HYDROGEOLOGICAL REPORT FOR PROPOSED WELLINGS OF BROCKVILLE RESIDENTIAL SUBDIVISION, BROCKVILLE, ON

FINAL REPORT

March 21, 2022

Prepared for:
Nautical Lands General Contractors Inc. /
Wellings 2019 Inc.
2062 Carp Road
Carp, ON K0A 1L0

Prepared by:
Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham, ON L3R 0B8

Project Number:
160401602

Limitations and Sign-off

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Prepared by: _____
Signature

PROFESSIONAL GEOSCIENTIST
STEPHEN M. DI BIASE
PRACTISING MEMBER
1203
March 21, 2022
ONTARIO

Stephen Di Biase, P.Geo.
Printed Name

Reviewed by: _____
Signature

Digitally signed by Roger Freymond
Date: 2022.03.21 15:27:02 -04'00'

Roger Freymond, P.Eng.
Printed Name

Table of Contents

LIST OF APPENDICES

1 Introduction

Stantec Consulting Ltd. (Stantec) has been retained by Nautical Lands General Contractors Inc. and Wellings 2019 Inc. (the Client) to undertake a hydrogeological investigation of the property located at 3064 Parkedale Avenue in Brockville, Ontario (Site).

The scope of this hydrogeological assessment has been completed in accordance with Conservation Authority guidelines for development applications (2013). The purpose of this study is to document baseline groundwater conditions throughout the Site and evaluate how the form and/or function of the groundwater system could potentially be impacted by the proposed development. The proposed development will be serviced by municipal watermain and sanitary sewer.

This hydrogeological report (provided herein) is arranged into seven sections, including this introduction (Section 1). Section 2 presents the physical setting and hydrogeological conditions within a broader area relative to the Site. Stantec's field study methodology and hydrogeological assessment are described within Sections 3 and 4, respectively. Based on the field study results, an impact assessment and recommended mitigation measures are provided in Section 5. Report conclusions and references are listed in Sections 6 and 7, respectively. All figures and tables referenced in this report are presented in **Appendices A** and **B**, respectively. **Appendix C** provides logs from on-site geotechnical boreholes and grain size analysis of overburden soils. The result of single well response tests and laboratory certificates of analyses are provided in **Appendices D** and **E**, respectively. Local Domestic Well Surveys and source protection mapping (as provided by the Ontario Ministry of the Environment, Conservation and Parks) are included in **Appendices F** and **G**, respectively. Preliminary development plans for the Site are compiled in **Appendix H**.

2 Physical Setting

2.1 Site Description and Proposed Development

Figure 1 shows the location of the Site, which is municipally known as 3064 Parkedale Avenue in Brockville, Ontario. The Site is located in the western northern portion of the City of Brockville, situated on the north side of Parkedale Avenue, west of Stewart Blvd.

The Site currently reflects open space land use. Dense trees and brush are present along the western, northern and eastern limits of the Site. The Site is bounded by residential dwellings to the west, east and south. The Site is also bounded by a commercial developments to the north and a golf course to the southwest.

Named 'Wellings of Brockville', the new community would be composed of a series of townhouse dwellings centered around a community clubhouse. The proposed development plan is provided in **Appendix H**. The proposed development reflects 120 residential units. All units and the clubhouse are one-storey (without basements). The site layout also shows driveways, parking lots and a stormwater pond in the northwest corner of the site.

2.2 Topography and Drainage

Topography and drainage in proximity to the Site is shown on **Figure 2**. Ground surface slopes from elevated lands located on the southern portion of the Site towards low-lying areas at the northern portion of the Site. Total relief across the Site is approximately 9 m, ranging from approximately 116 masl along Parkedale Road to 107 masl along the Site's northern limit.

As shown on **Figure 2**, overland drainage flows in a northerly direction, towards the unevaluated wetland areas associated with Grants Creek. Grants Creek reflects an intermittent watercourse on the north side of the Site. Perennial flow within Grants Creek is generally observed on the east side of the Brockville Landfill, approximately 700 m west of the Site. Grants Creek flows in a westerly direction, outflowing into Lake Ontario on the west side of the City.

2.3 Geology

Near surface geological deposits in proximity to the Site, as mapped by the Ontario Geological Survey (OGS, 2010), are shown on **Figure 3**. According to the OGS, bedrock outcrops are prevalent in the area, as shown in pink (Unit 4) in **Figure 3**. Overburden, shown in green (Unit 5b) on **Figure 3**, reflects a thin (i.e., less than 10 m in thickness) deposit of silty sand glacial till.

3 Field Studies

Section 3 provides the methodology used to obtain the data required to complete the hydrogeological investigation. The major components of the hydrogeological investigation included the following:

- borehole drilling / monitoring well installation and development
- groundwater level monitoring
- hydraulic response testing
- groundwater sampling.

The methodology for these tasks is described in Sections 3.1 through 3.4 below.

3.1 Site Instrumentation

As part of a geotechnical investigation (Stantec, 2021), a total of 8 geotechnical boreholes (21-2 through 21-9) were advanced between January 12 through January 14, 2021. The locations of the boreholes are shown on **Figure 4**. The boreholes were advanced using a track-mounted CME drill rig. Soil samples were collected at regular intervals while conducting Standard Penetration Tests (SPT). The subsurface stratigraphy encountered in each hole was recorded in the field by Stantec personnel. Bedrock was cored at two locations (21-2 and 21-3) using HQ-size coring equipment. The boreholes were backfilled with auger cuttings and bentonite hole plug. Monitoring wells were installed within six of the eight geotechnical boreholes (MW21-2, MW21-3, MW21-4, MW21-5, MW21-6 and MW21-9) to allow for on-going groundwater elevation monitoring. The logs for the boreholes, as well as laboratory analyses, are included in **Appendix C**.

The six monitoring wells were installed in accordance with O. Reg. 903 as recently amended.
The monitoring wells were constructed of 50 mm inside diameter, Schedule 40 PVC pipe with a No. 10 slot screen (0.01-inch slot). The annular space between the monitoring well pipe and surrounding soils was backfilled with silica sand to a maximum of 0.3 m above the top of the screen and the remainder of the annular space was filled with bentonite chips. All monitoring wells were completed with lockable protective covers, sticking up approximately 1 m above ground surface. Well construction details are summarized in **Table 1** in **Appendix B**.

3.2 Water Level Monitoring

Groundwater levels were recorded at the six monitoring wells using a combination of automated and manual measurement methods. Stantec personnel manually measured water levels quarterly from January 2021 through to November 2021. To provide a continuous record of water level monitoring, Stantec personnel installed a Solinst Edge Levelogger® (Levelogger) into the water column of all monitoring wells. The Leveloggers established a continuous record of groundwater levels over a 1-year period.

A summary of the manual groundwater level measurements is provided in **Table 2**. Hydrographs presenting both the automatic and manually collected data are provided on **Figure 5**. The precipitation data provided on the hydrographs were obtained from the Environment Canada website for the Brockville PCC climate station (ID 6100971), located approximately 3.6 km east of the Site.

3.3 Hydraulic Response Testing

Stantec performed in-situ hydraulic response testing at all monitoring wells on January 20 and 21, 2021 to estimate the horizontal hydraulic conductivity of the overburden soil or bedrock beneath the Site. The testing consisted of creating an instantaneous change in the well water level by adding or removing a known volume of water followed by recording the time taken for the water level to return to static conditions. Data were analyzed using the Hvorslev (1951) solution. Testing provided an estimate of the horizontal hydraulic conductivity of the overburden soils or bedrock within the screened interval for each monitoring well. **Table 2** provides a summary of the calculated horizontal hydraulic conductivities, with the test results and analytical solutions presented on **Figures D-1** through **D-6** in **Appendix D**.

