24/1954	Attributed to 1200 Gordon Street
7407906	Guelph	Monitoring	Overburden	~	6.1	~	1/5/2022	Monitoring Well Drilled by GM BluePlan.
7407907	Guelph	Monitoring	Overburden	~	6.1	~	1/5/2022	Monitoring Well Drilled by GM BluePlan.
7407908	Guelph	Monitoring	Overburden	~	6.1	~	1/4/2022	Monitoring Well Drilled by GM BluePlan.
7407909	Guelph	Monitoring	Overburden	~	6.1	~	1/5/2022	Monitoring Well Drilled by GM BluePlan.
7407910	Guelph	Monitoring	Overburden	~	6.1	~	1/4/2022	Monitoring Well Drilled by GM BluePlan.
Wells Within 500 m of Site								
6700922	Guelph	Domestic	Bedrock	21.6	42.7	15.20	9/2/1966	
6700927	Guelph	Domestic	Bedrock	11.9	22.9	0.90	1/9/1967	
6702420	Guelph	Domestic	Bedrock	14.9	22.6	4.30	7/4/1949	
6702421	Guelph	Commercial	Bedrock	12.8	22.9	2.70	10/19/1949	
6702427	Guelph	Domestic	Bedrock	14.6	29.3	4.30	5/27/1961	
6702431	Guelph	Domestic	Bedrock	13.4	27.1	2.10	12/7/1959	
6702432	Guelph	Domestic	Bedrock	16.2	32.6	6.40	12/7/1963	
6702556	Guelph	Domestic	Bedrock	19.8	46.6	11.00	4/19/1954	
6702558	Guelph	Domestic	Bedrock	22.9	31.4	12.20	6/28/1954	
6702559	Guelph	Domestic	Bedrock	18.9	33.5	8.50	6/29/1954	
6702560	Guelph	Domestic	Bedrock	21.6	45.7	10.40	7/5/1954	
6702563	Guelph	Domestic	Bedrock	18.9	49.7	10.40	1/19/1955	
6702564	Guelph	Domestic	Bedrock	19.2	38.7	7.30	4/4/1955	
6702565	Guelph	Domestic	Bedrock	21.6	40.2	12.20	8/18/1956	
6702566	Guelph	Domestic	Bedrock	21.6	38.7	12.20	12/18/1956	
6702567	Guelph	Domestic	Bedrock	16.2	33.5	4.90	2/11/1957	
6702568	Guelph	Domestic	Bedrock	22.9	35.7	9.10	4/24/1957	
6702569	Guelph	Domestic	Bedrock	21.9	40.2	11.60	5/1/1957	
6702570	Guelph	Domestic	Bedrock	18.3	38.1	7.90	10/8/1958	
6702571	Guelph	Domestic	Bedrock	20.7	54.6	12.20	6/2/1959	
6702572	Guelph	Domestic	Bedrock	19.2	42.7	11.00	6/23/1959	
6702573	Guelph	Domestic	Bedrock	18.9	36.9	9.80	7/15/1959	
6702574	Guelph	Domestic	Bedrock	20.1	53.9	10.40	12/18/1959	
6702575	Guelph	Domestic	Bedrock	23.2	38.1	9.10	3/16/1962	
6702576	Guelph	Domestic	Bedrock	20.7	43.9	8.20	3/29/1962	
6702577	Guelph	Domestic	Bedrock	19.2	48.2	9.10	6/20/1962	
6702578	Guelph	Domestic	Bedrock	18.9	36.3	9.80	3/23/1964	
6702579	Guelph	Domestic	Bedrock	21.0	39.0	10.70	5/22/1965	
6702580	Guelph	Domestic	Bedrock	20.4	43.9	12.20	8/27/1965	
6702581	Guelph	Domestic	Bedrock	20.1	40.8	10.70	8/8/1964	
6702586	Guelph	Domestic	Bedrock	18.9	35.1	8.50	10/22/1957	
6702587	Guelph	Domestic	Bedrock	34.4	46.3	9.10	4/12/1958	
6702588	Guelph	Domestic	Bedrock	18.3	35.1	9.10	7/29/1958	
6703346	Guelph	Commercial	Bedrock	10.7	21.3	0.60	4/21/1969	
6703908	Guelph	Domestic	Bedrock	12.5	21.9	0.00	5/6/1971	

Table 2: Monitoring Well Details and Water Level Observations

			Water Level							
Well ID	Ground Elev.	TOC Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
(--)	(masl)	(masl)	(mbTOC)	(masl)	(mbTOC)	(masl)	(mbTOC)	(masl)	(mbTOC)	(masl)
Date Measured:			25-Jan-22		11-May-22		19-Oct-22		26-Jan-23	
MW-1	343.80	344.86	4.07	340.79	3.39	341.47	6.97	337.89	5.23	339.62
MW-2	343.35	344.50	5.21	339.29	4.19	340.31	6.99	337.51	7.00	337.51
MW-3	344.90	344.81	2.66	342.16	2.08	342.74	4.28	340.54	2.36	342.45
MW-4	343.32	344.39	3.63	340.77	3.27	341.12	4.05	340.35	2.62	341.77
MW-5	344.41	345.46	6.19	339.27	4.49	340.97	6.83	338.62	6.85	338.61

mbTOC - metres below top of casing of well.
TOC - Top of Casing
masl - metres above Sea Level
Elev. - Elevation
~ - Not Measured

Table 3a: Results of Groundwater Quality Analyses - General Chemistry and Organic Parameters

	Sample ID	MW-1	MW-2	MW-3	MW-4	MW-5
	Sample Description	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
	Sampling Date	2021-10-04	2021-10-04	2021-10-04	2021-10-04	2021-10-04
Parameters	**Criteria 1** **PWQO**	**Concentration**				
Bicarb. Alkalinity (calc. as CaCO3) (mg/L)		330	460	330	550	360
Calculated TDS (mg/L)		390	730	820	790	440
Carb. Alkalinity (calc. as CaCO3) (mg/L)		2.1	3.5	2.1	2.3	3.9
Hardness (CaCO3) (mg/L)		340	550	470	480	370
Conductivity (umho/cm)		710	1300	1400	1400	800
Orthophosphate (P) (mg/L)		<0.010	<0.010	<0.010	0.029	<0.010
pH	**6.5:8.5**	7.83	7.91	7.82	7.64	8.06
Dissolved Sulphate (SO4) (mg/L)		14	46	60	65	12
Alkalinity (Total as CaCO3) (mg/L)		330	460	330	560	360
Dissolved Chloride (Cl-) (mg/L)		30	140	160	120	63
Nitrite (N) (mg/L)		<0.010	<0.010	0.482	0.087	<0.010
Nitrate (N) (mg/L)		2.56	0.89	28.9	0.37	0.13
Nitrate + Nitrite (N) (mg/L)		2.56	0.89	28.9	0.46	0.13
Total Ammonia-N (mg/L)		<0.050	0.2	0.82	12	0.20
Dissolved Organic Carbon (mg/L)		1.3	2.0	2.6	3.9	1.5

Notes:

1. Criteria are from the Ontario Provincial Water Quality Objectives (Criteria 1),
Criteria are indicated by:
Bold 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. ---- represents sample parameters that were not analyzed; ~ = No value specified.
5. BV Labs Job Number: C221712

Table 3b: Results of Groundwater Quality Analyses - Metals Parameters

	Sample ID	MW-1	MW-2	MW-3	MW-4	MW-5
	Sample Type	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
	Sampling Date	2022-01-25	2022-01-25	2022-01-25	2022-01-25	2022-01-25
Parameters	**Criteria 1** **PWQO**	**Concentration**				
Dissolved Aluminum (Al) (ug/L)		<4.9	16	<4.9		12
Dissolved Antimony (Sb) (ug/L)	**20**	<0.50	<0.50	0.62	<0.50	<0.50
Dissolved Arsenic (As) (ug/L)	**100**	<1.0	<1.0	1	<1.0	<1.0
Dissolved Barium (Ba) (ug/L)		120	90	140	140	54
Dissolved Beryllium (Be) (ug/L)	**11**	<0.40	<0.40	<0.40	<0.40	<0.40
Dissolved Boron (B) (ug/L)	**200**	28	100	76	76	62
Dissolved Cadmium (Cd) (ug/L)	**0.2**	<0.090	<0.090	<0.090	<0.090	<0.090
Dissolved Chromium (Cr) (ug/L)		<5.0	<5.0	<5.0	<5.0	<5.0
Dissolved Cobalt (Co) (ug/L)	**0.9**	<0.50	<0.50	<0.50	**2.2**	<0.50
Dissolved Copper (Cu) (ug/L)	**5**	<0.90	2.2	1.3	**5.1**	1.3
Dissolved Iron (Fe) (ug/L)	**300**	<100	<100	<100	<100	<100
Dissolved Lead (Pb) (ug/L)	**5**	<0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Manganese (Mn) (ug/L)		24	46	69	350	27
Dissolved Molybdenum (Mo) (ug/L)	**40**	3.7	15	29	6.1	17
Dissolved Nickel (Ni) (ug/L)	**25**	<1.0	2.9	<1.0	4.8	<1.0
Dissolved Selenium (Se) (ug/L)	**100**	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Silver (Ag) (ug/L)	**0.1**	<0.090	<0.090	<0.090	<0.090	<0.090
Dissolved Sodium (Na) (ug/L)		11000	65000	89000	72000	15000
Dissolved Thallium (Tl) (ug/L)	**0.3**	<0.050	<0.050	<0.050	0.081	<0.050
Dissolved Uranium (U) (ug/L)	**5**	1.8	2.7	3.7	2.5	1.2
Dissolved Vanadium (V) (ug/L)	**6**	0.75	0.87	0.84	1.2	0.52
Dissolved Zinc (Zn) (ug/L)	**30**	<5.0	<5.0	<5.0	<5.0	<5.0

1. Criteria are from the Ontario Provincial Water Quality Objectives (Criteria 1), the Ontario Drinking Water Standards Maximiun Acceptable Concentrations (Criteria 2) and Aesthic Objectives (Criteria 3) . Criteria are indicated by:
   White Text for Criteria 1, *Italics* for Criteria 2, <u>Underlined</u> for Criteria 3.
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. ---- represents sample parameters that were not analyzed; ~ = No value specified.
5. BV Labs Job Number: C221712

Table 4a: Results of Groundwater Quality Results - Guelph Sanitary Sewer Bylaw

	Sample ID	MW-3	MW-4
	Sample Description	Groundwater	Groundwater
	Sampling Date	2022-10-19	2022-10-19
Parameters (mg/L)	**Criteria 1 City of Guelph: Sanitary By-Law**	**Concentration**	**Concentration**
Metal Parameters			
Total Aluminum (Al)	***50***	8.1	1.3
Total Antimony (Sb)	***5***	<0.02	<0.02
Total Arsenic (As)	***1***	<0.01	<0.01
Total Bismuth (Bi)	***5***	<0.05	<0.05
Total Cadmium (Cd)	***1***	<0.002	<0.002
Total Chromium (Cr)	***5***	0.02	<0.01
Total Cobalt (Co)	***5***	0.007	0.003
Total Copper (Cu)	***3***	0.02	0.01
Total Iron (Fe)	***50***	14	1.5
Total Lead (Pb)	***5***	0.06	0.01
Total Manganese (Mn)	***5***	0.81	0.29
Total Molybdenum (Mo)	***5***	0.011	0.007
Total Nickel (Ni)	***3***	0.015	0.009
Total Phosphorus (P)	***10***	0.88	0.1
Total Selenium (Se)	***5***	<0.02	<0.02
Total Silver (Ag)	***5***	<0.01	<0.01
Total Tin (Sn)	***5***	<0.02	<0.02
Total Titanium (Ti)	***5***	0.28	0.028
Total Vanadium (V)	***5***	0.023	0.005
Total Zinc (Zn)	***3***	0.23	0.043
Inorganics			
Fluoride (F-)	***10***	0.18	0.7
Total Kjeldahl Nitrogen (TKN)	***100***	<2.0	9.1
Phenols-4AAP	***1***	<0.0010	<0.0010
Dissolved Sulphate (SO4)	***1500***	47	83
Total Cyanide (CN)	***2***	<0.0050	<0.0050
Dissolved Chloride (Cl-)	***1500***	140	100
Petroleum Hydrocarbons			
Total Oil & Grease	***-***	2.8	1.8
Total Oil & Grease Mineral/Synthetic	***15***	1	0.6
Other			
Total Animal/Vegetable Oil and Grease	***100***	1.8	1.2

Notes:
1. Criteria are from the *City of Guelph Sanitary Sewer By-Law 1996-15202* for discharge to Sanitary Sewers (Criteria 1)
2. Criteria and concentrations are given in units mg/L
3. -- No value specified.
4. Bureau Veritas Laboratory job number: C2U6144

Table 4b: Results of Groundwater Quality Results - Guelph Storm Sewer Bylaw

	Sample ID	MW-3	MW-4
	Sample Description	Groundwater	Groundwater
	Sampling Date	2022-10-19	2022-10-19
Parameters	**Criteria 1 City of Guelph: Storm By-Law**	**Concentration**	**Concentration**
Metal Parameters			
Mercury (Hg) (mg/L)	***0.001***	<0.00010	<0.00010
Total Cadmium (Cd) (µg/L)	***1***	0.66	0.14
Total Chromium (Cr) (µg/L)	***200***	25	<5.0
Total Copper (Cu) (µg/L)	***10***	***25***	***13***
Total Lead (Pb) (µg/L)	***50***	50	6.6
Total Nickel (Ni) (µg/L)	***50***	16	9.6
Total Zinc (Zn) (µg/L)	***50***	***250***	46
Inorganic Parameters			
Total Carbonaceous BOD (mg/L)	***15***	<2	<2
pH	***6.0:9.0***	7.78	7.53
Total Suspended Solids (mg/L)	***15***	***610***	***230***
Microbiological Parameters			
Fecal Coliform (5TMPN/100mL)	***200 MPN/100mL***	<1.8	<1.8

Notes:
1. Criteria are from the *City of Guelph Storm Sewer By-Law 1996-15202* for discharge to Storm Sewers (Criteria 1)
2. Criteria and concentrations are given in either units mg/L or (µg/L) - specified per parameter
3. -- No value specified.
4. Bureau Veritas Laboratory job number: C2U6144

CHARTS

Chart 1: Hydrograph of MW-1

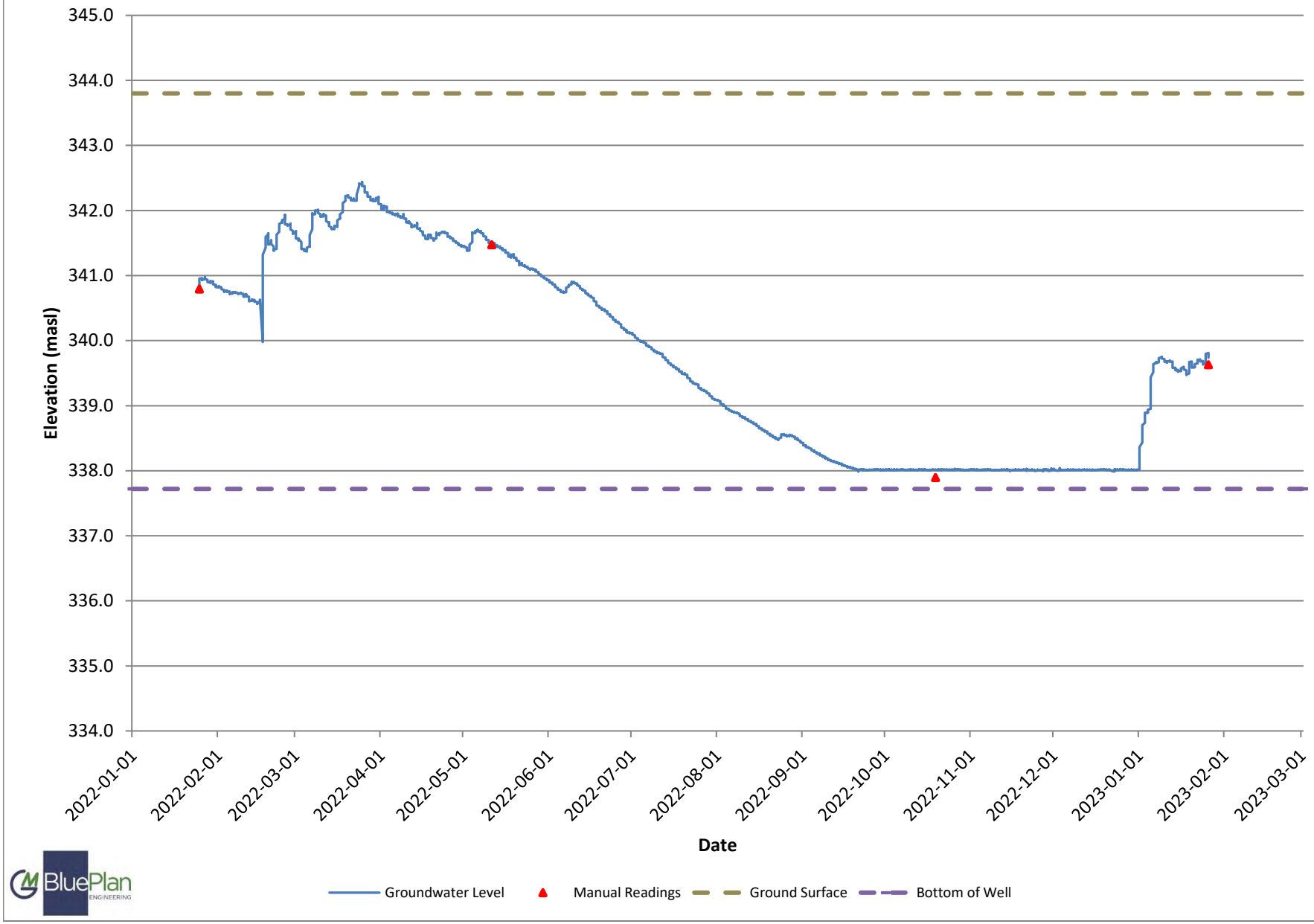


Chart 2: Hydrograph of MW-2

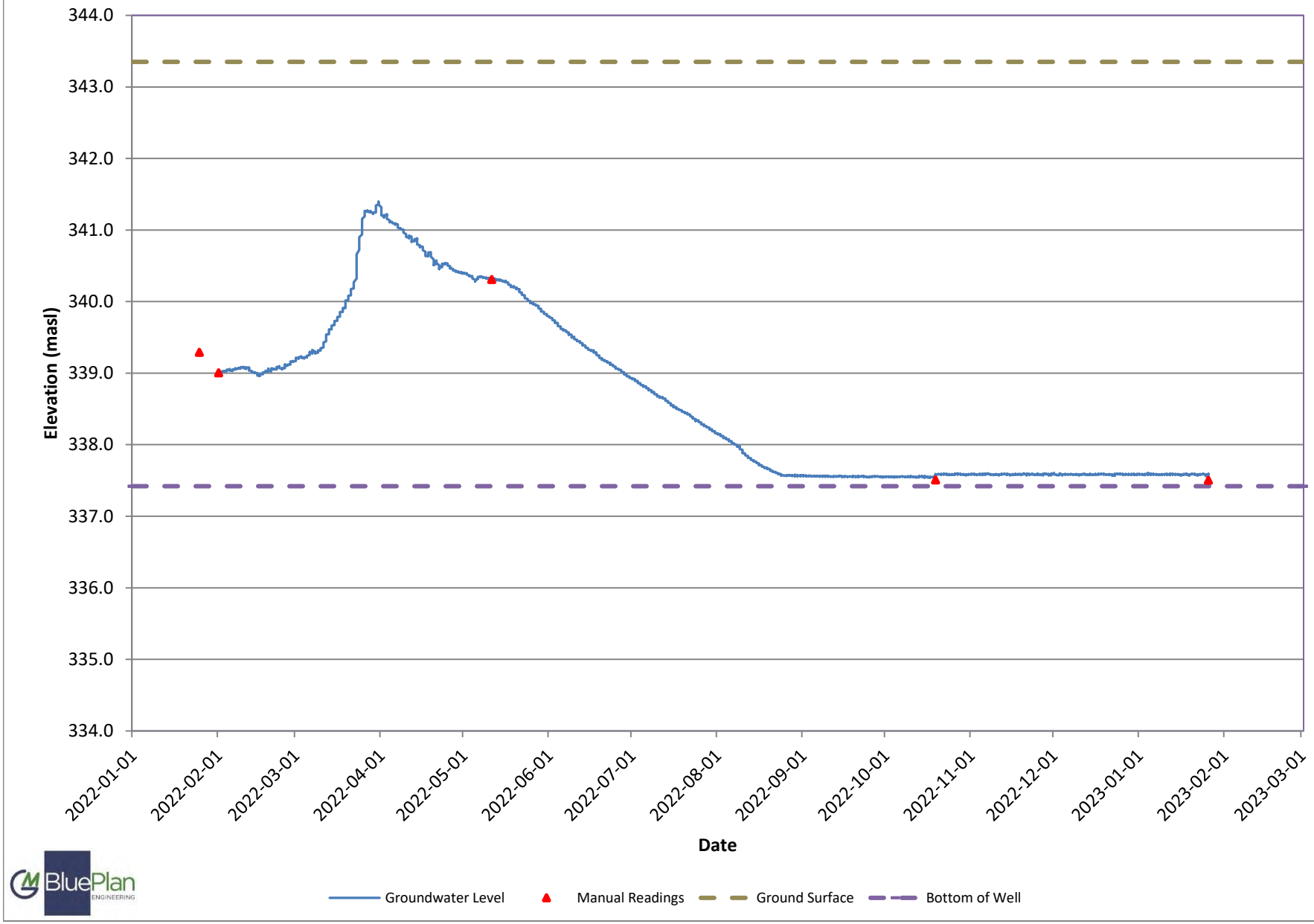


Chart 3: Hydrograph of MW-3

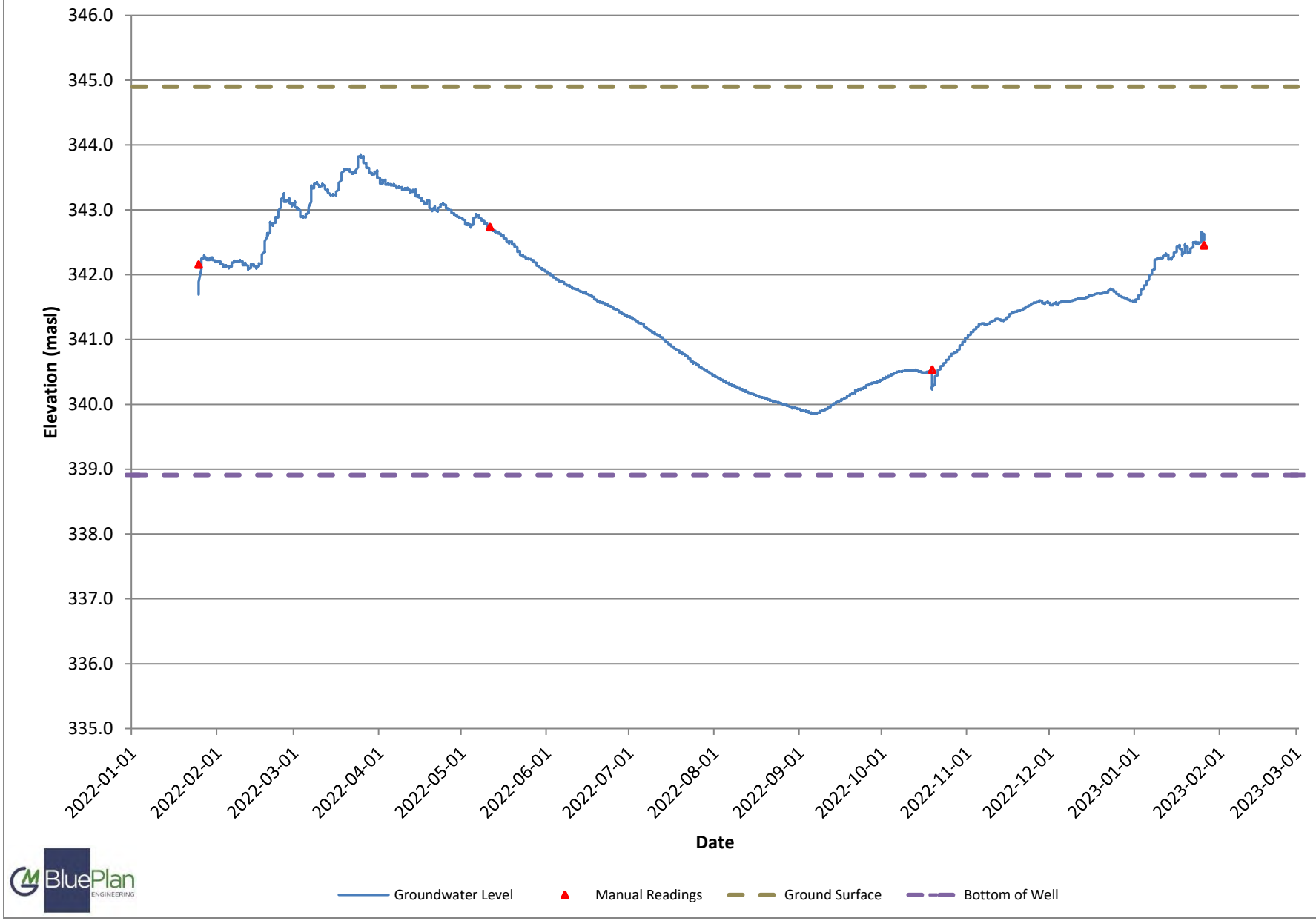


Chart 4: Hydrograph of MW-4

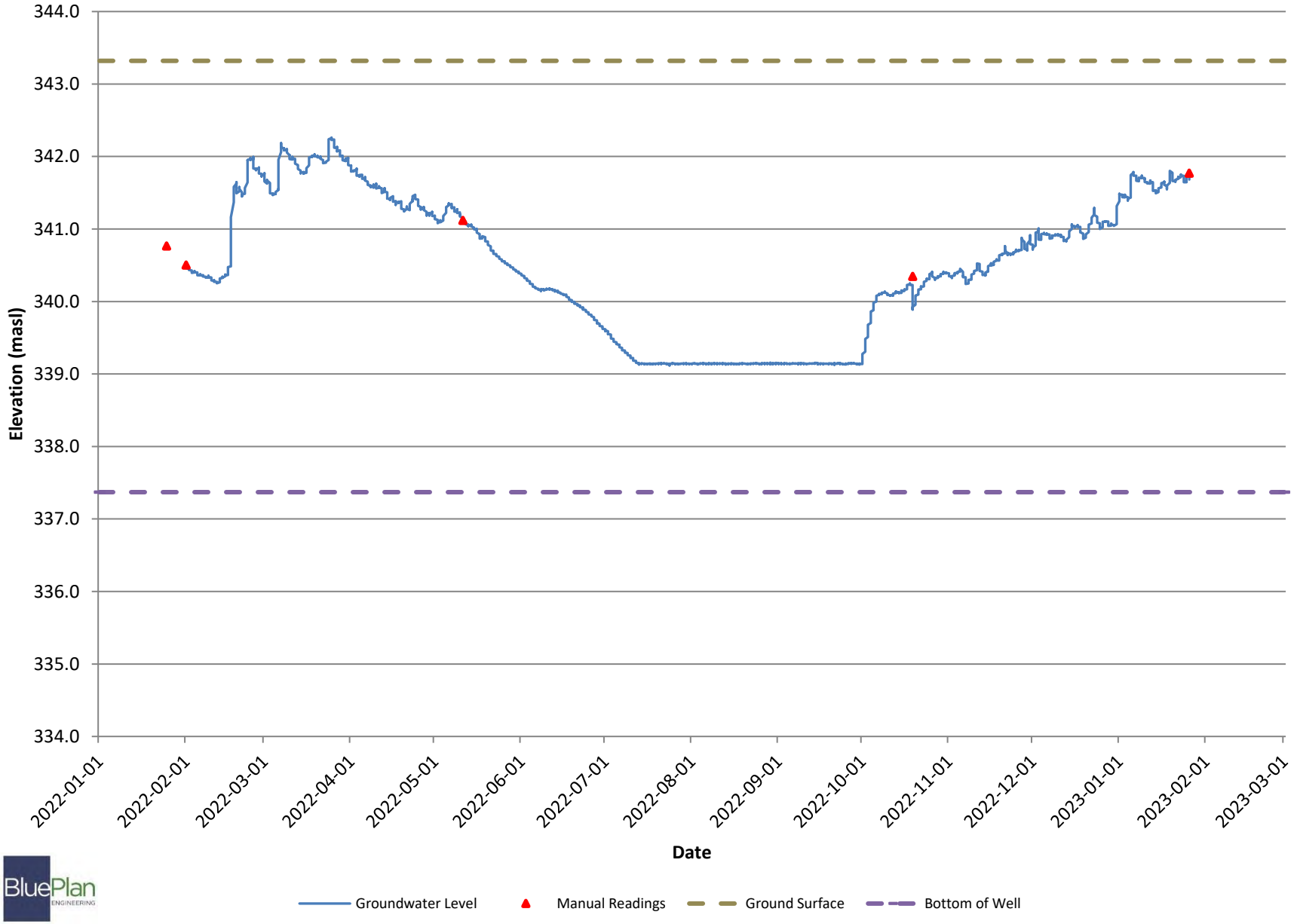
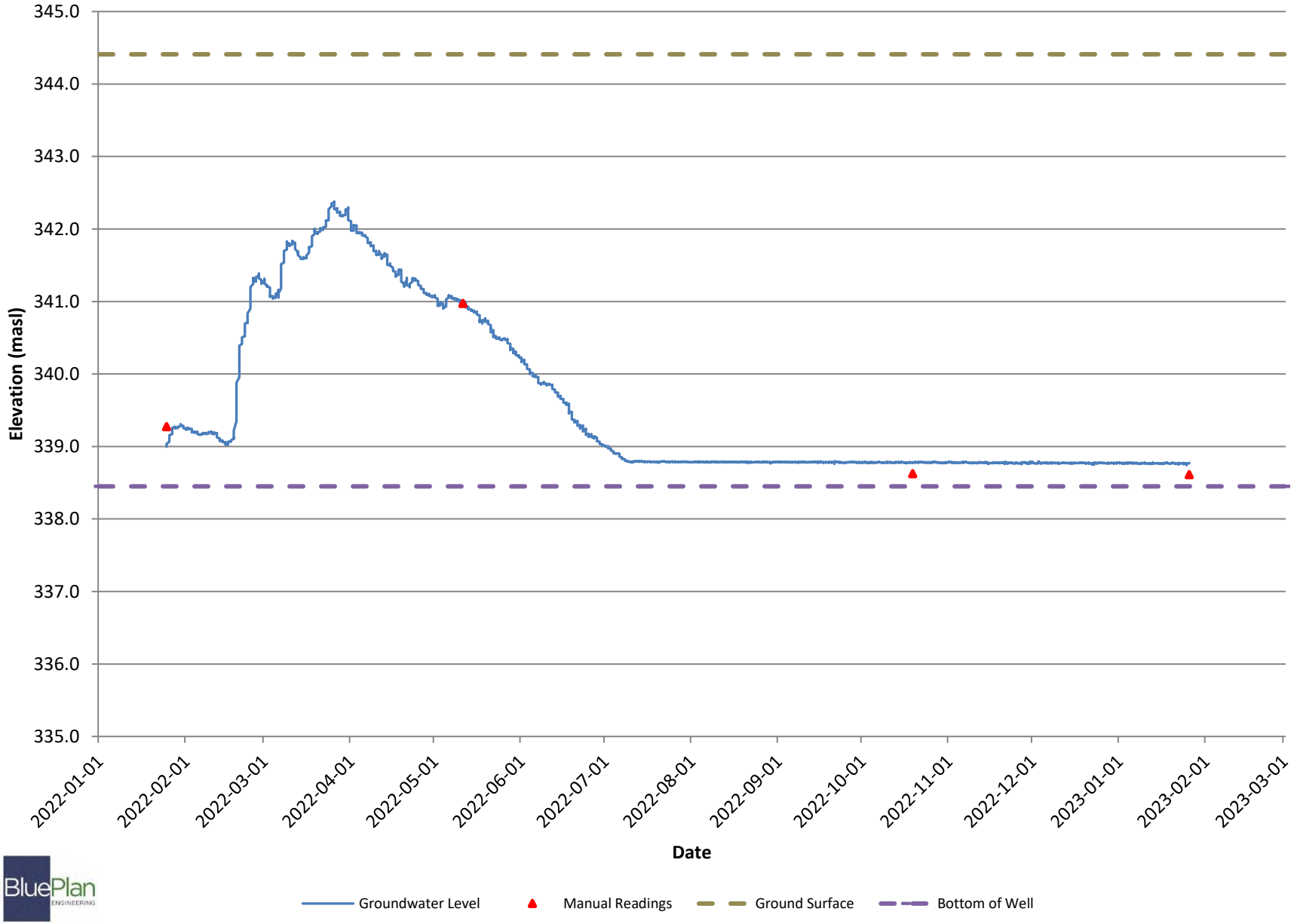
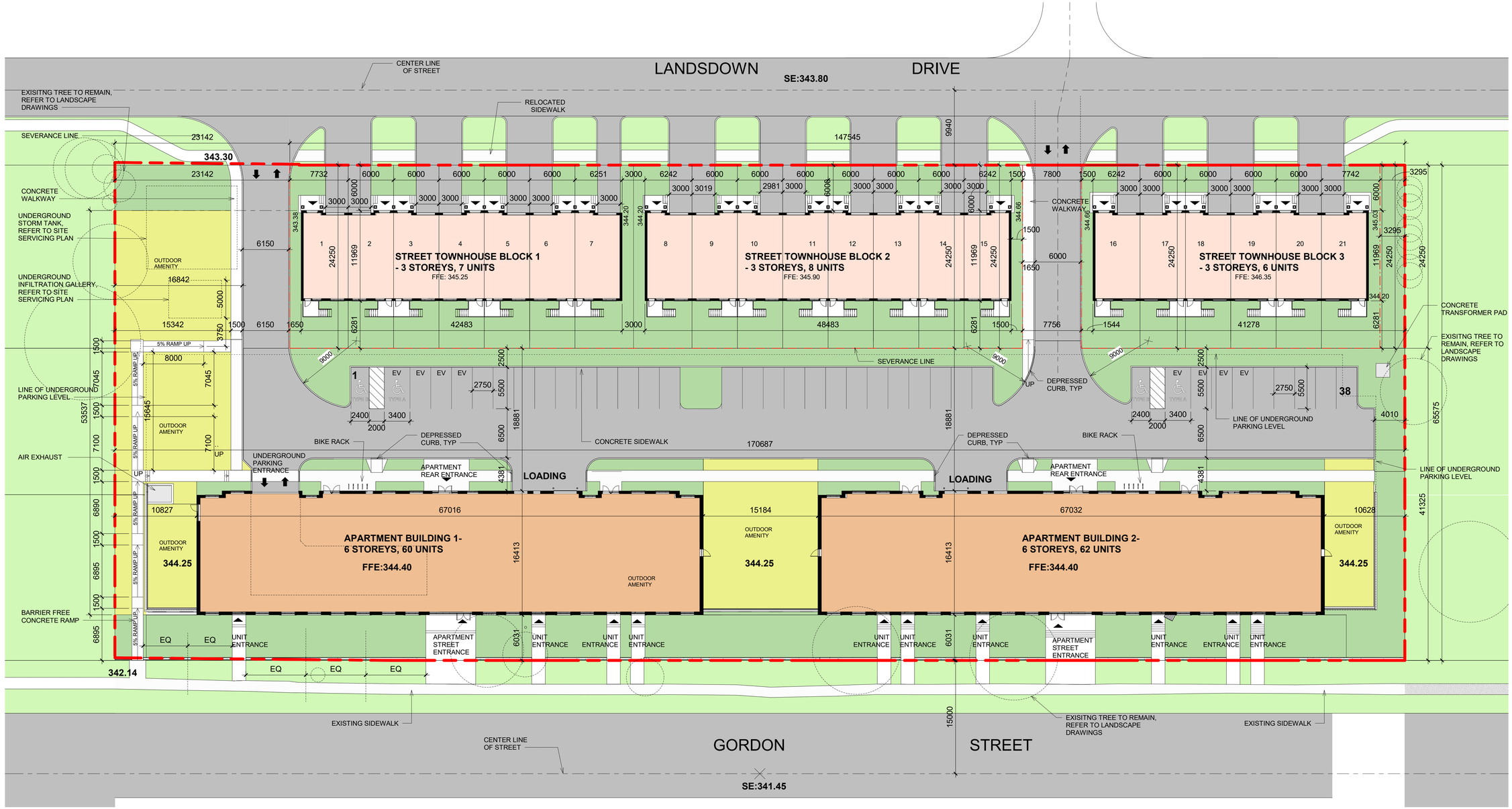