3.4 Groundwater Quality Sampling

To establish a baseline of local groundwater quality, groundwater samples were collected from three on-Site monitoring wells (MW21-2, MW21-4 and MW21-9) on January 21, 2021. Groundwater sampling involved using the same tubing that was used to develop the monitoring wells. Prior to collecting the sample, Stantec personnel purged the well until the field parameters of pH, temperature, and conductivity stabilized, indicating that the sample would be reflective of groundwater drawn from the bedrock or overburden soils underlying the Site. Following purging, sampled groundwater was poured directly from the HDPE tubing into lab supplied sample bottles. The groundwater samples were carefully packed into coolers with ice, which was added to maintain sample temperatures below 10°C during transit to the analytical laboratory. Samples were delivered to Bureau Veritas Laboratories (BV Labs) for analysis relative to Ontario Drinking Water Objectives. The analytical results are summarized in **Table 3**. Laboratory certificates of analyses are included in **Appendix E**.

3.5 Local Private Well Survey

A house-to-house well survey was undertaken at neighboring properties to document details regarding the quality and quantity of local private groundwater supply wells. As summarized in **Table 4** (**Appendix B**), Stantec delivered notification letters to a total of 13 neighboring residences on Parkedale Avenue. A copy of the notification letters and accompanying well survey forms are included in **Appendix F**. The notification letter described the purpose of the well survey and provided contact information for Stantec staff, in case of further questions or concerns. As part of the well survey, Stantec requested any available well construction details (e.g., type, depth, location) from the owners.

Stantec received responses from two (2) neighboring properties. The locations of the respondents' wells, named RW1 and RW2, are shown in **Figure 4**. The results of the well survey are summarized in **Table 4**. A groundwater sample was collected from each of the RW's in accordance with the following methodology:

- Water samples were collected from external water faucets, up-stream of residential treatment systems.
- A disinfectant was applied to the exterior of the faucet and water was flowed through the faucets for approximately 5 minutes, prior to sampling.
- Effluent from the faucets were poured directly into the sampling bottles. The bottles were packed in ice-filled containers and transported to Bureau Veritas Laboratories in Mississauga, ON.
- Groundwater samples were analyzed for metals, non-metals, ions and bacteria.

The analytical results are summarized in **Table 3**. Laboratory certificates of analyses are included in **Appendix E**. The individual results of the chemical analyses were distributed to the respective well owners within 12 hours of receipt from the laboratory. Both samples (RW1 and RW2) were compliant with health-related criteria associated with the Ontario Drinking Water Standards (ODWS). Relative to aesthetic objectives of the ODWS, total hardness and sodium were noted outside the aesthetic objectives of 80 to 100 mg/L and 20 mg/L, respectively. For RW-1, the concentration of total dissolved solids was also above the aesthetic objective of 500 mg/L. It is noted that the water quality at RW-1 is treated with a water softener, hence the low concentration of hardness and elevated concentration of sodium.

3.6 Groundwater Quality Sampling

To establish a baseline of local groundwater quality, groundwater samples were collected from three on-Site monitoring wells (MW21-2, MW21-4 and MW21-9) on January 21, 2021. Groundwater sampling involved using the same tubing that was used to develop the monitoring wells. Prior to collecting the sample, Stantec personnel purged the well until the field parameters of pH, temperature, and conductivity stabilized, indicating that the sample would be reflective of groundwater drawn from the bedrock or overburden soils underlying the Site. Following purging, sampled groundwater was poured directly from the HDPE tubing into lab supplied sample bottles. The groundwater samples were carefully packed into coolers with ice, which was added to maintain sample temperatures below 10°C during transit to the analytical laboratory. Samples were delivered to Bureau Veritas Laboratories (BV Labs) for analysis relative to the Ontario Drinking Water Standards (ODWS). The analytical results are summarized in **Table 3**, while laboratory certificates of analyses are included in **Appendix F**.

4 Hydrogeological Assessment

4.1 Local Hydrogeology

On-Site geotechnical borehole logs are shown in profile (Cross-Section A-A') on **Figure 6**. The location of the profile, relative to the Site, is shown on **Figure 4**. Borehole drilling results indicate soil conditions consistent with the description provided in Section 2.3 above. Soil conditions beneath the Site, reflecting the following layers from ground surface down:

Glacial Till: near surface overburden soils reflects silty sand till, the soils are predominantly comprised of silt and clay, ranging from approximately 2 to 7 m in thickness throughout the Site. These soils are thicker in the upland area near Parkedale Avenue and thin towards the Grants Creek valleyland. The glacial till soil extends to the bedrock surface.

Sandstone (March Formation): generally reflects interbedded light to medium grey or brown sandstone, dolostone, sandy dolostone and dolomitic sandstone that weathers pale brown. Laminations are typically 5 to 60 cm in thickness. The March formation is considered to be relatively permeable when sandstone interbeds are present (CSPC, 2017). As shown of **Figure 6**, the bedrock surface is rolling, ranging from 109 masl at the southern limit of the Site to 105 masl at the northern limit of the Site.

4.1.1 GROUNDWATER LEVELS AND FLOW

Continuous and manual water level data measured within onsite monitoring wells from January 21, 2021 through November 5, 2021 are summarized on **Figure 5** and **Table 2**, respectively. Observed groundwater levels within these monitoring wells generally ranged from 116 to 107 masl. These groundwater levels are interpreted to reflect a local water table elevation (i.e., a shallow groundwater flow system).

A cyclical pattern of groundwater fluctuations is common within shallow groundwater systems in southern Ontario. High water table conditions occur in the winter and spring (i.e., January to May) due to lower evapotranspiration losses and a melting snowpack, which provide a greater volume of water for recharge. These general observations are evident within the hydrographs, which show a dramatic response to groundwater recharge events in December 2020 and March 2021. Low water table conditions generally occur in the late summer to early fall as more water is drawn from the subsurface over this period to meet evapotranspiration demands. These patterns are also observed in the hydrographs which are lowest during the summer season. The total range of water table fluctuation observed between the spring and summer of 2021 ranges from 2 m in the lower elevation of the Site to 3 m in the upland area.

Hydrograph patterns shown on **Figure 5** are similar, indicating a consistency of water table fluctuations across the Site. The highest groundwater elevations (i.e., as observed manually on January 21, 2021) are summarized on **Figure 7**, which shows the seasonal high water table elevation and groundwater flow patterns across the Site. The water table is a subdued reflection of the surface topography. In general, groundwater flows in a northerly direction across the Site, towards the Grants Creek valleyland.

4.1.2 HYDRAULIC CONDUCTIVITY

The interpreted hydraulic conductivity values for the shallow overburden soils (glacial till soils), as summarized on **Table 2**, ranged from 3 $x10^{-7}$ to 1 $x10^{-8}$ m/s. This range of values is considered reasonable for a glacial till soil with a sand - silt matrix.

The interpreted hydraulic conductivity of the sandstone bedrock ranged from 1 $x10^{-6}$ m/s to 4 $x10^{-7}$ m/s. These values are considered normal for sandstone bedrock, which reflects the source for local private groundwater supply wells.