Chart 5: Hydrograph of MW-5



APPENDIX A:
CONCEPTUAL SITE PLAN



1 A0.01 SITE PLAN
1 : 250

PROJECT STATISTICS

THIS SITE PLAN DEVELOPMENT AND ZONING INFORMATION IS BASED ON ZONING BY-LAW (1995)-14864

PROPERTY LEGAL DESCRIPTION

LEGAL DESCRIPTION: PART OF LOT 5, CONCESSION 8, CITY OF GUELPH, COUNTY OF WELLINGTON.

ZONING CLASSIFICATION

CURRENT: R.1B
PROPOSED: R.3B STREET TOWNHOUSE
R.4B HIGH DENSITY APARTMENT

SITE AREA

TOWNHOUSE: 3,308M²
APARTMENT: 7,884M²
TOTAL: 11,192M², 2.766 ACRE

ZONING COMPLIANCE		DENSITY	LOT AREA	LOT FRONTAGE	FRONT YARD	SIDE YARD	REAR YARD	BUILDING COVERAGE	FLOOR SPACE INDEX & GFA	BUILDING HEIGHT	ANGULAR PLANE	BUILDING DISTANCE	COMMON AMENITY AREA	LANDSCAPE AREA	PARKING SPACE	DRIVEWAY WIDTH
TOWNHOUSE (R.3B)	REQUIRED	-	MIN 180M²/UNIT	MIN 6M	MIN 6M	MIN 1.5M	MIN 7.5M	MAX 50%	-	MAX 3 STOREYS	45º	-	-	1,185.8 M² (35% LOT AREA)	MIN 21 (1/UNIT)	MAX 3M (HALF OF LOT FRONTAGE
	PROVIDED	21 UNITS (62.0 UNITS/HA)	145.5M²/UNIT	MIN 6M	6M	MIN. 1.5M	6.28M	46.5%	-	3 STOREYS	37.4º	3M	-	1,265M² (38.2% LOT AREA)	42 (2/UNIT)	3.0M
APARTMENT (R.4B)	REQUIRED	118 UNITS (150 UNITS/HA)	650M²	MIN 15M	MIN 6M	MIN 10.325M	MIN 10.325M	-	MAX 1.50 (GFA 11,826M²)	MAX 10 STOREYS	45º	MIN 15M	2,640M² *	3161.6 M² (40% LOT AREA)	MIN 158 **	MIN 6.5M-7.0M
	PROVIDED	122 UNITS (154.7 UNITS/HA)	7,884M²	170.7M	6M	10.628M	18,881M	-	1.59 (12,568 M²)	6 STOREYS	47.6º	15M	1,526M²	3460M² (43.9% LOT AREA)	162	6.5M-7.0M

* REQUIRED APARTMENT COMMON AMENITY AREA CALCULATION:
30 M² PER UNIT FOR FIRST 20 UNITS AND 20M² PER UNIT FOR ADDITIONAL UNITS.

** REQUIRED APARTMENT PARKING SPACE CALCULATION:
1.5 PARKING SPACE PER UNIT FOR THE FIRST 20 UNITS AND 1.25 PARKING SPACE PER UNIT IN ADDITION TO 20 UNITS, INCLUDING 20% VISITOR PARKING SPACES.
REGULAR PARKING SPACE: 2.75Mx5.5M.
BARRIER FREE PARKING SPACE: 3.4Mx5.5M FOR TYPE A, AND 2.4Mx5.5M FOR TYPE B, WITH 1.5M WIDE AISLE

APARTMENT UNIT MIX

1 BEDROOM	33	27.05%
2 BEDROOM	55	45.08%
3 BEDROOM	25	20.49%
4 BEDROOM	9	7.38%
TOTAL	122	100%

CREDIT NOTES

THIS SITE PLAN IS BASED UPON AND MUST BE READ IN CONJUNCTION WITH THE TOPOGRAPHICAL PLAN OF SURVEY PREPARED BY VAN HARTEN SURVEYING INC., FILE NO. 27080-19, DATED FEBRUARY 21, 2021.
BROADVIEW ARCHITECT INC. ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA SUPPLIED AND SUCH DATA IS NOT INCLUDED UNDER SEALS OF CERTIFICATION, IF ANY

Broadview Architect Inc.
10 Four Seasons Place, Suite 1000
Toronto, ON., M9B 6H7
Tel: 416.938.0399
www.broadviewarch.com

NO.	ISSUED FOR	DATE
1	Pre-Consultation	Mar 17, 2021
2	ZBA/OPA	Feb 7, 2022
3	ZBA/OPA	Apr 14, 2023

SEAL

CONSTRUCTION NORTH TRUE NORTH

1166_1204 GORDON STREET RESIDENTIAL DEVELOPMENT

1166_1204 GORDON STREET, GUELPH, ONTARIO

SHEET NAME

SITE PLAN AND PROJECT STATISTICS

START DATE: Feb 2021
DRAWN BY: HC
CHECKED BY:
SCALE: As indicated
PROJECT NO.: 21002
DRAWING: A0.01

D:\Architectural\01- Architectural Projects\2021\21002-1166_1204 Gordon St., Guelph\0 2- Drawings\Revit Project\1166_1204 Gordon St_Guelph-Apartments_2023_LT.rvt
2023-04-13 5:13:44 PM

APPENDIX B:
WATER WELL RECORDS

UTM Z E
R N
Elev. R 1 1 3 0
Basin 2 3

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

67 No. 2557

Water-Well Record

County or Territorial District Wellington Township, ~~Village, Town or City~~ Puslinch
Con. VIII Lot 25 5 Street and Number (if in Village, Town or City)
Owner [redacted] Address R R # 3 Guelph Ont.
Date completed 24th (day) June (month) 1954 (year)

Pipe and Casing Record [redacted]

Casing diameter(s) 4½"
Length(s) 77 ft
Type of screen none
Length of screen none

Pumping Test

Static level 34 ft
Pumping rate 480 G P H
Pumping level 61 ft
Duration of test 6 hrs.

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Top soil		2
clay & stones	2	73
grey rock	73	111
black rock	111	124
grey rock	124	136

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
94 ft - 136 ft	fresh	102 ft

For what purpose(s) is the water to be used?
house
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? hillside

Drilling firm J.L.Graham
Address R R # 3 Guelph Ont.

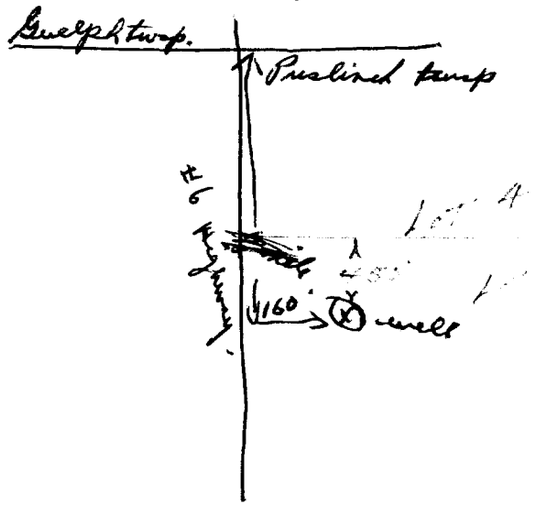
Name of Driller J.L.Graham
Address R R # 3
helper - George Peres. Guelph
Licence Number

I certify that the foregoing statements of fact are true.

Date June 24 1954
Signature of Licensee

Location of Well

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



CSS.S8

Form 5

UTM 1 7 Z | | E

1 7 R | | N

Elev. 9 R 9 1 2 5

Basin 2 3

Con VIII

Lot 5

No. 2561

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

PUSLINCH

[redacted]p, ~~Village, Town or City~~ ...Puslinch Twp

[redacted]Town or City)

[redacted]s. 15 Waterloo St E

Date Completed ... 16 (day) ... Oct (month) ... 54 (year) Cost of Well (excluding pump) ...

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	4 inch	Date	Oct 16/54
Length(s) of casing(s)	5	Static level	36 ft
Type of screen	—	Pumping level	42 ft
Length of screen	—	Pumping rate	10 gal per min
Distance from top of screen to ground level	—	Duration of test	½ hr
Is well a gravel-wall type?	no	Distance from cylinder or bowls to ground level	—

Water Record

Kind (fresh or mineral) ... fresh

Quality (hard, soft, contains iron, sulphur, etc.) ... hard

Appearance (clear, cloudy, coloured) ... Clear

For what purpose(s) is the water to be used? ... domestic

How far is well from possible source of contamination? ... none

What is the source of contamination? ... —

Enclose a copy of any mineral analysis that has been made of water ... —

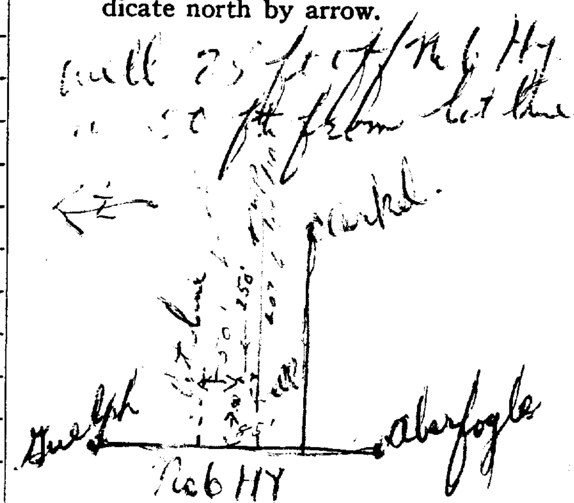
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
101	fresh	65

Well Log

Overburden and Bedrock Record	From 0 ft.	To ....ft.
hard pan	0	61
rough gravel	61	77
grey limestone	77	101

Location of Well

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



Situation: Is well on upland, in valley, or on hillside? ... hillside

Drilling Firm ... Charles Hill

Address ... R R 2 Elora

Name of Driller ... John Cudney

Address ... Salem Ont

Date ... Oct 16/54

Licence Number ... 272

Charles Hill

Signature of Licensee

FORM 5

CSS 58

UTM | | Z | | | | | | E
| 9 | R | | | | | | | N
Elev. | 9 | R | 1 | 1 | 3 | 0 |
Basin | 2 | 3 | | | |

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

No. 2562

Water-Well Record

County or Territorial District....Wellington.....Township, ~~Village, Town or City~~....Puslinch.....

[redacted] Village, Town or City)....R R # 3 Guelph.....

[redacted] Address ....R..R..#..3..Guelph..Ont.....

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) ....4½"....
Length(s) ....75 ft.....
Type of screen ....none....
Length of screen ....none....

Pumping Test

Static level ....34 ft....
Pumping rate ....10 G P M....
Pumping level ....44 ft....
Duration of test ....3 hrs....

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
stones & clay		64	100'- 125'	91 ft	fresh
sand clay	64	67			
light brown rock	67	125			

Water Record

For what purpose(s) is the water to be used?
....house....
Is water clear or cloudy?....clear....
Is well on upland, in valley, or on hillside....upland....

Drilling firm ....J L Graham....
Address ....R R # 3 Guelph....

Name of Driller ....Albert Earley....
Address ....17 Fleet St. Guelph....

Licence Number....353....

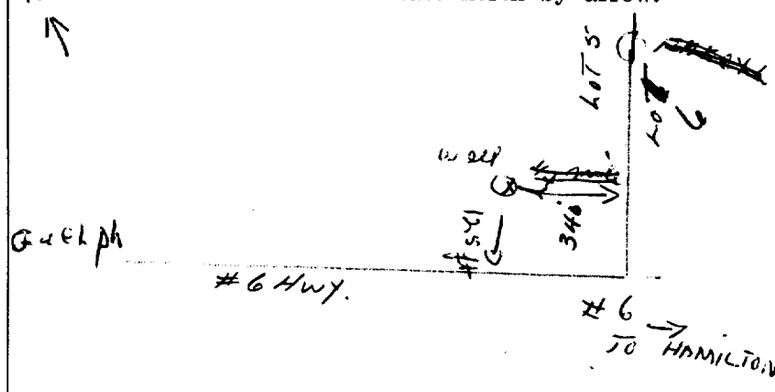
I certify that the foregoing statements of fact are true.

Date....Dec..24..1954....

Signature of Licensee

Location of Well

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



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Form 5

APPENDIX C:
WELLHEAD PROTECTION AREA VULNERABILITY MAP

Grand River Conservation Authority

Date: Nov 22, 2022

WHPA Vulnerability

WHPA Vulnerability scores for 1166-1204 Gordon Street, Guelph

Legend

- Municipal Boundary (GRCA)
- Watercourse - Local (GRCA)

WHPA Vulnerability (GRCA)

- 10
- 8
- 6
- 4
- 2
- Waterbody - Local (GRCA)

0 10 20 40 60 Metres

N

Map Centre (UTM NAD83 z17): 564,328.55 4,818,635.67

This map is not to be used for navigation | 2020 Ortho (ON)

NAD 1983 UTM Zone 17N

Scale: 1,986

APPENDIX D:
CERTIFICATE OF ANALYSIS

Your Project #: 121139
Site Location: GORDON STREET
Your C.O.C. #: n/a

Attention: Abdi Faarah

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

Report Date: 2022/10/28
Report #: R7361514
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2U6144
Received: 2022/10/19, 17:00

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonaceous BOD	2	2022/10/21	2022/10/26	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	2	N/A	2022/10/25	CAM SOP-00463	SM 23 4500-Cl E m
Total Cyanide	2	2022/10/21	2022/10/23	CAM SOP-00457	OMOE E3015 5 m
Fluoride	2	2022/10/24	2022/10/25	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2022/10/24	2022/10/24	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	1	2022/10/25	2022/10/25	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by Axial ICP	2	2022/10/25	2022/10/25	CAM SOP-00408	EPA 6010D m
Total Metals Analysis by ICPMS	2	N/A	2022/10/26	CAM SOP-00447	EPA 6020B m
Fecal coliform, (5TMPN/100mL)	2	N/A	2022/10/20	MFHPB-19, Apr 2002	Health Canada
Animal and Vegetable Oil and Grease	2	N/A	2022/10/26	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	2	2022/10/25	2022/10/26	CAM SOP-00326	EPA1664B m,SM5520B m
pH	2	2022/10/24	2022/10/25	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	2	N/A	2022/10/25	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	2	N/A	2022/10/26	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	2	2022/10/25	2022/10/26	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (1)	2	2022/10/25	2022/10/26	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	2	2022/10/24	2022/10/25	CAM SOP-00428	SM 23 2540D m

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 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

Your Project #: 121139
Site Location: GORDON STREET
Your C.O.C. #: n/a

Attention: Abdi Faarah

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

Report Date: 2022/10/28
Report #: R7361514
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C2U6144
Received: 2022/10/19, 17:00

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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765

==========

Bureau Veritas 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 Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

GUELPH SANITARY SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ494			UBJ494		
Sampling Date				2022/10/19 14:00			2022/10/19 14:00		
COC Number				n/a			n/a		
	UNITS	Criteria	Criteria-2	MW - 3	RDL	QC Batch	MW - 3 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	-	100	1.8	0.50	8295419			
Inorganics									
Fluoride (F-)	mg/L	-	10	0.18	0.10	8302996	0.17	0.10	8302996
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	<2.0 (1)	2.0	8305162			
Phenols-4AAP	mg/L	-	1	<0.0010	0.0010	8305386			
Dissolved Sulphate (SO4)	mg/L	-	1500	47	1.0	8303009			
Total Cyanide (CN)	mg/L	-	2	<0.0050	0.0050	8297303			
Dissolved Chloride (Cl-)	mg/L	-	1500	140	1.0	8303007			
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	2.8	0.50	8305290			
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	1.0	0.50	8305298			
Metals									
Total Aluminum (Al)	mg/L	-	50	8.1	0.1	8303257			
Total Antimony (Sb)	mg/L	-	5	<0.02	0.02	8303257			
Total Arsenic (As)	mg/L	-	1	<0.01	0.01	8303257			
Total Bismuth (Bi)	mg/L	-	5	<0.05	0.05	8303257			
Total Cadmium (Cd)	mg/L	0.001	1	**<0.002 (2)**	0.002	8303257			
Total Chromium (Cr)	mg/L	-	5	0.02	0.01	8303257			
Total Cobalt (Co)	mg/L	-	5	0.007	0.002	8303257			
Total Copper (Cu)	mg/L	0.01	3	0.02	0.01	8303257			
Total Iron (Fe)	mg/L	-	50	14	0.02	8303257			
Total Lead (Pb)	mg/L	0.05	5	0.06	0.01	8303257			
Total Manganese (Mn)	mg/L	-	5	0.81	0.001	8303257			
Total Molybdenum (Mo)	mg/L	-	5	0.011	0.005	8303257			
Total Nickel (Ni)	mg/L	0.05	3	0.015	0.005	8303257			
Total Phosphorus (P)	mg/L	-	10	0.88	0.05	8303257			
Total Selenium (Se)	mg/L	-	5	<0.02	0.02	8303257			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202
(1) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.

(2) RDL exceeds criteria

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Bureau Veritas Job #: C2U6144
Report Date: 2022/10/28

GM BluePlan Engineering Limited
Client Project #: 121139
Site Location: GORDON STREET
Sampler Initials: AF

GUELPH SANITARY SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ494			UBJ494		
Sampling Date				2022/10/19 14:00			2022/10/19 14:00		
COC Number				n/a			n/a		
	UNITS	Criteria	Criteria-2	MW - 3	RDL	QC Batch	MW - 3 Lab-Dup	RDL	QC Batch
Total Silver (Ag)	mg/L	-	5	<0.01	0.01	8303257			
Total Tin (Sn)	mg/L	-	5	<0.02	0.02	8303257			
Total Titanium (Ti)	mg/L	-	5	0.28	0.005	8303257			
Total Vanadium (V)	mg/L	-	5	0.023	0.005	8303257			
Total Zinc (Zn)	mg/L	0.05	3	0.23	0.005	8303257			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202

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GUELPH SANITARY SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ495		
Sampling Date				2022/10/19 14:30		
COC Number				n/a		
	UNITS	Criteria	Criteria-2	MW - 4	RDL	QC Batch
Calculated Parameters						
Total Animal/Vegetable Oil and Grease	mg/L	-	100	1.2	0.50	8295419
Inorganics						
Fluoride (F-)	mg/L	-	10	0.70	0.10	8302996
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	9.1	1.0	8305162
Phenols-4AAP	mg/L	-	1	<0.0010	0.0010	8305386
Dissolved Sulphate (SO4)	mg/L	-	1500	83	1.0	8303009
Total Cyanide (CN)	mg/L	-	2	<0.0050	0.0050	8297303
Dissolved Chloride (Cl-)	mg/L	-	1500	100	1.0	8303007
Petroleum Hydrocarbons						
Total Oil & Grease	mg/L	-	-	1.8	0.50	8305290
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	0.60	0.50	8305298
Metals						
Total Aluminum (Al)	mg/L	-	50	1.3	0.1	8303257
Total Antimony (Sb)	mg/L	-	5	<0.02	0.02	8303257
Total Arsenic (As)	mg/L	-	1	<0.01	0.01	8303257
Total Bismuth (Bi)	mg/L	-	5	<0.05	0.05	8303257
Total Cadmium (Cd)	mg/L	0.001	1	**<0.002 (1)**	0.002	8303257
Total Chromium (Cr)	mg/L	-	5	<0.01	0.01	8303257
Total Cobalt (Co)	mg/L	-	5	0.003	0.002	8303257
Total Copper (Cu)	mg/L	0.01	3	0.01	0.01	8303257
Total Iron (Fe)	mg/L	-	50	1.5	0.02	8303257
Total Lead (Pb)	mg/L	0.05	5	0.01	0.01	8303257
Total Manganese (Mn)	mg/L	-	5	0.29	0.001	8303257
Total Molybdenum (Mo)	mg/L	-	5	0.007	0.005	8303257
Total Nickel (Ni)	mg/L	0.05	3	0.009	0.005	8303257
Total Phosphorus (P)	mg/L	-	10	0.10	0.05	8303257
Total Selenium (Se)	mg/L	-	5	<0.02	0.02	8303257
Total Silver (Ag)	mg/L	-	5	<0.01	0.01	8303257
Total Tin (Sn)	mg/L	-	5	<0.02	0.02	8303257
Total Titanium (Ti)	mg/L	-	5	0.028	0.005	8303257

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202
(1) RDL exceeds criteria

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GUELPH SANITARY SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ495		
Sampling Date				2022/10/19 14:30		
COC Number				n/a		
	UNITS	Criteria	Criteria-2	MW - 4	RDL	QC Batch
Total Vanadium (V)	mg/L	-	5	0.005	0.005	8303257
Total Zinc (Zn)	mg/L	0.05	3	0.043	0.005	8303257

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202

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Bureau Veritas Job #: C2U6144
Report Date: 2022/10/28

GM BluePlan Engineering Limited
Client Project #: 121139
Site Location: GORDON STREET
Sampler Initials: AF

GUELPH STORM SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ494			UBJ494	
Sampling Date				2022/10/19 14:00			2022/10/19 14:00	
COC Number				n/a			n/a	
	UNITS	Criteria	Criteria-2	MW - 3	RDL	QC Batch	MW - 3 Lab-Dup	QC Batch
Inorganics								
Total Carbonaceous BOD	mg/L	15	300	<2	2	8298747		
pH	pH	6.0:9.0	5.5:9.5	7.78		8303000	7.81	8303000
Total Suspended Solids	mg/L	15	350	610	10	8302259		
Metals								
Mercury (Hg)	mg/L	0.001	0.1	<0.00010	0.00010	8301159		
Total Cadmium (Cd)	ug/L	1	1000	0.66	0.090	8303664		
Total Chromium (Cr)	ug/L	-	5000	25	5.0	8303664		
Total Copper (Cu)	ug/L	10	3000	25	0.90	8303664		
Total Lead (Pb)	ug/L	50	5000	50	0.50	8303664		
Total Nickel (Ni)	ug/L	50	3000	16	1.0	8303664		
Total Zinc (Zn)	ug/L	50	3000	250	5.0	8303664		
Microbiological								
Fecal coliform	5TMPN/100mL	-	-	<1.8	1.8	8297025		

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202

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GUELPH STORM SEWER BYLAW (1996-15202)

Bureau Veritas ID				UBJ495		
Sampling Date				2022/10/19 14:30		
COC Number				n/a		
	UNITS	Criteria	Criteria-2	MW - 4	RDL	QC Batch
Inorganics						
Total Carbonaceous BOD	mg/L	15	300	<2	2	8298747
pH	pH	6.0:9.0	5.5:9.5	7.53		8303000
Total Suspended Solids	mg/L	15	350	230	10	8302259
Metals						
Mercury (Hg)	mg/L	0.001	0.1	<0.00010	0.00010	8303531
Total Cadmium (Cd)	ug/L	1	1000	0.14	0.090	8303664
Total Chromium (Cr)	ug/L	-	5000	<5.0	5.0	8303664
Total Copper (Cu)	ug/L	10	3000	13	0.90	8303664
Total Lead (Pb)	ug/L	50	5000	6.6	0.50	8303664
Total Nickel (Ni)	ug/L	50	3000	9.6	1.0	8303664
Total Zinc (Zn)	ug/L	50	3000	46	5.0	8303664
Microbiological						
Fecal coliform	5TMPN/100mL	-	-	<1.8	1.8	8297025

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Guelph Storm Sewer Discharges Bylaw (1996)-15202
Criteria-2: Guelph Sanitary Sewer Discharges Bylaw (1996)-15202

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Bureau Veritas Job #: C2U6144
Report Date: 2022/10/28

GM BluePlan Engineering Limited
Client Project #: 121139
Site Location: GORDON STREET
Sampler Initials: AF

TEST SUMMARY

Bureau Veritas ID: UBJ494
Sample ID: MW - 3
Matrix: Water

Collected: 2022/10/19
Shipped:
Received: 2022/10/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	8298747	2022/10/21	2022/10/26	Gurjot Kaur
Chloride by Automated Colourimetry	KONE	8303007	N/A	2022/10/25	Samuel Law
Total Cyanide	SKAL/CN	8297303	2022/10/21	2022/10/23	Prgya Panchal
Fluoride	ISE	8302996	2022/10/24	2022/10/25	Kien Tran
Mercury in Water by CVAA	CV/AA	8301159	2022/10/24	2022/10/24	Japneet Gill
Total Metals Analysis by Axial ICP	ICPX	8303257	2022/10/25	2022/10/25	Gagandeep Rai
Total Metals Analysis by ICPMS	ICP/MS	8303664	N/A	2022/10/26	Nan Raykha
Fecal coliform, (5TMPN/100mL)	INC/MPN	8297025	N/A	2022/10/20	Sonja Elavinamannil
Animal and Vegetable Oil and Grease	BAL	8295419	N/A	2022/10/26	Automated Statchk
Total Oil and Grease	BAL	8305290	2022/10/25	2022/10/26	Navneet Singh
pH	AT	8303000	2022/10/24	2022/10/25	Kien Tran
Phenols (4AAP)	TECH/PHEN	8305386	N/A	2022/10/25	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8303009	N/A	2022/10/26	Samuel Law
Total Kjeldahl Nitrogen in Water	SKAL	8305162	2022/10/25	2022/10/26	Rajni Tyagi
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	8305298	2022/10/25	2022/10/26	Navneet Singh
Total Suspended Solids	BAL	8302259	2022/10/24	2022/10/25	Masood Siddiqui

Bureau Veritas ID: UBJ494 Dup
Sample ID: MW - 3
Matrix: Water

Collected: 2022/10/19
Shipped:
Received: 2022/10/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Fluoride	ISE	8302996	2022/10/24	2022/10/25	Kien Tran
pH	AT	8303000	2022/10/24	2022/10/25	Kien Tran

Bureau Veritas ID: UBJ495
Sample ID: MW - 4
Matrix: Water

Collected: 2022/10/19
Shipped:
Received: 2022/10/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	8298747	2022/10/21	2022/10/26	Gurjot Kaur
Chloride by Automated Colourimetry	KONE	8303007	N/A	2022/10/25	Samuel Law
Total Cyanide	SKAL/CN	8297303	2022/10/21	2022/10/23	Prgya Panchal
Fluoride	ISE	8302996	2022/10/24	2022/10/25	Kien Tran
Mercury in Water by CVAA	CV/AA	8303531	2022/10/25	2022/10/25	Japneet Gill
Total Metals Analysis by Axial ICP	ICPX	8303257	2022/10/25	2022/10/25	Gagandeep Rai
Total Metals Analysis by ICPMS	ICP/MS	8303664	N/A	2022/10/26	Nan Raykha
Fecal coliform, (5TMPN/100mL)	INC/MPN	8297025	N/A	2022/10/20	Sonja Elavinamannil
Animal and Vegetable Oil and Grease	BAL	8295419	N/A	2022/10/26	Automated Statchk
Total Oil and Grease	BAL	8305290	2022/10/25	2022/10/26	Navneet Singh
pH	AT	8303000	2022/10/24	2022/10/25	Kien Tran
Phenols (4AAP)	TECH/PHEN	8305386	N/A	2022/10/25	Mandeep Kaur
Sulphate by Automated Colourimetry	KONE	8303009	N/A	2022/10/26	Samuel Law
Total Kjeldahl Nitrogen in Water	SKAL	8305162	2022/10/25	2022/10/26	Rajni Tyagi