4.1.3 GROUNDWATER QUALITY

Figure 8 provides a comparison of key analytical parameters for each of the seven collected groundwater samples. These samples reflect a magnesium-bicarbonate type water. Relative to the ODWS, the groundwater quality results indicate elevated concentrations of hardness, total dissolved solids and manganese. Elevated concentrations of these parameters are common in the overburden and bedrock aquifers of southern Ontario. Groundwater quality results did not exceed the health-related criteria of the ODWS.

As discussed in Section 3.5 above, the quality of water sampled from RW-1 has been treated with a water softener. As such, this water sample is not representative of local groundwater quality.

4.1.4 GROUNDWATER USE

The predominant user of groundwater are local domestic water supply wells along Parkedale Avenue. A municipal watermain distribution system extends throughout the urban area of Brockville. The location of municipal watermains, as reported by the City of Brockville (2017) are shown in green on **Figure 4**. Properties to the north, east and south of the Site are serviced by municipal water supply, which is sourced from the St. Lawrence Seaway.

Properties located west and southwest of the Site, are serviced by private groundwater supply wells completed within the bedrock. Details of the local private wells that were surveyed by Stantec are summarized in **Table 4**. As shown on **Figure 3**, MECP water well records along Parkedale Avenue (west of the Site) are few (i.e., less than 10) and may not be representative of the local area. In general, it is expected that private wells are completed as open bedrock boreholes to depths of approximately 18 m or greater.

4.2 Source Protection Assessment

The Cataraqui Region Conservation Authority (CRCA) and Cataraqui Source Protection Committee (CSPC) have studied surface and groundwater quality and quantity within their Source Protection Area (CSPC, 2017). The CSPC Source Protection Plans contain policies that address significant, moderate, and low threats to source water. The respective Source Protection Plan policies may limit or restrict drinking water threat activities, or they may address threat activities through provincial instruments, education, outreach, or incentives. Local source protection mapping in proximity to the Site, as provided

by the MECP Source Water Protection Atlas, are shown in **Appendix G**. The following four types of vulnerable drinking water areas are identified considerd within the Source Water Protection Atlas:

- Significant groundwater recharge areas (SGRAs);
- Highly vulnerable aquifers (HVAs);
- Wellhead Protection Areas (WHPAs); and
- Intake Protection Zone's (IPZs).

Serveral Sourcewater Protection Plan policies have been translated into the City of Brockville Official Plan. Section 3.6.10 states that as an implementation body identified in the Cataraqui Source Protection Plan, the City of Brockville will:

- comply with significant drinking water threat policies;
- have regard for all other land use planning policies; and
- provide due consideration for other non-binding recommendations in the Cataraqui Source Protection Plan to realize source water protection.

Generally speaking residential forms of development, especially those served by piped water and wastewater infrastructure, are not considered drinking water threats under Provincial regulations or management risk officials. The proposed land use policy changes will remove various commercial and industrial uses as uses permitted as-of-right under the current Zoning By-law, and facilitate residential development through a subsequent Site Plan approval process.

4.2.1 SIGNFICANT GROUNDWATER RECHARGE AREAS (SGRA)

SGRA's are areas that reflect granular soil cover that would facilitate direct groundwater recharge into subsurface aquifers. A recharge area is considered significant when it helps maintain the water level in an aquifer that supplies a community or private residence with drinking water. As shown on **Figure G-1** in **Appendix G**, MECP Source Water Protection mapping indicates that the Site is located within a SGRA.

Section 3.6.10.1.2.1 of the Brockville Official Plan indicates the following with respect to SGRA's:

> *i) New development and / or expansions to existing development within significant groundwater recharge areas and/or highly vulnerable aquifers that involve the storage or manufacture of potential contaminants (that could include DNAPLs, organic solvents, commercial fertilizer, pesticides, liquid fuel, road salt, snow storage, mine tailings and PCBs) where they would be drinking water threats may be subject to the implementation of risk management measures to protect the groundwater.*
>
> *ii) The Zoning By-Law shall prohibit or restrict land uses that require risk management measures.*

4.2.2 HIGHLY VULNERABLE AQUIFERS (HVA)

An aquifer is defined as a water bearing, granular soil that facilitates groundwater flow over broad areas. A HVA is one that is particularly susceptible to contamination due to its shallow depth or lack of an overlying confining layer. MECP Source Water Protection mapping (**Appendix G**) indicates that HVA conditions exist within portions of the Site. Development constraints within HVA areas, as discussed within the City's official plan, are summarized in Section 4.2.1. above.

4.2.3 WELLHEAD PROTECTION AREA (WHPA)

A WHPA is the area around the wellhead that contributes source water to a drinking water system. WHPA's are delineated on plan maps, shown as different sized and spherical shaped zones around the municipal well. These zones indicate how fast groundwater is travelling through the ground toward a municipal supply well. As shown on **Figure G-1** in **Appendix G**, there are no WHPAs in proximity to the Site.

4.2.4 INTAKE PROTECTION ZONE (IPZ)

An IPZ is an area of land and water around a municipal intake pipe that contributes source water to a drinking water system. IPZs are delineated on plan maps, showing where surface water is coming from to supply a municipal intake at a water treatment plant, and how fast it is travelling toward the intake pipe. As shown on **Figure G-2** in **Appendix G**, there are no IPZs in proximity to the Site.

4.3 Pre- and Post-Development Water Budget

Water balance calculations have been undertaken to assess potential changes of on-Site groundwater recharge under the post-development condition. A water balance is an accounting of the distribution of components of the hydrologic cycle and can be simplified in the following equation:

$$P = ET + S + R + I$$

where:

P = precipitation, ET = evapotranspiration, S = change in groundwater storage,

R = runoff, and I = infiltration

The water balance is used to compare pre- and post-development conditions and to determine what mitigation methods may be required. The key component of the water balance is evapotranspiration (ET), which is calculated using the soil moisture balance model developed by Thornthwaite and Mather (1957). The Thornthwaite and Mather model assumes that different soil textures have a characteristic capacity to hold water. Any deficit to the soil holding capacity must be met before water can infiltrate.

Monthly values of precipitation (rainfall plus snowmelt) and potential evapotranspiration rates are input to the model. Potential evapotranspiration is calculated based on temperature, heat index, and an adjusting factor for latitude. The actual evapotranspiration is calculated using the input precipitation, calculated potential evapotranspiration, and change in soil moisture storage.

Infiltration and runoff are calculated using the water surplus, ground slope, soil type, and ground cover. Values for infiltration and runoff are generated as a depth and are reported in millimetres (mm). These depth values can generate annual volumetric values by inputting known areas for land use under pre- and post-development conditions. An infiltration deficit is calculated as the difference between pre-development infiltration and post-development infiltration.

Temperature and precipitation averages for the region from 1981-2010 were obtained from the Environment and Climate Change Canada (ECCC) website for the Brockville PCC climate station (ID 6100971), located approximately 3.6 km east of the Site.

For pre-development condition, soil moisture capacity was set at 250 mm corresponding to predominantly silt loam with pasture / shrubs landscape according to the MECP *SWM Planning Design Manual* (MECP, 2003). Lands planned for development with impervious surfaces (i.e., roofs, roads, sidewalks, SWM pond) under the post-development condition are expected to reflect approximately 2.2 hectare (ha) of the 6 ha Site. Therefore approximately 37% of the Site area will reflect impervious surface under the post-development condition. Pre-development and post-development water balance calculations completed for the Site are shown in **Tables 6** and **7**, respectively.

4.3.1 PRE-DEVELOPMENT WATER BALANCE

The water balance calculations generated unique values of actual evapotranspiration, water surplus, infiltration, and runoff for each characteristic soil. As shown in **Table 5**, the average annual precipitation at the Site is estimated at 987 mm based on data obtained from the Brockville climate station (Environment Canada, 2022). Annual actual evapotranspiration is estimated at 572 mm, equating to 415 mm of surplus water that is available for runoff and infiltration within the Site. Overall, the average annual volume of infiltration to the Site under the pre-development condition is estimated at approximately 6,965 m^3/year or unit rate of approximately 116 mm/year.

4.3.2 POST-DEVELOPMENT WATER BALANCE

Portions of the Site will be converted to impervious surfaces as a part of proposed development and, subsequently, a reduction in the volume of water infiltrating to the subsurface is anticipated. Based on the Conceptual Site Plan (**Appendix H**), pervious surfaces will decrease by approximately 37%. The detailed water balance for the post-development condition is provided in **Table 6**. The unmitigated post-development infiltration rate for the Site is estimated to be approximately 5,199 m^3/year, representing a deficit of approximately 1,766 m^3/year.

Low impact development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff by managing runoff as close to source as possible, with the implementation of such strategies also providing the residual benefit of offsetting potential infiltration losses associated with the increase in impervious surfaces associated with a given development. Options available to mitigate reduced groundwater recharge could include roof downspout disconnection for the balance of the roof areas and side and backyard grass swales.

4.4 Construction Dewatering

Proposed development units and the clubhouse are one-storey (without basements). Detailed design (i.e., plan and profile) drawings are not available for foundations of the proposed structures or the Site Servicing. However, Stantec has been advised of the following:

- The foundations for the proposed units will be completed approximately 0.5 m above the seasonal high water table surface.
- The depth of excavation trenches for the Site servicing (i.e., watermain, storm sewer and sanitary sewer) will not exceed 5 m.

Construction dewatering at the Site is therefore expected to be temporary, limited to facilitating installation of infrastructure services. The trenches will generally terminate within the overburden soil. On the west side of the Site, proposed trenching may intercept the bedrock surface. Groundwater control measures should reflect conventional pumping from filtered sumps within the excavation. Provided herein is an assessment of the anticipated groundwater pumping rate to facilitate the proposed trenching.

4.4.1 CONCEPTUAL MODEL FOR DEWATERING

The conceptual model for the dewatering calculations is provided below and reflect a worst-case scenario, relative to the field measurements obtained during the in-situ hydraulic conductivity testing and groundwater elevation monitoring.

- A static groundwater elevation of 111 masl, which reflects an average of the water table range observed across the Site.
- The maximum depth of proposed trenching is expected to be 106 masl, which reflects a 5 m water table drawdown.
- Groundwater control measures will be carried out over a trenching footprint (200 m x 10 m) of approximately 2,000 m^2.
- The representative hydraulic conductivity of the bedrock, which is considered to reflect the primary source of local groundwater flow, is 1 $x10^{-6}$ m/s.
- The active groundwater flow system is considered to reflect the water table surface (111 masl) to 90 masl.

4.4.2 DEWATERING ZONE OF INFLUENCE

In response to proposed short term dewatering, a dewatering zone of influence will extend radially from the excavation area. Applying the Theis analytical solution (Theis, 1935), the dewatering zone of influence (i.e., lateral extent of groundwater level drawdown) extending from a point along the edge of the excavation area can be estimated as follows:

$$s(r,t) = \frac{Q_p}{4\pi T} W\left(\frac{r^2 S}{4Tt}\right)$$

where = drawdown at distance (r) and time (t) after the start of pumping;

Q_p = pumping rate (per point source) required to achieve 5 m drawdown (approx. 14 m^3/day);

T = transmissivity (2 m^2/day; K = 1 x10^{-6} m/s x 21 m saturated thickness);

S = storativity (1% is typical for sandstone bedrock); and

W = Theis well function.

It is expected that steady-state pumping conditions will be achieved within approximately 7 days of pumping. The interpreted drawdown versus distance relationship is shown on **Figure 9**. Based on the analysis provided above, the lateral extent of the dewatering zone of influence is interpreted to extend approximately 100 m from the edge of the dewatering area.

4.4.3 DEWATERING RATE

The steady state groundwater pumping rate (Q_T) required to maintain a 5 m depression of the water table elevation over the footprint of the excavation area is interpreted by applying the following equilibrium equation (Powers et al., 2007) for unconfined aquifer conditions:

$$Q_T = \frac{\pi \mathrm{K}(H^2 - h^2)}{\ln R_o / r_w} + 2\left[\frac{\mathrm{xK}(H^2 - h^2)}{2L}\right]$$

where K = inferred hydraulic conductivity of bedrock (1 x10^{-6} m/s);

H = height of water level within active groundwater flow system (111 masl – 90 masl = 21 m);

h = desired water height within active groundwater flow system (106 masl – 90 masl = 16 m);

R_o = radius of influence (105 m, representing a 100 m ZOI beyond radius of dewatering area);

r_w = end radius of dewatering area (5 m);

x = length of dewatering area (200 m); and

L = Line source distance (105 m, representing a 100 m ZOI beyond radius of dewatering area).

Based on this equation, the steady-state pumping rate required to maintain a 5 m water table depression over an open 200 m trench length is calculated to be approximately 50 m^3/day.

During construction, higher dewatering rates will be required initially to remove water stored in the overburden. Applying an effective porosity of 1%, the total volume of groundwater stored within the 100 m dewatering radius of influence is estimated to be approximately 500 m^3. Removal of this water over a 7-day period reflects a storage removal rate of approximately 70 m^3/day.

The total dewatering rate required in support of the proposed construction should reflect the sum total of the interpreted overburden storage removal rate (70 m^3/day) and steady state inflow rate (50 m^3/day), which is 120 m^3/day. This construction dewatering can be accommodated with the registration of an Environmental Activity Sector Registry (EASR), which allows construction dewatering up to 400 m^3/day. Using the full allowance of the EASR pumping rate, reflects a factor of safety of 3 on the peak daily dewatering rate.

4.4.4 DISPOSAL OF PUMPED GROUNDWATER

Groundwater quality results from the on-Site monitoring wells indicate compliance with several parameters of the City of Brockville Storm Sewer use by-law (By-Law 046-2014). It is likely that discharge of dewatering effluent to the storm sewer is possible, subject to further dewatering effluent quality analyses (to be provided by the contractor).

5 Environmental Impacts and Mitigation

Following on the hydrogeological assessment provided above, potential effects of proposed site development and possible mitigation measures are discussed herein.

5.1 Construction Dewatering

Groundwater control measures, in support temporary trenching associated with sewer / watermain installations, wil be short term (i.e., approximately 1 to 2 months in duration). The lateral extent of groundwater level drawdown, as shown on **Figure 9**, is expected to be a distance of 100 m from proposed sewer / watermain locations. Local private wells are completed within bedrock, with depths known to be greater than 18 m. Proposed construction dewatering may temporarily lower the water level in neighboring private wells up to 1 m, however, this effect should not impact the operation of the local private wells.

Temporary construction dewatering will not affect the normal seasonal flow rate within nearby surface water courses. If compliant with storm sewer by-law parameters, captured dewatering effluent can be diverted to local drainage courses to mitigate any potential for effects.

5.2 Source Water Protection

Recognizing that the Site is located within an area of high aquifer vulnerability (HVI) and significant groundwater recharge (SGRA), the following measures are recommended during short-term construction and long term building operation.