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Bureau Veritas Job #: C2U6144
Report Date: 2022/10/28

GM BluePlan Engineering Limited
Client Project #: 121139
Site Location: GORDON STREET
Sampler Initials: AF

TEST SUMMARY

Bureau Veritas ID: UBJ495
Sample ID: MW - 4
Matrix: Water

Collected: 2022/10/19
Shipped:
Received: 2022/10/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	8305298	2022/10/25	2022/10/26	Navneet Singh
Total Suspended Solids	BAL	8302259	2022/10/24	2022/10/25	Masood Siddiqui

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Bureau Veritas Job #: C2U6144
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GM BluePlan Engineering Limited
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GENERAL COMMENTS

Revised Report[10/28/2022]: criteria added and project name revised

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8297303	Total Cyanide (CN)	2022/10/23	112	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20		
8298747	Total Carbonaceous BOD	2022/10/26					<2	mg/L	NC	30	91	85 - 115
8301159	Mercury (Hg)	2022/10/24	96	75 - 125	115 (1)	80 - 120	0.00036, RDL=0.00010	mg/L	NC	20		
8302259	Total Suspended Solids	2022/10/25					<10	mg/L	6.9	25	100	85 - 115
8302996	Fluoride (F-)	2022/10/25	102	80 - 120	101	80 - 120	<0.10	mg/L	5.6	20		
8303000	pH	2022/10/25			102	98 - 103			0.32	N/A		
8303007	Dissolved Chloride (Cl-)	2022/10/25	NC	80 - 120	103	80 - 120	1.0, RDL=1.0	mg/L	0.86	20		
8303009	Dissolved Sulphate (SO4)	2022/10/26	NC	75 - 125	104	80 - 120	<1.0	mg/L	0.044	20		
8303257	Total Aluminum (Al)	2022/10/25	NC	80 - 120	104	80 - 120	<0.1	mg/L	1.6	20		
8303257	Total Antimony (Sb)	2022/10/25	107	80 - 120	101	80 - 120	<0.02	mg/L	NC	20		
8303257	Total Arsenic (As)	2022/10/25	113	80 - 120	100	80 - 120	<0.01	mg/L	NC	20		
8303257	Total Bismuth (Bi)	2022/10/25	99	80 - 120	99	80 - 120	<0.05	mg/L	0.85	20		
8303257	Total Cadmium (Cd)	2022/10/25	108	80 - 120	99	80 - 120	<0.002	mg/L	NC	20		
8303257	Total Chromium (Cr)	2022/10/25	110	80 - 120	101	80 - 120	<0.01	mg/L	3.3	20		
8303257	Total Cobalt (Co)	2022/10/25	99	80 - 120	97	80 - 120	<0.002	mg/L	NC	20		
8303257	Total Copper (Cu)	2022/10/25	105	80 - 120	96	80 - 120	<0.01	mg/L	3.0	20		
8303257	Total Iron (Fe)	2022/10/25	NC	80 - 120	98	80 - 120	<0.02	mg/L	0.66	20		
8303257	Total Lead (Pb)	2022/10/25	97	80 - 120	99	80 - 120	<0.01	mg/L	1.3	20		
8303257	Total Manganese (Mn)	2022/10/25	NC	80 - 120	96	80 - 120	<0.001	mg/L	0.47	20		
8303257	Total Molybdenum (Mo)	2022/10/25	107	80 - 120	102	80 - 120	<0.005	mg/L	1.6	20		
8303257	Total Nickel (Ni)	2022/10/25	NC	80 - 120	100	80 - 120	<0.005	mg/L	1.1	20		
8303257	Total Phosphorus (P)	2022/10/25	NC	80 - 120	101	80 - 120	<0.05	mg/L	1.1	20		
8303257	Total Selenium (Se)	2022/10/25	114	80 - 120	102	80 - 120	<0.02	mg/L	NC	20		
8303257	Total Silver (Ag)	2022/10/25	102	80 - 120	96	80 - 120	<0.01	mg/L	NC	20		
8303257	Total Tin (Sn)	2022/10/25	103	80 - 120	103	80 - 120	<0.02	mg/L	0.74	20		
8303257	Total Titanium (Ti)	2022/10/25	102	80 - 120	96	80 - 120	<0.005	mg/L	6.6	20		
8303257	Total Vanadium (V)	2022/10/25	105	80 - 120	97	80 - 120	<0.005	mg/L	0	20		
8303257	Total Zinc (Zn)	2022/10/25	NC	80 - 120	99	80 - 120	<0.005	mg/L	0.50	20		
8303531	Mercury (Hg)	2022/10/25	100	75 - 125	99	80 - 120	<0.00010	mg/L	NC	20		
8303664	Total Cadmium (Cd)	2022/10/26	101	80 - 120	100	80 - 120	<0.090	ug/L	1.8	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8303664	Total Chromium (Cr)	2022/10/26	99	80 - 120	100	80 - 120	<5.0	ug/L	NC	20		
8303664	Total Copper (Cu)	2022/10/26	101	80 - 120	103	80 - 120	<0.90	ug/L	3.4	20		
8303664	Total Lead (Pb)	2022/10/26	98	80 - 120	100	80 - 120	<0.50	ug/L	2.0	20		
8303664	Total Nickel (Ni)	2022/10/26	96	80 - 120	99	80 - 120	<1.0	ug/L	2.7	20		
8303664	Total Zinc (Zn)	2022/10/26	100	80 - 120	103	80 - 120	<5.0	ug/L	0.53	20		
8305162	Total Kjeldahl Nitrogen (TKN)	2022/10/26	105	80 - 120	97	80 - 120	<0.10	mg/L	13	20	89	80 - 120
8305290	Total Oil & Grease	2022/10/26			99	85 - 115	<0.50	mg/L	0.25	25		
8305298	Total Oil & Grease Mineral/Synthetic	2022/10/26			96	85 - 115	<0.50	mg/L	0.52	25		
8305386	Phenols-4AAP	2022/10/25	102	80 - 120	99	80 - 120	<0.0010	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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

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Bureau Veritas Job #: C2U6144
Report Date: 2022/10/28

GM BluePlan Engineering Limited
Client Project #: 121139
Site Location: GORDON STREET
Sampler Initials: AF

VALIDATION SIGNATURE PAGE

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

Cristina Carriere, Senior Scientific Specialist

Sonja Elavinamannil, Master of Biochemistry, Team Lead

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

MICRO

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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266

CHAIN OF CUSTODY RECORD - COMPOSITE SAMPLES - ONTARIO

ENV COC - 00019/2

19-Oct-22 17:00

Ashton Gibson

C2U6144

AK0 ENV-1660

Invoice Information	Invoice to (requires report)	Report Information (if differs from invoice)		Project Information	
Company :		Company:		Quotation #:	
Contact Name:	GM Blueplan Engineering Ltd	Contact Name:	Abdi Faarah; Matt Long	P.O. #/ AFE#:	
Street Address:		Street Address:		Project #:	121139
City:	Prov: Postal Code:	City:	Prov: Postal Code:	Site #:	
Phone:		Phone:		Site Location:	Gordon Street
Email:	info@gmblueplan.ca	Email:	abdi.faarah@gmblueplan.ca	Site Location Province:	
Copies:		Copies:	matt.long@gmblueplan.ca	Sampled By:	Abdi Faarah

Rush Confirmation #:

Regulatory Criteria

REG 153: Table 1 / Table 2 / Table 3 / Table _____ — Res/Park / Ind/Comm / Agri/other — Med/Fine / Course / For RSC

OTHER: CCME / Reg 558* / *min 3 day TAT / MISA / PWQO — Reg 406, Table: _____ / Sanitary Sewer Bylaw / Storm Sewer Bylaw / Municipality Guelph

Other (provide detail):

Include Criteria on Certificate of Analysis (check if yes):

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

Regular Turnaround Time (TAT)

☐ 5 to 7 Day ☐ 10 Day

Rush Turnaround Time (TAT) Surcharges apply

Same Day ☐ 1 Day 2 Day ☐ 3 Day 4 Day

Date Required: YY MM DD

	Sample Identification	Start Sample Date YY	MM	DD	Start Time (24hr) HH	MM	TO	End Sample Date YY	MM	DD	End Time (24hr) HH	MM	Matrix	1 FIELD FILTERED	2 FIELD PRESERVED	3 LAB FILTRATION REQUIRED	4 BTEX/ F1	5 F2 - F4	6 VOCs	7 Reg 153 metals and inorganics	8 Reg 153 ICPMS metals	9 Reg 153 metals (Hg, Cr VI, ICPMS metals, HWS - B)	10 Guelph Sewer plug	11	12	13	14 # OF CONTAINERS SUBMITTED	15 HOLD - DO NOT ANALYZE	Comments
1	MW-3	22	10	19	14	00	TO						GW										✓				12		Metals NOT Filtered
2	MW-4	22	10	19	14	30	TO						GW										✓				12		1
3							TO																						
4							TO																						
5							TO																						
6							TO																						
7							TO																						
8							TO																						
9							TO																						
10							TO																						
11							TO																						
12							TO																						

MICRO

REC'D IN WATERLOO

*UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS AND CONDITIONS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS OR BY CALLING THE LABORATORY LISTED ABOVE TO OBTAIN A COPY

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present	✓					
Seal intact	✓					
Cooling media present	✓					
				5	7	6

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present	✓					
Seal intact	✓					
Cooling media present	✓					
				2	3	3

LAB USE ONLY	Yes	No	°C	1	2	3	Temperature reading by:
Seal present							
Seal intact							
Cooling media present							

	Relinquished by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM	Received by: (Signature/ Print)	Date YY	MM	DD	Time HH	MM	Special instructions
1	Abdi Faarah	22	10	19	17	00	KRISHNA PRASAD PAUDEL	2022	10	20	08	47	
2							Ayinde Ammo	2022	10	20	15	45	

Your Project #: 121139
Your C.O.C. #: 767865-48-01

Attention: Abdi Faarah

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

Report Date: 2022/02/02
Report #: R6987313
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C221712
Received: 2022/01/26, 08:38

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	5	N/A	2022/01/27	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	5	N/A	2022/01/28	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	5	N/A	2022/01/28	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	5	N/A	2022/01/27	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	5	N/A	2022/01/27	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	5	N/A	2022/02/01	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	5	N/A	2022/01/31	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	5	N/A	2022/02/01		
Anion and Cation Sum	5	N/A	2022/02/01		
Total Ammonia-N	1	N/A	2022/01/31	CAM SOP-00441	USGS I-2522-90 m
Total Ammonia-N	4	N/A	2022/02/01	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2022/01/28	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	4	N/A	2022/02/01	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	5	2022/01/27	2022/01/27	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	5	N/A	2022/01/28	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	5	N/A	2022/02/01		Auto Calc
Sat. pH and Langelier Index (@ 4C)	5	N/A	2022/02/01		Auto Calc
Sulphate by Automated Colourimetry	5	N/A	2022/01/28	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	5	N/A	2022/02/01		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.

Your Project #: 121139
Your C.O.C. #: 767865-48-01

Attention: Abdi Faarah

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

Report Date: 2022/02/02
Report #: R6987313
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C221712
Received: 2022/01/26, 08:38

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

==========

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC910		RSC911		RSC912		
Sampling Date		2022/01/25 12:45		2022/01/25 12:30		2022/01/25 14:00		
COC Number		767865-48-01		767865-48-01		767865-48-01		
	UNITS	MW-1	QC Batch	MW-2	RDL	MW-3	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	8.00	7802381	14.3	N/A	14.6	N/A	7802381
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	330	7800896	460	1.0	330	1.0	7800896
Calculated TDS	mg/L	390	7800811	730	1.0	820	1.0	7800811
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.1	7800896	3.5	1.0	2.1	1.0	7800896
Cation Sum	me/L	7.33	7802381	14.1	N/A	13.7	N/A	7802381
Hardness (CaCO3)	mg/L	340	7800898	550	1.0	470	1.0	7800898
Ion Balance (% Difference)	%	4.37	7802379	0.660	N/A	3.33	N/A	7802379
Langelier Index (@ 20C)	N/A	0.842	7802382	1.07		0.818		7802382
Langelier Index (@ 4C)	N/A	0.594	7802383	0.824		0.571		7802383
Saturation pH (@ 20C)	N/A	6.99	7802382	6.84		7.01		7802382
Saturation pH (@ 4C)	N/A	7.23	7802383	7.09		7.25		7802383
Inorganics								
Total Ammonia-N	mg/L	<0.050	7808983	0.20	0.050	0.82	0.050	7808983
Conductivity	umho/cm	710	7803274	1300	1.0	1400	1.0	7803274
Dissolved Organic Carbon	mg/L	1.3	7803343	2.0	0.40	2.6	0.40	7803343
Orthophosphate (P)	mg/L	<0.010	7804659	<0.010	0.010	<0.010	0.010	7804659
pH	pH	7.83	7803280	7.91		7.82		7803280
Dissolved Sulphate (SO4)	mg/L	14	7804652	46	1.0	60	1.0	7804652
Alkalinity (Total as CaCO3)	mg/L	330	7803281	460	1.0	330	1.0	7803281
Dissolved Chloride (Cl-)	mg/L	30	7804643	140	1.0	160	2.0	7804643
Nitrite (N)	mg/L	<0.010	7803336	<0.010	0.010	0.482	0.010	7803320
Nitrate (N)	mg/L	2.56	7803336	0.89	0.10	28.9	0.50	7803320
Nitrate + Nitrite (N)	mg/L	2.56	7803336	0.89	0.10	29.4	0.50	7803320
Metals								
Dissolved Aluminum (Al)	ug/L	<4.9	7803580	16	4.9	<4.9	4.9	7803580
Dissolved Antimony (Sb)	ug/L	<0.50	7803580	<0.50	0.50	0.62	0.50	7803580
Dissolved Arsenic (As)	ug/L	<1.0	7803580	<1.0	1.0	1.0	1.0	7803580
Dissolved Barium (Ba)	ug/L	120	7803580	90	2.0	140	2.0	7803580
Dissolved Beryllium (Be)	ug/L	<0.40	7803580	<0.40	0.40	<0.40	0.40	7803580
Dissolved Boron (B)	ug/L	28	7803580	100	10	76	10	7803580
Dissolved Cadmium (Cd)	ug/L	<0.090	7803580	<0.090	0.090	<0.090	0.090	7803580
Dissolved Calcium (Ca)	ug/L	86000	7803580	100000	200	99000	200	7803580
Dissolved Chromium (Cr)	ug/L	<5.0	7803580	<5.0	5.0	<5.0	5.0	7803580
Dissolved Cobalt (Co)	ug/L	<0.50	7803580	<0.50	0.50	<0.50	0.50	7803580

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

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC910		RSC911		RSC912		
Sampling Date		2022/01/25 12:45		2022/01/25 12:30		2022/01/25 14:00		
COC Number		767865-48-01		767865-48-01		767865-48-01		
	UNITS	MW-1	QC Batch	MW-2	RDL	MW-3	RDL	QC Batch
Dissolved Copper (Cu)	ug/L	<0.90	7803580	2.2	0.90	1.3	0.90	7803580
Dissolved Iron (Fe)	ug/L	<100	7803580	<100	100	<100	100	7803580
Dissolved Lead (Pb)	ug/L	<0.50	7803580	<0.50	0.50	<0.50	0.50	7803580
Dissolved Magnesium (Mg)	ug/L	31000	7803580	73000	50	55000	50	7803580
Dissolved Manganese (Mn)	ug/L	24	7803580	46	2.0	69	2.0	7803580
Dissolved Molybdenum (Mo)	ug/L	3.7	7803580	15	0.50	29	0.50	7803580
Dissolved Nickel (Ni)	ug/L	<1.0	7803580	2.9	1.0	<1.0	1.0	7803580
Dissolved Phosphorus (P)	ug/L	100	7803580	110	100	110	100	7803580
Dissolved Potassium (K)	ug/L	2400	7803580	9300	200	13000	200	7803580
Dissolved Selenium (Se)	ug/L	<2.0	7803580	<2.0	2.0	<2.0	2.0	7803580
Dissolved Silicon (Si)	ug/L	3600	7803580	5900	50	3300	50	7803580
Dissolved Silver (Ag)	ug/L	<0.090	7803580	<0.090	0.090	<0.090	0.090	7803580
Dissolved Sodium (Na)	ug/L	11000	7803580	65000	100	89000	100	7803580
Dissolved Strontium (Sr)	ug/L	140	7803580	220	1.0	270	1.0	7803580
Dissolved Thallium (Tl)	ug/L	<0.050	7803580	<0.050	0.050	<0.050	0.050	7803580
Dissolved Titanium (Ti)	ug/L	<5.0	7803580	<5.0	5.0	<5.0	5.0	7803580
Dissolved Uranium (U)	ug/L	1.8	7803580	2.7	0.10	3.7	0.10	7803580
Dissolved Vanadium (V)	ug/L	0.75	7803580	0.87	0.50	0.84	0.50	7803580
Dissolved Zinc (Zn)	ug/L	<5.0	7803580	<5.0	5.0	<5.0	5.0	7803580

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC912			RSC913			RSC913		
Sampling Date		2022/01/25 14:00			2022/01/25 14:30			2022/01/25 14:30		
COC Number		767865-48-01			767865-48-01			767865-48-01		
	UNITS	MW-3 Lab-Dup	RDL	QC Batch	MW-4	RDL	QC Batch	MW-4 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				15.8	N/A	7802381			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				550	1.0	7800896			
Calculated TDS	mg/L				790	1.0	7800811			
Carb. Alkalinity (calc. as CaCO3)	mg/L				2.3	1.0	7800896			
Cation Sum	me/L				13.9	N/A	7802381			
Hardness (CaCO3)	mg/L				480	1.0	7800898			
Ion Balance (% Difference)	%				6.31	N/A	7802379			
Langelier Index (@ 20C)	N/A				0.915		7802382			
Langelier Index (@ 4C)	N/A				0.669		7802383			
Saturation pH (@ 20C)	N/A				6.73		7802382			
Saturation pH (@ 4C)	N/A				6.97		7802383			
Inorganics										
Total Ammonia-N	mg/L	0.82	0.050	7808983	12	0.050	7805115			
Conductivity	umho/cm				1400	1.0	7803274	1400	1.0	7803274
Dissolved Organic Carbon	mg/L				3.9	0.40	7803343			
Orthophosphate (P)	mg/L				0.029	0.010	7804659	0.016	0.010	7804659
pH	pH				7.64		7803280	7.65		7803280
Dissolved Sulphate (SO4)	mg/L				65	1.0	7804652	65	1.0	7804652
Alkalinity (Total as CaCO3)	mg/L				560	1.0	7803281	550	1.0	7803281
Dissolved Chloride (Cl-)	mg/L				120	1.0	7804643	120	1.0	7804643
Nitrite (N)	mg/L				0.087	0.010	7803320			
Nitrate (N)	mg/L				0.37	0.10	7803320			
Nitrate + Nitrite (N)	mg/L				0.46	0.10	7803320			
Metals										
Dissolved Aluminum (Al)	ug/L				<4.9	4.9	7803580			
Dissolved Antimony (Sb)	ug/L				<0.50	0.50	7803580			
Dissolved Arsenic (As)	ug/L				<1.0	1.0	7803580			
Dissolved Barium (Ba)	ug/L				140	2.0	7803580			
Dissolved Beryllium (Be)	ug/L				<0.40	0.40	7803580			
Dissolved Boron (B)	ug/L				76	10	7803580			
Dissolved Cadmium (Cd)	ug/L				<0.090	0.090	7803580			
Dissolved Calcium (Ca)	ug/L				110000	200	7803580			
Dissolved Chromium (Cr)	ug/L				<5.0	5.0	7803580			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC912			RSC913			RSC913		
Sampling Date		2022/01/25 14:00			2022/01/25 14:30			2022/01/25 14:30		
COC Number		767865-48-01			767865-48-01			767865-48-01		
	UNITS	MW-3 Lab-Dup	RDL	QC Batch	MW-4	RDL	QC Batch	MW-4 Lab-Dup	RDL	QC Batch
Dissolved Cobalt (Co)	ug/L				2.2	0.50	7803580			
Dissolved Copper (Cu)	ug/L				5.1	0.90	7803580			
Dissolved Iron (Fe)	ug/L				<100	100	7803580			
Dissolved Lead (Pb)	ug/L				1.5	0.50	7803580			
Dissolved Magnesium (Mg)	ug/L				49000	50	7803580			
Dissolved Manganese (Mn)	ug/L				350	2.0	7803580			
Dissolved Molybdenum (Mo)	ug/L				6.1	0.50	7803580			
Dissolved Nickel (Ni)	ug/L				4.8	1.0	7803580			
Dissolved Phosphorus (P)	ug/L				<100	100	7803580			
Dissolved Potassium (K)	ug/L				12000	200	7803580			
Dissolved Selenium (Se)	ug/L				<2.0	2.0	7803580			
Dissolved Silicon (Si)	ug/L				6500	50	7803580			
Dissolved Silver (Ag)	ug/L				<0.090	0.090	7803580			
Dissolved Sodium (Na)	ug/L				72000	100	7803580			
Dissolved Strontium (Sr)	ug/L				460	1.0	7803580			
Dissolved Thallium (Tl)	ug/L				0.081	0.050	7803580			
Dissolved Titanium (Ti)	ug/L				<5.0	5.0	7803580			
Dissolved Uranium (U)	ug/L				2.5	0.10	7803580			
Dissolved Vanadium (V)	ug/L				1.2	0.50	7803580			
Dissolved Zinc (Zn)	ug/L				<5.0	5.0	7803580			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC914			RSC914		
Sampling Date		2022/01/25 15:00			2022/01/25 15:00		
COC Number		767865-48-01			767865-48-01		
	UNITS	MW-5	RDL	QC Batch	MW-5 Lab-Dup	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	9.29	N/A	7802381			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	360	1.0	7800896			
Calculated TDS	mg/L	440	1.0	7800811			
Carb. Alkalinity (calc. as CaCO3)	mg/L	3.9	1.0	7800896			
Cation Sum	me/L	8.24	N/A	7802381			
Hardness (CaCO3)	mg/L	370	1.0	7800898			
Ion Balance (% Difference)	%	6.01	N/A	7802379			
Langelier Index (@ 20C)	N/A	0.919		7802382			
Langelier Index (@ 4C)	N/A	0.670		7802383			
Saturation pH (@ 20C)	N/A	7.14		7802382			
Saturation pH (@ 4C)	N/A	7.39		7802383			
Inorganics							
Total Ammonia-N	mg/L	0.20	0.050	7808983			
Conductivity	umho/cm	800	1.0	7803274			
Dissolved Organic Carbon	mg/L	1.5	0.40	7803343	1.5	0.40	7803343
Orthophosphate (P)	mg/L	<0.010	0.010	7804659			
pH	pH	8.06		7803280			
Dissolved Sulphate (SO4)	mg/L	12	1.0	7804652			
Alkalinity (Total as CaCO3)	mg/L	360	1.0	7803281			
Dissolved Chloride (Cl-)	mg/L	63	1.0	7804643			
Nitrite (N)	mg/L	<0.010	0.010	7804632			
Nitrate (N)	mg/L	0.13	0.10	7804632			
Nitrate + Nitrite (N)	mg/L	0.13	0.10	7804632			
Metals							
Dissolved Aluminum (Al)	ug/L	12	4.9	7803580			
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	7803580			
Dissolved Arsenic (As)	ug/L	<1.0	1.0	7803580			
Dissolved Barium (Ba)	ug/L	54	2.0	7803580			
Dissolved Beryllium (Be)	ug/L	<0.40	0.40	7803580			
Dissolved Boron (B)	ug/L	62	10	7803580			
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	7803580			
Dissolved Calcium (Ca)	ug/L	57000	200	7803580			
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	7803580			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		RSC914			RSC914		
Sampling Date		2022/01/25 15:00			2022/01/25 15:00		
COC Number		767865-48-01			767865-48-01		
	UNITS	MW-5	RDL	QC Batch	MW-5 Lab-Dup	RDL	QC Batch
Dissolved Cobalt (Co)	ug/L	<0.50	0.50	7803580			
Dissolved Copper (Cu)	ug/L	1.3	0.90	7803580			
Dissolved Iron (Fe)	ug/L	<100	100	7803580			
Dissolved Lead (Pb)	ug/L	<0.50	0.50	7803580			
Dissolved Magnesium (Mg)	ug/L	55000	50	7803580			
Dissolved Manganese (Mn)	ug/L	27	2.0	7803580			
Dissolved Molybdenum (Mo)	ug/L	17	0.50	7803580			
Dissolved Nickel (Ni)	ug/L	<1.0	1.0	7803580			
Dissolved Phosphorus (P)	ug/L	100	100	7803580			
Dissolved Potassium (K)	ug/L	7700	200	7803580			
Dissolved Selenium (Se)	ug/L	<2.0	2.0	7803580			
Dissolved Silicon (Si)	ug/L	4500	50	7803580			
Dissolved Silver (Ag)	ug/L	<0.090	0.090	7803580			
Dissolved Sodium (Na)	ug/L	15000	100	7803580			
Dissolved Strontium (Sr)	ug/L	160	1.0	7803580			
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	7803580			
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	7803580			
Dissolved Uranium (U)	ug/L	1.2	0.10	7803580			
Dissolved Vanadium (V)	ug/L	0.52	0.50	7803580			
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	7803580			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Bureau Veritas Job #: C221712
Report Date: 2022/02/02

GM BluePlan Engineering Limited
Client Project #: 121139
Sampler Initials: AF

TEST SUMMARY

Bureau Veritas ID: RSC910
Sample ID: MW-1
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7800896	N/A	2022/01/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7800898	N/A	2022/02/01	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7803580	N/A	2022/01/31	Nan Raykha
Ion Balance (% Difference)	CALC	7802379	N/A	2022/02/01	Automated Statchk
Anion and Cation Sum	CALC	7802381	N/A	2022/02/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7808983	N/A	2022/02/01	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7803336	N/A	2022/02/01	Chandra Nandlal
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7802382	N/A	2022/02/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7802383	N/A	2022/02/01	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7800811	N/A	2022/02/01	Automated Statchk

Bureau Veritas ID: RSC911
Sample ID: MW-2
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7800896	N/A	2022/01/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7800898	N/A	2022/02/01	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7803580	N/A	2022/01/31	Nan Raykha
Ion Balance (% Difference)	CALC	7802379	N/A	2022/02/01	Automated Statchk
Anion and Cation Sum	CALC	7802381	N/A	2022/02/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7808983	N/A	2022/02/01	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7803320	N/A	2022/02/01	Chandra Nandlal
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7802382	N/A	2022/02/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7802383	N/A	2022/02/01	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7800811	N/A	2022/02/01	Automated Statchk

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TEST SUMMARY

Bureau Veritas ID: RSC912
Sample ID: MW-3
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7800896	N/A	2022/01/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7800898	N/A	2022/02/01	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7803580	N/A	2022/01/31	Nan Raykha
Ion Balance (% Difference)	CALC	7802379	N/A	2022/02/01	Automated Statchk
Anion and Cation Sum	CALC	7802381	N/A	2022/02/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7808983	N/A	2022/02/01	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7803320	N/A	2022/02/01	Chandra Nandlal
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7802382	N/A	2022/02/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7802383	N/A	2022/02/01	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7800811	N/A	2022/02/01	Automated Statchk

Bureau Veritas ID: RSC912 Dup
Sample ID: MW-3
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	7808983	N/A	2022/02/01	Amanpreet Sappal

Bureau Veritas ID: RSC913
Sample ID: MW-4
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7800896	N/A	2022/01/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7800898	N/A	2022/02/01	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7803580	N/A	2022/01/31	Nan Raykha
Ion Balance (% Difference)	CALC	7802379	N/A	2022/02/01	Automated Statchk
Anion and Cation Sum	CALC	7802381	N/A	2022/02/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7805115	N/A	2022/01/31	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7803320	N/A	2022/02/01	Chandra Nandlal
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7802382	N/A	2022/02/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7802383	N/A	2022/02/01	Automated Statchk

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TEST SUMMARY

Bureau Veritas ID: RSC913
Sample ID: MW-4
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7800811	N/A	2022/02/01	Automated Statchk

Bureau Veritas ID: RSC913 Dup
Sample ID: MW-4
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan

Bureau Veritas ID: RSC914
Sample ID: MW-5
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7803281	N/A	2022/01/27	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7800896	N/A	2022/01/28	Automated Statchk
Chloride by Automated Colourimetry	KONE	7804643	N/A	2022/01/28	Alina Dobreanu
Conductivity	AT	7803274	N/A	2022/01/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7800898	N/A	2022/02/01	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7803580	N/A	2022/01/31	Nan Raykha
Ion Balance (% Difference)	CALC	7802379	N/A	2022/02/01	Automated Statchk
Anion and Cation Sum	CALC	7802381	N/A	2022/02/01	Automated Statchk
Total Ammonia-N	LACH/NH4	7808983	N/A	2022/02/01	Amanpreet Sappal
Nitrate & Nitrite as Nitrogen in Water	LACH	7804632	N/A	2022/01/28	Nimarta Singh
pH	AT	7803280	2022/01/27	2022/01/27	Surinder Rai
Orthophosphate	KONE	7804659	N/A	2022/01/28	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7802382	N/A	2022/02/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7802383	N/A	2022/02/01	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7804652	N/A	2022/01/28	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7800811	N/A	2022/02/01	Automated Statchk

Bureau Veritas ID: RSC914 Dup
Sample ID: MW-5
Matrix: Water

Collected: 2022/01/25
Shipped:
Received: 2022/01/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7803343	N/A	2022/01/27	Anna-Kay Gooden

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GENERAL COMMENTS

Results relate only to the items tested.

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Bureau Veritas Job #: C221712
Report Date: 2022/02/02

QUALITY ASSURANCE REPORT

GM BluePlan Engineering Limited
Client Project #: 121139
Sampler Initials: AF

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7803274	Conductivity	2022/01/27			100	85 - 115	<1.0	umho/cm	0	25
7803280	pH	2022/01/27			102	98 - 103			0.077	N/A
7803281	Alkalinity (Total as CaCO3)	2022/01/27			98	85 - 115	<1.0	mg/L	0.25	20
7803320	Nitrate (N)	2022/02/01	95	80 - 120	93	80 - 120	<0.10	mg/L	0.97	20
7803320	Nitrite (N)	2022/02/01	102	80 - 120	103	80 - 120	<0.010	mg/L	0.62	20
7803336	Nitrate (N)	2022/02/01	96	80 - 120	96	80 - 120	<0.10	mg/L	0.78	20
7803336	Nitrite (N)	2022/02/01	104	80 - 120	105	80 - 120	<0.010	mg/L	NC	20
7803343	Dissolved Organic Carbon	2022/01/27	93	80 - 120	94	80 - 120	<0.40	mg/L	3.5	20
7803580	Dissolved Aluminum (Al)	2022/01/31	107	80 - 120	95	80 - 120	<4.9	ug/L		
7803580	Dissolved Antimony (Sb)	2022/01/31	117	80 - 120	101	80 - 120	<0.50	ug/L	NC	20
7803580	Dissolved Arsenic (As)	2022/01/31	106	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
7803580	Dissolved Barium (Ba)	2022/01/31	107	80 - 120	98	80 - 120	<2.0	ug/L	2.3	20
7803580	Dissolved Beryllium (Be)	2022/01/31	106	80 - 120	99	80 - 120	<0.40	ug/L	NC	20
7803580	Dissolved Boron (B)	2022/01/31	100	80 - 120	93	80 - 120	<10	ug/L	1.2	20
7803580	Dissolved Cadmium (Cd)	2022/01/31	106	80 - 120	98	80 - 120	<0.090	ug/L	NC	20
7803580	Dissolved Calcium (Ca)	2022/01/31	NC	80 - 120	96	80 - 120	<200	ug/L		
7803580	Dissolved Chromium (Cr)	2022/01/31	100	80 - 120	91	80 - 120	<5.0	ug/L	NC	20
7803580	Dissolved Cobalt (Co)	2022/01/31	99	80 - 120	92	80 - 120	<0.50	ug/L	3.5	20
7803580	Dissolved Copper (Cu)	2022/01/31	101	80 - 120	93	80 - 120	<0.90	ug/L	2.7	20
7803580	Dissolved Iron (Fe)	2022/01/31	102	80 - 120	93	80 - 120	<100	ug/L		
7803580	Dissolved Lead (Pb)	2022/01/31	97	80 - 120	97	80 - 120	<0.50	ug/L	NC	20
7803580	Dissolved Magnesium (Mg)	2022/01/31	NC	80 - 120	93	80 - 120	<50	ug/L		
7803580	Dissolved Manganese (Mn)	2022/01/31	103	80 - 120	95	80 - 120	<2.0	ug/L		
7803580	Dissolved Molybdenum (Mo)	2022/01/31	116	80 - 120	99	80 - 120	<0.50	ug/L	0.71	20
7803580	Dissolved Nickel (Ni)	2022/01/31	95	80 - 120	91	80 - 120	<1.0	ug/L	3.6	20
7803580	Dissolved Phosphorus (P)	2022/01/31	113	80 - 120	116	80 - 120	<100	ug/L		
7803580	Dissolved Potassium (K)	2022/01/31	107	80 - 120	99	80 - 120	<200	ug/L		
7803580	Dissolved Selenium (Se)	2022/01/31	102	80 - 120	94	80 - 120	<2.0	ug/L	NC	20
7803580	Dissolved Silicon (Si)	2022/01/31	112	80 - 120	96	80 - 120	<50	ug/L		
7803580	Dissolved Silver (Ag)	2022/01/31	99	80 - 120	95	80 - 120	<0.090	ug/L	NC	20
7803580	Dissolved Sodium (Na)	2022/01/31	NC	80 - 120	93	80 - 120	<100	ug/L	2.2	20