5.2.1 SHORT-TERM CONSTRUCTION

During short-term construction, mitigative measures must be taken to minimize the risk of releasing substances to the subsurface that could impact the quality of groundwater resources. The most probable type of substance release during construction would be a spill attributable to the refueling of major construction equipment that cannot readily leave the site (e.g., earth movers). By implementing proper protocols for the handling of fuels and lubricants during construction, the risk of a spill occurring will be reduced. The following procedures are recommended to prevent onsite spills:

- All trucks or other road vehicles would be refueled and maintained offsite, where practicable;
- Refueling and lubrication of other construction equipment would not be allowed within 30 m of a drainage system or dewatering excavation;
- Regular inspections of hydraulic and fuel systems on machinery, with leaks being repaired immediately upon detection or the equipment being removed from Site;
- Spill kits containing absorbent materials would be kept on hand;
- Implement best management practices and develop an emergency spill response plan.

Given the anticipated construction activities are not expected to involve the storage or use of bulk chemicals or fuels, any potential spill that does occur would be localized and involve a small volume of material. Standard containment facilities and emergency response materials will require to be maintained onsite during construction, with refueling, equipment maintenance, and other potentially contaminating activities being confined to designated areas.

5.2.2 LONG-TERM OPERATION

Recommendations to be considered by the municipality to conform with the County's official plan are as follows:

- A Contaminant Management Plan (CMP) is required in HVAs if there will be bulk fuel (>2,500 L) or bulk chemicals (>250 kg pesticide) stored/handled. Based on the proposed use of the Site, a CMP is not warrented.
- With respect to the use of salt on the property located within the HVA, Stantec recommends the use of a contractor who is certified by "Smart About Salt", and use of best management practices identified in the TAC Synthesis of Best Management Practices for Salt and Snow are followed: https://www.tac-atc.ca/en/publications/bp-rsm1-e

6 Conclusions

Following on the hydrogeological assessment provided above, and the field studies undertaken between January 2021 and November 2021, the following conclusions are respectively submitted:

1. The Site is blanketed by 3 to 7 m of glaciolacustrine (silt and sand) till soil. The hydraulic conductivity of these non-water bearing soils are interpreted to be on the order of 1 $x10^{-7}$ m/s or less. As such, the overburden forms an aquitard across the Site surface, limiting groundwater recharge. The overburden is underlain by sandstone bedrock. The bulk hydraulic conductivity of the near surface bedrock is interpreted to be approximately 1 $x10^{-6}$ m/s or less. The shallow sandstone bedrock reflects a moderate to low water bearing formation and the active groundwater flow system beneath the Site.
2. Local overland drainage is accommodated by the headwaters of Grants Creek, which is an intermittent drainage course flowing in a westerly direction along the north side of the Site. This drainage course and associated (unevaluated) wetland area is predominantly sustained by overland drainage following precipitation events. Perennial flow within Grants Creek is generally observed on the east side of the Brockville Landfill, approximately 700 m west of the Site.
3. The seasonal high water table elevation is a subdued reflection of the surface topography, ranging from approximately 116 masl on the southern limit of the Site to 108 masl on the northern limit of the Site. Groundwater flows in a northerly direction, towards Grants Creek and associated unevaluated wetlands. Water table fluctuations, in response to seasonal varation of the water surplus, ranges from 2 m in the lower elevation of the Site to 3 m in the upland area.
4. Groundwater in the shallow overburden soils and bedrock is generally characterized by magnesium-bicarbonate type water. In general, the groundwater satisfies health-related Ontario Drinking Water Standards (ODWS). Elevated concentrations of manganese and hardness were detected, which is typical of bedrock groundwater flow in southern Ontario.
5. Municipal watermain and sewer services exist in the urban areas east of the Site. These services do not currently extend to residential properties west of the Site. As part of a water well survey, Stantec identified two properties (on the west side of the Site) reliant on their private groundwater supply wells. Baseline groundwater quality information at these private wells has been provided. Local private wells are completed within the underlying bedrock aquifer.
6. A calculated 6,965 m^3 (116 mm per unit area) of annual infiltration occurs under pre-development conditions on the Site. Under post-development conditions, Stantec estimates that 37% of the land surface (2.2 ha of 6 ha in total) will be converted to impervious cover, reducing annual infiltration to 5,199 m^3 (87 mm), and resulting in an annual infiltration deficit of approximately 4,592 m^3 (57 mm per unit area).
7. The Site does not intersect any wellhead or intake protection zones. However, due to the limited thickness of low permeability overburden cover, the MECP does delineate areas of significant groundwater recharge and high aquifer vulnerability within the Site. Temporary construction works should be undertaken in accordance with best management practices for minimizing the

potential for spills. A Contaminant Management Plan (CMP) should not be required due to the proposed long-term use of the Site. The use of a contractor who is certified by "Smart About Salt" and competent with the TAC Synthesis of Best Management Practices for Salt and Snow is recommended.

8. Temporary groundwater control measures will be required to manage minor groundwater seepage into temporary trench excavations associated with sewer and watermain construction. The total (i.e., peak) dewatering rate during temporary construction is calculated to be as high as 120 m^3/day, following the start of dewatering operations. An Environmental Activity Sector Registration will be required to permit the water taking associated with the proposed trenching. Temporary construction dewatering should not affect normal flow conditions in nearby Grants Creek or the operation of local private wells.
9. Servicing may occur below the groundwater table in some areas of the Site. Efforts may be required to minimize the disturbance that this servicing could have on pre-development groundwater flow patterns. Typically, the most common mitigation measure is the installation of anti-seepage (cut-off) collars to prevent the preferential movement of groundwater along the servicing alignments. An assessment for the need, total number and exact placements of anti-seepage collars along the servicing alignments should be explored in more detail during the detailed design phase.

7 References

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Appendix A
Figures

Stantec

Legend

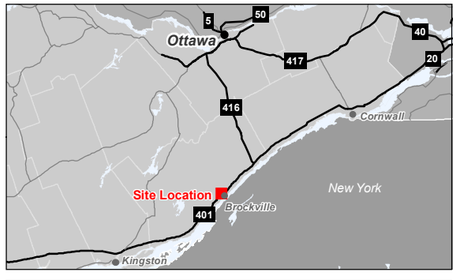
- Property Boundary
- Proposed Site Layout

0 25 50 metres

1:1,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Orthoimagery © Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



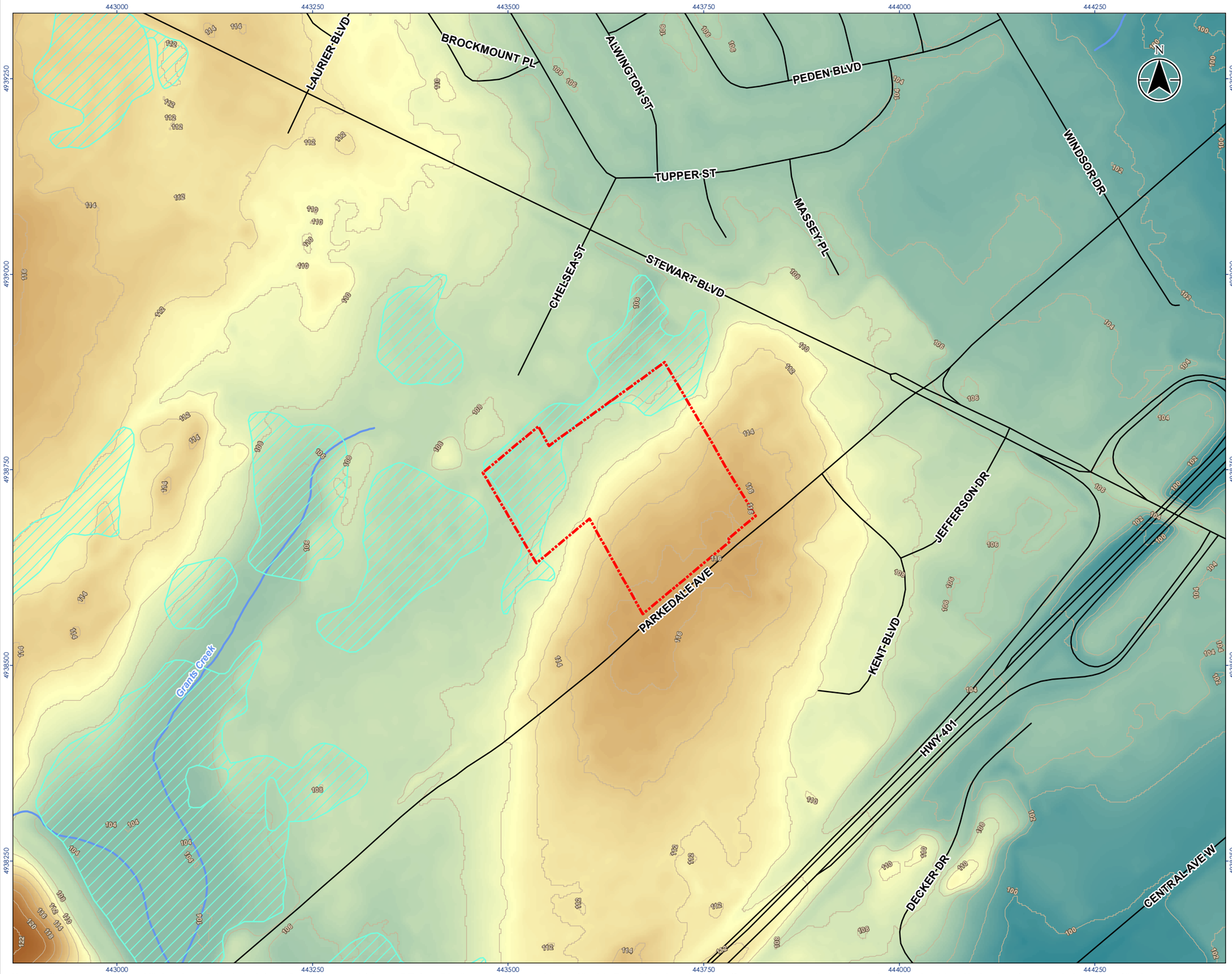
Project Location
City of Brockville

160401602 REVA
Prepared by PRM on 2022-03-15
Technical Review by SMD on 2022-03-15

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
1

Title
Site Location



Stantec

Legend

- Property Boundary
- Road
- Ground Contour (2m Interval)
- Watercourse
- Wetland - Not evaluated per Ontario Wetland Evaluation System

Elevation (m AMSL)

High : 123

Low : 98

0 100 200 metres

1:5,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
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3. Topography derived from the Digital Raster Acquisition Project Eastern Ontario

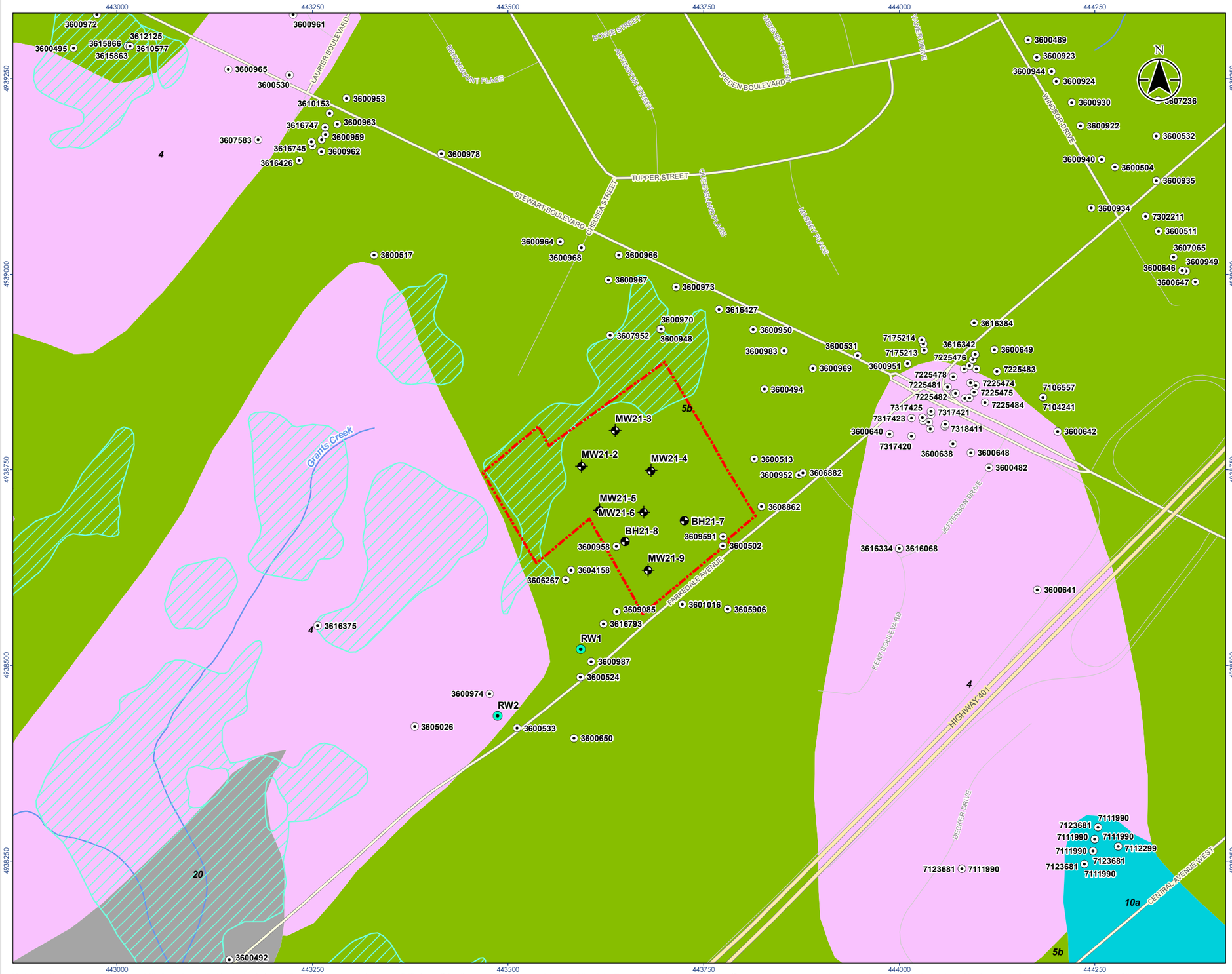
Project Location
City of Brockville

160401602 REVA
Prepared by PRM on 2021-10-04
Technical Review by SMD on 2021-10-04

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
2

Title
Topography and Drainage



Stantec

Legend

- Property Boundary
- Geotechnical Borehole and Monitoring Well (Stantec, 2021)
- Geotechnical Borehole (Stantec, 2021)
- Surveyed Domestic Well
- Water Well Location
- Expressway / Highway
- Major Road
- Minor Road
- Watercourse
- Wetland - Not evaluated per Ontario Wetland Evaluation System

Surficial Geology

- 20: Organic deposits
- 10a: Fine-textured glaciomarine deposits (Massive-well laminated)
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 4: Paleozoic bedrock-drift complex

0 100 200 metres

1:5,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Ontario Geological Survey 2010. Surficial geology of Southern Ontario: Ontario Geological Survey, Miscellaneous Release--Data 128-REV ISBN 978-1-4435-2483-4
4. MECP water well record locations have been positioned based on published UTM coordinates and their locations should be considered approximate.