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			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7803580	Dissolved Strontium (Sr)	2022/01/31	NC	80 - 120	96	80 - 120	<1.0	ug/L		
7803580	Dissolved Thallium (Tl)	2022/01/31	98	80 - 120	96	80 - 120	<0.050	ug/L	NC	20
7803580	Dissolved Titanium (Ti)	2022/01/31	107	80 - 120	94	80 - 120	<5.0	ug/L		
7803580	Dissolved Uranium (U)	2022/01/31	101	80 - 120	95	80 - 120	<0.10	ug/L	0.39	20
7803580	Dissolved Vanadium (V)	2022/01/31	104	80 - 120	93	80 - 120	<0.50	ug/L	NC	20
7803580	Dissolved Zinc (Zn)	2022/01/31	97	80 - 120	92	80 - 120	<5.0	ug/L	NC	20
7804632	Nitrate (N)	2022/01/28	94	80 - 120	97	80 - 120	<0.10	mg/L	0.48	20
7804632	Nitrite (N)	2022/01/28	98	80 - 120	102	80 - 120	<0.010	mg/L	NC	20
7804643	Dissolved Chloride (Cl-)	2022/01/28	NC	80 - 120	101	80 - 120	<1.0	mg/L	0.036	20
7804652	Dissolved Sulphate (SO4)	2022/01/28	NC	75 - 125	100	80 - 120	<1.0	mg/L	0.036	20
7804659	Orthophosphate (P)	2022/01/28	105	75 - 125	98	80 - 120	<0.010	mg/L	NC	25
7805115	Total Ammonia-N	2022/01/31	96	75 - 125	97	80 - 120	<0.050	mg/L	15	20
7808983	Total Ammonia-N	2022/02/01	96	75 - 125	99	80 - 120	<0.050	mg/L	0.61	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).

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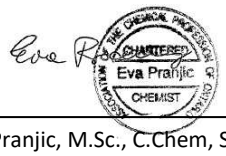
VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific 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.

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26-Jan-22 08:38
Ashton Gibson
C221712

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#1067 GM BluePlan Engineering Limited	Company Name:		Quotation #:	B47865
Attention:	Joe Rotondi	Attention:	Abdi Faarah ; Matt Long	P.O. #:	
Address:	650 Woodlawn Rd W Block C, Unit 2	Address:		Project:	~~210383~~ 121139
	Guelph ON N1K 1B8			Project Name:	
Tel:	(519) 824-8150 Fax: (519) 824-8089	Tel:	Fax:	Site #:	
Email:	jrotondi@gmblueplan.ca info@gmblueplan.ca	Email:	abdi.faarah@gmblueplan.ca	Sampled By:	Abdi Faarah

UDE ENV 1077

COC #: C#767865-48-01

Bottle Order #: 767865

Project Manager: Ashton Gibson

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)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

Special Instructions

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	Alkalinity	Chloride by Automated Colourimetry	Conductivity	Total Ammonia-N	Nitrate (NO3) and Nitrite (NO2) in Water	Total Phosphorus (Colourimetric)	total/dissolved metals	RCAP comprehensive			# of Bottles	Comments
1		MW-1	2022/01/25	12:15	GW	✓								✓			5	
2		MW-2		12:30	GW	✓								✓			5	
3		MW-3		14:00	GW	✓								✓			5	
4		MW-4		~~15:00~~ 14:30	GW	✓								✓			5	
5		MW-5		15:00	GW	✓								✓			5	
6																		
7																		
8																		
9																		
10																		

REC'D IN WATERLOO

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 #)*

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Abdi Faarah	22/01/25	16:00	Sarah Webster	2022/01/26	0838	
			DIPIKA SINGH	2022/01/26	15:45	

Laboratory Use Only
Time Sensitive | Temperature (°C) on Recei: 4 | 3 | 5 | Custody Seal Present ✓ Intact | Yes ✓ | No

* 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

Ice packs.

01/3 4 RH

APPENDIX E:
BOREHOLE LOGS

MONITORING WELL ID: MW-1

BluePlan ENGINEERING

CLIENT GSD Development & Management Inc.
PROJECT NAME 1166 - 1204 Gordon Street Hydrogeological Study
PROJECT NUMBER 121139
PROJECT LOCATION Guelph, ON
DATE COMPLETED 2022-01-04
CONTRACTOR Aardvark Drilling Inc.
LOGGED BY AF
METHOD Hollow Stem Auger
WELL CONSTRUCTION 2" PVC Well Construction
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	SPT N VALUE 20 40 60 80	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
	-2								Protective Stick-Up Casing
0	0	344					0.00 Ground Surface	343.80	
							Brown SAND AND GRAVEL, dry.		
	2		SS 1	2-4-9-11/-0.42	>>				
							0.76	343.04	
							Dark Brown TOPSOIL, some organics, dry.		
							1.07	342.73	
	4		SS 2	2-9-11-9/-0.42	>>		Brown SANDY SILT TILL, some gravel and clay.		Bentonite Seal
	6	342							
2			SS 3	4-5-5-7/-0.42	>>				
	8								
			SS 4	4-7-9-7/-0.42	>>				
	10								GWL = 340.79 masl measured on 2022-01-25
	12		SS 5	4-6-9-9/-0.42	>>				
		340							
4									
	14		SS 6	14-14-13-12/-0.42	>>		4.12	339.68	
							Becomes moist at 4.12 m.		Well Gravel / Filter Pack
	16		SS 7	8-18-12-26/-0.42	>>				PVC Slotted Well Screen
							5.34	338.46	
	18						Becomes wet at 5.34 m.		
		338	SS 8	4-11-11-15/-0.42	>>				
6	20								

Borehole Terminated at 6.10 m.

MONITORING WELL ID: MW-2

CLIENT GSD Development & Management Inc.
PROJECT NAME 1166 - 1204 Gordon Street Hydrogeological Study
PROJECT NUMBER 121139
PROJECT LOCATION Guelph, ON
DATE COMPLETED 2022-01-05
CONTRACTOR Aardvark Drilling Inc.
LOGGED BY AF
METHOD Hollow Stem Auger
WELL CONSTRUCTION 2" PVC Well Construction
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	SPT N VALUE 20 40 60 80	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	-2	344						Protective Stick-Up Casing
0	0						0.00 Ground Surface 343.35	
							0.15 Dark Brown TOPSOIL. 343.20	
	2		SS 1	0-4-5-5/- 0.42	>>		Brown SANDY SILT TILL, some gravel and clay, dry.	
	4	342	SS 2	1-1-2-4/- 0.42	>>			Bentonite Seal
2	6		SS 3	7-6-9-17/- 0.42	>>		Increasing gravel content with depth.	
	8		SS 4	7-11-17-8/- 0.42	>>			
	10	340	SS 5	7-13-15-12/-0.42	>>			GWL = 339.29 masl measured on 2022-01-25
4	12							
	14		SS 6	18-22-27-15/-0.42	>>			Well Gravel / Filter Pack
	16		SS 7	20-30-30-32/-0.42	>>			PVC Slotted Well Screen
	18	338						
6	20		SS 8	22-45-36-40/-0.42	>>			

Borehole Terminated at 6.10 m.

MONITORING WELL ID: MW-3

CLIENT GSD Development & Management Inc.
PROJECT NAME 1166 - 1204 Gordon Street Hydrogeological Study
PROJECT NUMBER 121139
PROJECT LOCATION Guelph, ON
DATE COMPLETED 2022-01-04
CONTRACTOR Aardvark Drilling Inc.
LOGGED BY AF
METHOD Hollow Stem Auger
WELL CONSTRUCTION 2" PVC Well Construction
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	SPT N VALUE 20 40 60 80	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
							Ground Surface	
							0.00 ASPHALT pavement. 344.90	Flushmount Casing
							0.10 Brown SANDY GRAVEL FILL (B-Gravel). 344.80	
	2		SS 1	6-9-11-8/- 0.42	>>			
		344					0.76 Brown SILTY SAND TILL, some gravel and clay, dry. 344.14	
	4		SS 2	6-6-8-3/- 0.42	>>			Bentonite Seal
2	6		SS 3	1-2-6-12/- 0.42	>>			
	8							GWL = 342.16 masl measured on 2022-01-25
		342	SS 4	9-9-9-9/- 0.42	>>			
	10							
			SS 5	4-41-24- 17/-0.42	>>			
4	12							
	14		SS 6	15-13-24- 25/-0.42	>>			Well Gravel / Filter Pack
	16	340	SS 7	50-50-50- 50/-0.42	>>			PVC Slotted Well Screen
	18							
6	20		SS 8	15-33-36- 20/-0.42	>>			

Borehole Terminated at 6.10 m.

MONITORING WELL ID: MW-4

CLIENT GSD Development & Management Inc.
PROJECT NAME 1166 - 1204 Gordon Street Hydrogeological Study
PROJECT NUMBER 121139
PROJECT LOCATION Guelph, ON
DATE COMPLETED 2022-01-05
CONTRACTOR Aardvark Drilling Inc.
LOGGED BY AF
METHOD Hollow Stem Auger
WELL CONSTRUCTION 2" PVC Well Construction
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	SPT N VALUE 20 40 60 80	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	0	344					0.00 Ground Surface 343.32	Protective Stick-Up Casing
							0.18 Dark Brown TOPSOIL. 343.14	
			SS 1	0-2-1-2/-0.42			Brown SANDY SILT TILL, some clay, minor gravel, moist to wet.	
		342	SS 2	1-0-0-1/-0.42				Bentonite Seal
2	6		SS 3	1-4-3-6/-0.42				GWL = 340.77 masl measured on 2022-01-25
			SS 4	3-5-7-3/-0.42				
		340	SS 5	6-15-13-11/-0.42				
4	12						3.81 339.51 Becomes dry starting at 3.81 m.	
	14		SS 6	9-11-13-18/-0.42				Well Gravel / Filter Pack
	16		SS 7	14-40-41-38/-0.42				PVC Slotted Well Screen
		338						
6	20		SS 8	15-23-50-50/-0.42				

Borehole Terminated at 6.10 m.

MONITORING WELL ID: MW-5

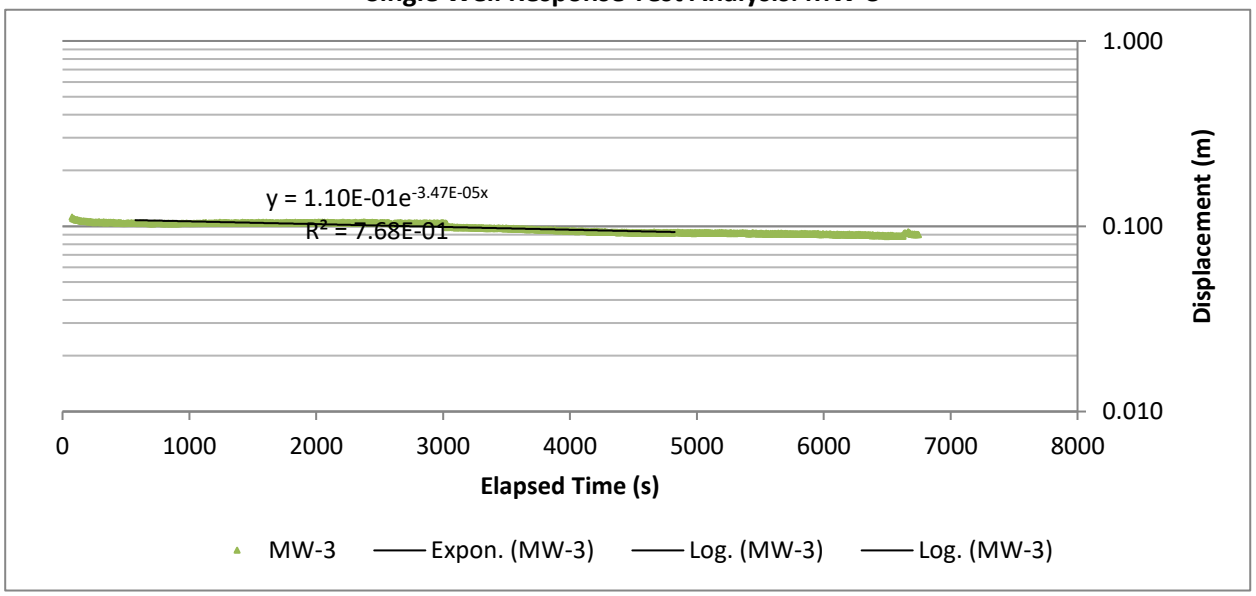
CLIENT GSD Development & Management Inc.
PROJECT NAME 1166 - 1204 Gordon Street Hydrogeological Study
PROJECT NUMBER 121139
PROJECT LOCATION Guelph, ON
DATE COMPLETED 2022-01-04
CONTRACTOR Aardvark Drilling Inc.
LOGGED BY AF
METHOD Hollow Stem Auger
WELL CONSTRUCTION 2" PVC Well Construction
NOTES

DEPTH (m)	DEPTH (ft)	ELEVATION (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	SPT N VALUE 20 40 60 80	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	0						0.00 Ground Surface 344.41	Protective Stick-Up Casing
		344	SS	0-2-2-3/-0.42	>>		Dark Brown TOPSOIL, some silt and moist sand.	
	2						0.61 343.80	
			SS	1-2-4-3/-0.42	>>		Brown SANDY SILT TILL, some clay and gravel, moist to wet.	Bentonite Seal
	4							
2	6		SS	1-3-7-6/-0.42	>>			
		342						
	8		SS	8-26-36-12/-0.42	>>			
	10							
			SS	8-20-20-26/-0.42	>>			
	12						3.81 340.60	
4							Becomes dry starting at 3.81 m.	
	14	340	SS	13-20-32-22/-0.42	>>			Well Gravel / Filter Pack
								PVC Slotted Well Screen
	16		SS	31-23-12-26/-0.42	>>			GWL = 339.27 masl measured on 2022-01-25
	18							
6			SS	12-17-21-37/-0.42	>>			
	20							

Borehole Terminated at 6.10 m.