Project Location
City of Brockville

160401602 REVA
Prepared by PRM on 2021-10-04
Technical Review by SMD on 2021-10-04

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
3

Title
Surficial Geology

Stantec

Legend

- Property Boundary
- Geotechnical Borehole and Monitoring Well (Stantec, 2021)
- Geotechnical Borehole (Stantec, 2021)
- Surveyed Domestic Well
- Proposed Site Layout
- Cross-Section Location
- Municipal Watermain

0 25 50 metres

1:2,000 (At original document size of 11x17)

Notes

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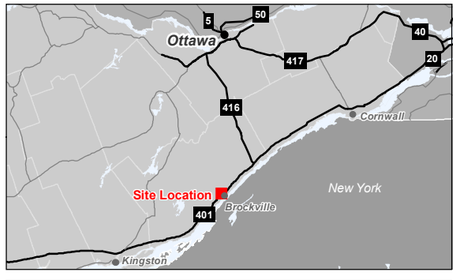


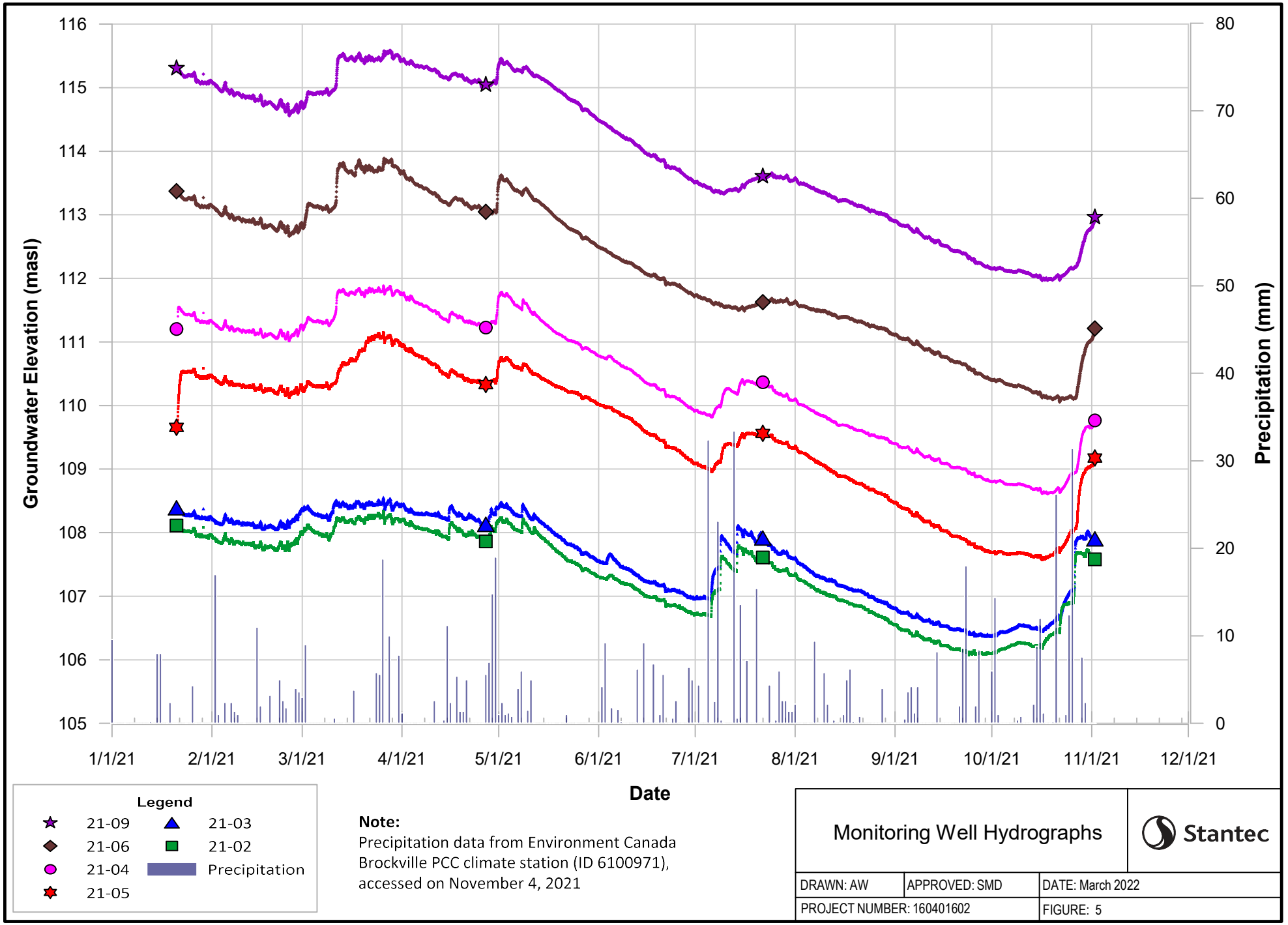
Project Location
City of Brockville

160401602 REVA
Prepared by PRM on 2022-03-15
Technical Review by SMD on 2022-03-15

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
4

Title
Site Instrumentation

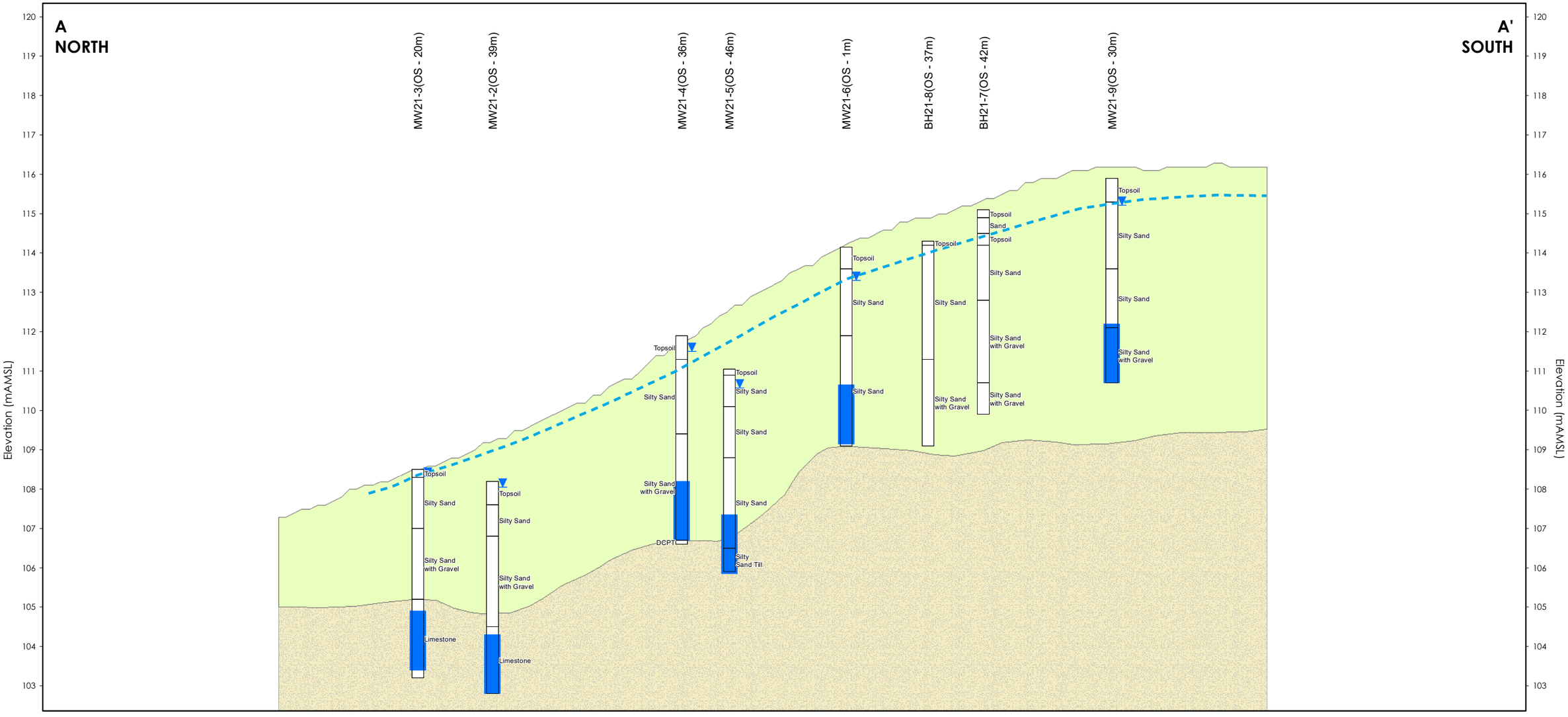


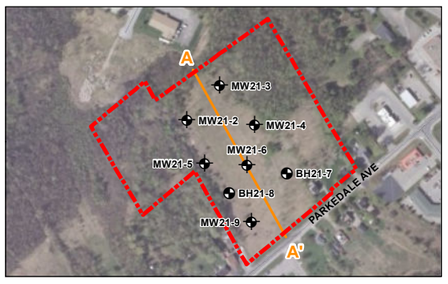
Note:
Precipitation data from Environment Canada Brockville PCC climate station (ID 6100971), accessed on November 4, 2021

Monitoring Well Hydrographs

Stantec

DRAWN: AW	APPROVED: SMD	DATE: March 2022