APPENDIX F:
SLUG TEST ANALYSES

Single Well Response Test Analysis: MW-3



Bouwer-Rice Analysis

Governing Equation:

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

$(1/t)(\ln(y_o/y_t))=$	3.47E-05	(from slope of data)
L =	1.55	(Saturated Length of Screen)
$r_w=$	0.076	(radius of filter pack)
$L/r_w=$	20.4	(ratio)
A =	2.00	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.35	(from shape factor curves in Bouwer and Rice, 1976)
C =	1.75	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.219	(from shape factor equation in Bouwer and Rice, 1976)
D =	1.55	(Saturated Thickness of Geologic Unit)
H =	1.55	(Height of water column above bottom of well)
$r_c=$	0.025	(radius of well casing)
k =	1.6E-08	m/s

Hydraulic Conductivity of Silty Sand/Sandy Silt Till = 1.6E-08 m/s

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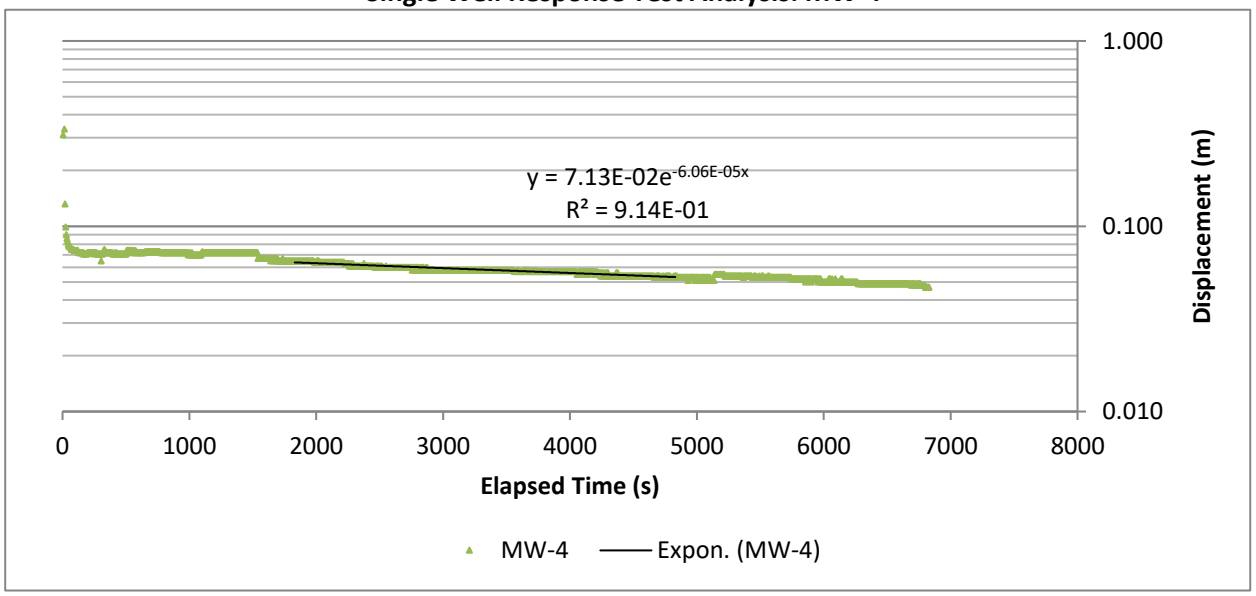
Single Well Response Test Analysis: MW-4



Bouwer-Rice Analysis

Governing Equation:

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

$(1/t)(\ln(y_o/y_t))=$	6.06E-05	(from slope of data)
L =	3.13	(Saturated Length of Screen)
$r_w=$	0.076	(radius of filter pack)
$L/r_w=$	41.2	(ratio)
A =	2.60	(from shape factor curves in Bouwer and Rice, 1976)
B =	0.5	(from shape factor curves in Bouwer and Rice, 1976)
C =	2.4	(from shape factor curves in Bouwer and Rice, 1976)
$\ln(R_e/r_w)=$	2.824	(from shape factor equation in Bouwer and Rice, 1976)
D =	3.13	(Saturated Thickness of Geologic Unit)
H =	3.13	(Height of water column above bottom of well)
$r_c=$	0.025	(radius of well casing)
k =	1.7E-08	m/s

Hydraulic Conductivity of Silty Sand/Sandy Silt Till = 1.7E-08 m/s

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APPENDIX G:
CONSTRUCTION DEWATERING ANALYSIS

Hydrogeological Calculations for Dewatering Estimates

Project: 1166-1204 Gordon Street Residential Development

Project Number: 121139 **Engineer/Technician:** AF

Description of Project:
Construction of two 6-storey residential buildings with a shared underground parking garage fronting on Gordon Street, and four blocks of townhouses fronting onto Landown Drive.

Description of Conceptual Model for Dewatering Estimation:

It is anticpated that some form dewatering will be required during the exacavtion for the founding elevation of the proposed underground parking garage and the basements for the propsoed townhouse units.

Based on available preliminary Site Plans for the proposed developement, the founding elevation for the underground parking garage (which is the excavation that is anticipated to require the most intensive dewatering) is 340.80 masl; and the founding elevation for the townhouse basements is about 342.2 masl.

Sufficient dewatering will be required such that the groundwater is approximately 1.0 m below the founding elevation. The highest recorded water table elevation is 343.84 masl.

The model used herein assumes that the excavations of the basements for all four townhouse blocks is occuring concurrently with the excavation of the underground parking garage.

Therefore, the main objective of dewatering will be to control flows contributed by the silty sand/sandy silt till infiltration into the excavations. The follwoing scenario is modelled using a hydrualic conductivity that was determined through the completion of single-well response tests at two on-site monitoring wells. A hydrualic conductivity of 1.65×10^{-8} m/s is used which is the geometric mean value between the two monitoring wells.

Expected Groundwater Flow for the Underground Parking Garage:
- Required drawdown of 4.0 m
- Dimensions: 35.3 m wide by 148 m long
- Analytical Model for Flow to Well of equivalent Perimeter (366.6 m perimeter => 58.3 m radius)
- Assuming a Hydrualic Conductivity of the Sandy Silt/Silty Sand Till
- k= 1.65×10^{-8} m/s

Expected Groundwater Flow for the contruction of basements for one Townhouse Block (x3 blocks total):
- Required drawdown of 2.7 m
- Dimensions: 12 m wide by 36 m long
- Analytical Model for Flow to Well of equivalent Perimeter (=> 19.0 m radius)
- Assuming a Hydrualic Conductivity of the Sandy Silt/Silty Sand Till
- k= 1.65×10^{-8} m/s

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Hydrogeological Calculations for Dewatering Estimates

Project: 1166-1204 Gordon Street Residential Development

Project Number: 121139 **Engineer/Technician:** AF

Undergound Parking Garage

Radius of Influence Estimation

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

R_0 =	1.5	m (Radius of Influence)
H=	8	m (Initial Head)
h=	4	m (Head at Drawdown)
k=	1.65E-08	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=	9.53E-05	m^3/s (Dewatering Flow)
k=	1.65E-08	m/s (Hydraulic Conductivity)
H=	8	m (Initial Head)
h=	4	m (Head at Drawdown)
R_0 =	59.8	m (Radius of Influence)
r_w=	58.3	m (Radius of Well or System)

Hydrogeological Calculations for Dewatering Estimates

Project: 1166-1204 Gordon Street Residential Development

Project Number: 121139 **Engineer/Technician:** AF

Townhouse Block Basements

Radius of Influence Estimation

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

R_0 =	1.0	m (Radius of Influence)
H=	5.4	m (Initial Head)
h=	2.7	m (Head at Drawdown)
k=	1.65E-08	m/s (Hydraulic Conductivity)

Calculation Approach: Flow to Well

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

Q=	2.13E-05	m^3/s (Dewatering Flow)
k=	1.65E-08	m/s (Hydraulic Conductivity)
H=	5.4	m (Initial Head)
h=	2.7	m (Head at Drawdown)
R_0 =	20.0	m (Radius of Influence)
r_w=	19	m (Radius of Well or System)

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Hydrogeological Calculations for Dewatering Estimates

Project: 1166-1204 Gordon Street Residential Development

Project Number: 121139 **Engineer/Technician:** AF

Summary

Contributions from

	Flow	
Excavation for Underground Parking Levels	8,238	L/d
Excavation for Townhouse Block Basements x3	5,512	L/d

.

Estimated Typical Groundwater Flow	13,749 L/day	*

*-Assumes simulataneous dewatering of underground parking structure and all townhouse basements. Does not account for

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APPENDIX H:
SECTION 59 POLICY APPLICABILITY FORM

Section 59* Policy Applicability Review

1. This form is to be prepared by, or on behalf of, an Applicant for a planning development application, building permit, or for an approval by the Committee of Adjustment. The Source Water Protection Program Coordinator is available to assist Applicants in completing this form.
2. The Section 59 Policy Applicability Review form is organized to first provide an initial screening (Part 3). The Source Water Protection Program Coordinator will review the information presented in Part 3 and make a decision as to whether additional information is required for specific activities (Part 3-1 through Part 3-22). In some cases where sufficient background information is available, the Source Water Protection Program Coordinator will request the additional information at the same time as the initial screening component.
3. The completed Section 59 Policy Applicability Review form will provide the basic information necessary to allow the City of Guelph to assess whether policies under Section 59 of the Clean Water Act, 2006 apply. The Source Water Protection Program Coordinator or the Risk Management Official may request additional information, conduct a detailed interview or site inspection.
4. The Source Water Protection Program Coordinator or the Risk Management Official will conduct a preliminary review to assess the information to determine whether Section 59 policies apply and make a decision with respect to whether policies of the approved Grand River Source Protection Plan for restricted land use under Section 59 of the Clean Water Act, 2006 apply.
5. An Application for a planning approval where Section 59 policies apply will not be deemed complete until the Risk Management Official has issued a Notice – Section 59

Part 1 – Property/Applicant Information:

Date (DD/MMM/YYYY): 08/MAR/2023

Property Owner: GSD Development & Management Inc.

Property Address: 1166, 1170, 1182, 1190, 1200, 1204 Gordon Street, Guelph

Phone: 416-357-8283 Email: gordonview1166@gmail.com

Applicant: Charles Li

Applicant Address: 4 Gainsville Avenue, Markham ON, L3R 1W6

Phone 416-357-8283 Email: gordonview1166@gmail.com

Type of Application

- ☐ Building Permit
- ☐ Site Plan Approval
- ☐ Plan of Subdivision
- ☐ Plan of Condominium
- ☐ Minor Variance
- ☐ Consent/Severance
- ☑ Zoning By-Law Amendment
- ☑ Official Plan Amendment

Brief Description (Overview) of Proposed Application for which the Review of Section 59 Policy Applicability is required:

Redevelopment of existing residential (single-detached houses) property to higher density residential devleopment, consisting of three 3-storey blocks of townhouses and two 6-storey apartment buildings and underground parking.

Yes — Has a Section 59 Policy Applicability Review been carried out previously for all or part of the property that is the subject of this application?

No — Has the Risk Management Official Previously Issued a Notice - S. 59 (2) for all or part of the property that is the subject of this application?

If a Section 59 Policy Applicability Review has been carried out previously, please identify changes to the proposed activities:

Previous proposal was for a residential development with a similar concept but some adjustments have been made (e.g. three blocks of townhouses in the current proposal compared to four blocks in the previous submission).

Part 2 – Existing and Proposed Land Use (Check all that apply):

Existing Land Use

- [x] Low Density Residential (single detached and semi-detached)
- [ ] Commercial – Mixed Use (including home businesses)
- [ ] Institutional
- [ ] Industrial
- [ ] Commercial - Retail
- [ ] Agricultural
- [ ] High Density Residential (Including townhouses and apartments)
- [ ] Commercial – Food Service
- [ ] Parks/Parkettes
- [ ] Commercial – Warehousing
- [ ] Conservation lands
- [ ] Vacant/Undeveloped
- [ ] Commercial/Institutional – Office
- [ ] Roads/Walkways/ Parking Areas
- [ ] Other (Describe):

Describe Existing Land Use/Activities:

Single detached houses.

Proposed Land Use

- [ ] Low Density Residential (single detached and semi-detached)
- [ ] Commercial – Mixed Use (including home businesses)
- [ ] Institutional
- [ ] Industrial
- [ ] Commercial - Retail
- [ ] Agricultural
- [x] High Density Residential (Including townhouses and apartments)

- [ ] Commercial – Food Service
- [ ] Parks/Parkettes
- [ ] Commercial – Warehousing
- [ ] Conservation lands
- [ ] Vacant/Undeveloped
- [ ] Commercial/Institutional – Office
- [ ] Roads/Walkways/ Parking Areas
- [ ] Other (Describe):

Describe Proposed Land Use/Activities:

Townhouses and apartment buildings.

Is there a Certificate of Property Use (CPU) registered on title?

No

If so, please include a copy of CPU with the completed Section 59 PAR form. See definition of CPU in Appendix B.

Is the applicant considering a geothermal system for the property?

No

If so, please include details (open loop and quantity of water required, closed loop and depth of proposed system). See information about Transport Pathways in Appendix A.

Provide Sketch or drawing of property to illustrate location of proposed land uses/activities:

See Site Plan enclosed.

Part 3 – Review of Proposed Activities – Screening

Please describe the proposed Activities that may be considered to be Prescribed Drinking Water Threats under the Clean Water Act, 2006.

A response is required for each of the Prescribed Drinking Water Threat Activities (#1 to 22). Information to assist applicants in filling out this form is provided in Appendix A.

Please respond to the best of your knowledge. If there is potential that one of the described activities may occur, please respond "Not Sure". If an activity may occur (Yes or Not Sure response), the Source Water Protection Program Coordinator, or the Risk Management Official may request additional information to further define the nature of the proposed activities (for each specific threat activity category (1-22). These additional questions will assist the Risk Management Official in identifying the requirement for a **Risk Management Plan**. Additional information may be requested as part of the negotiation of a **Risk Management Plan**, if required.

The Risk Management Official will review information provided on this screening and on supplemental forms submitted to described proposed activities and will make a decision regarding whether Section 58 policies apply, based on both the activity and the vulnerable areas/vulnerability scores mapped on the property.

Table 1 Proposed activities on the property

	Are any of the following Activities proposed to take place on the property?	
1	The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.	No
2	The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.	No
2(a)	Does the property have an existing or proposed sewage lift station?	No
2(b)	Does the property have an existing or proposed septic system?	Unsure
3	The application of agricultural source material to land.	No
4	The storage of agricultural source material.	No
5	The management of agricultural source material.	No

6	The application of non-agricultural source material to land.	No
7	The handling and storage of non-agricultural source material.	No
8	The application of commercial fertilizer to land.	No
9	The handling and storage of commercial fertilizer.	No
9(a)	If yes, please provided the estimated maximum volume in kilograms.	
10	The application of pesticide to land.	No
11	The handling and storage of pesticide.	No
11(a)	If yes, please provide the estimated maximum volume in liters.	
12	The application of road salt.	Yes
13	The handling and storage of road salt.	No
13(a)	If yes, please provide the estimated maximum volume (in kilograms) of salt stored on the site.	
13(b)	If yes, please provide the name of the party responsible for snow and salt management on the site (i.e. owner, property management company).	
13(c)	Is the responsible party Smart about Salt certified?	
14	The storage of snow.	Yes
15	The handling and storage of fuel.	No
15(a)	If yes, please provide the total volume of all fuel tanks located on the property (in liters).	
15(b)	If yes, how is fuel stored? (i.e. in above ground tanks or below ground tanks).	
16	The handling and storage of a dense non-aqueous phase liquid.	No

17	The handling and storage of an organic solvent.	No
18	The management of runoff that contains chemicals used in the de-icing of aircraft.	No
19	An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.	No
19(a)	Do you have a well(s) on the site?	Yes
19(b)	If there is a well(s) on the site, please provide Well ID and well record.	6702557,
20	An activity that reduces the recharge of an aquifer.	Yes
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.	No
22	The use, handling, or storage of liquid chemicals in containers greater than 1 L.	No
22(a)	If yes, please provide a detail listing or description of chemicals handled on site.	N/A

Please respond to the best of your knowledge. If there is potential that one of the described activities may occur, please respond "Unsure". If an activity may occur (Yes or Not Sure response), the Source Water Protection Program Coordinator, or the Risk Management Official, may request additional information on a "Review of Proposed Activities" form for specific threat activity categories (1-22)). These additional questions will form part of the Section 59 Policy Applicability Review and will assist the Risk Management Official in identifying the requirement for a **Risk Management Plan**. Further information may be requested as part of the negotiation of a **Risk Management Plan**, if required. Information to assist applicants in filling out this form is provided in Appendix A.