PROJECT NUMBER: 160401602		FIGURE: 5





Notes
1.

MW21-5 (OS m)

Well ID (Offset)

Sand

Stratigraphy

Water Level (January 20, 2021)

Well Screen

Legend

- Interpreted Water Table Surface
- Silty Sand (Glacial Till)
- March Formation (Sandstone Bedrock)

10x Vertical Exaggeration

0 25 50 metres

1:1,000 (At original document size of 11x17)

Stantec

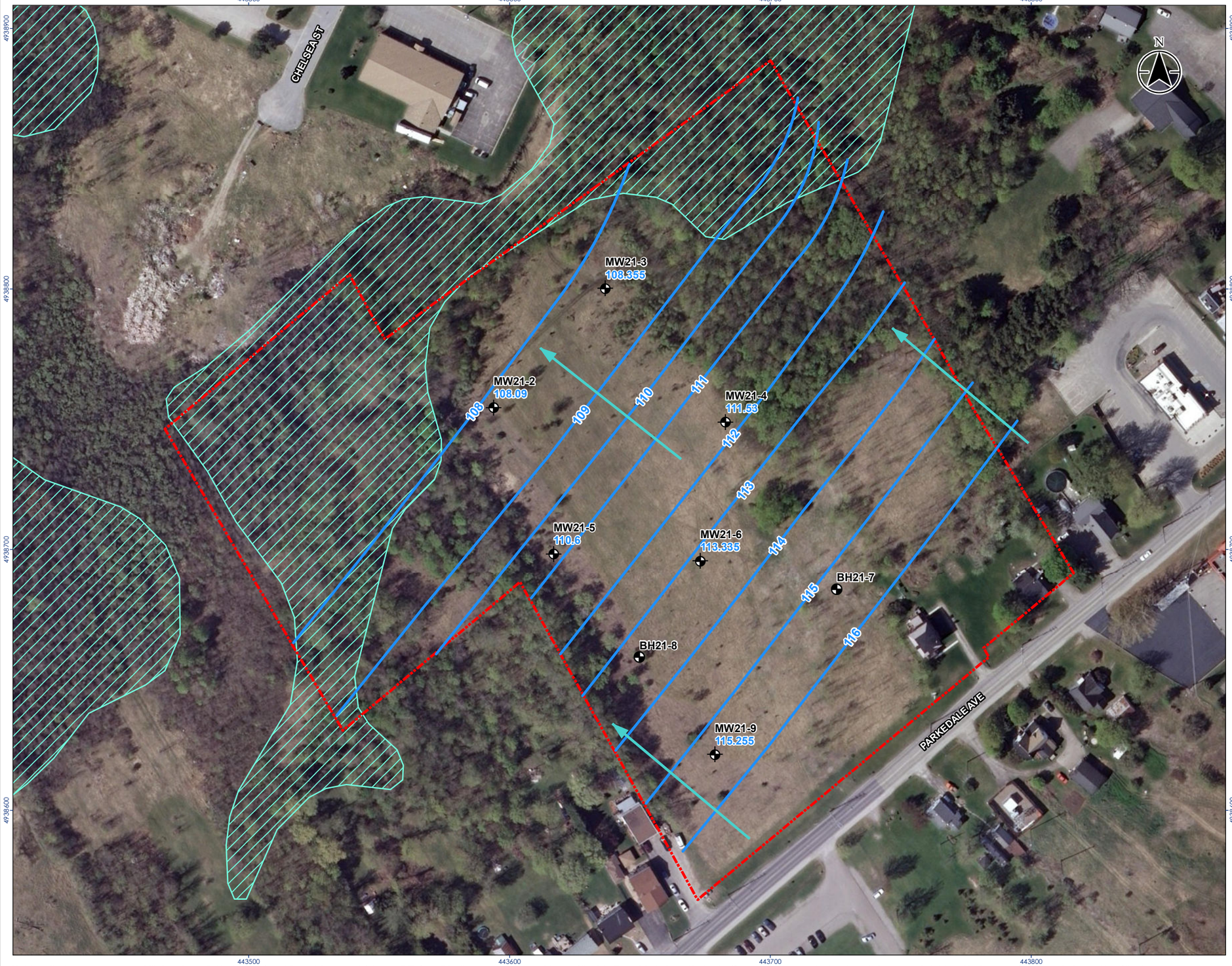
Project Location
City of Brockville

160401602 REVA
Prepared by pmoser on 2021-10-04
Technical Review by SMD on 2021-10-04

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
6

Title
Hydrogeological Profile A - A'



Stantec

Legend

- Property Boundary
- 108.54 Groundwater Elevation (January 20, 2021)
- Geotechnical Borehole and Monitoring Well (Stantec, 2021)
- Geotechnical Borehole (Stantec, 2021)
- Groundwater Contour (m AMSL)
- Inferred Direction of Groundwater Fllow
- Wetland - Not evaluated per Ontario Wetland Evaluation System

0 25 50 metres
1:1,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
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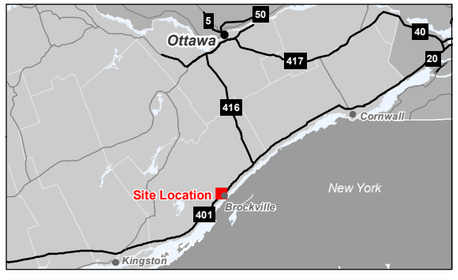


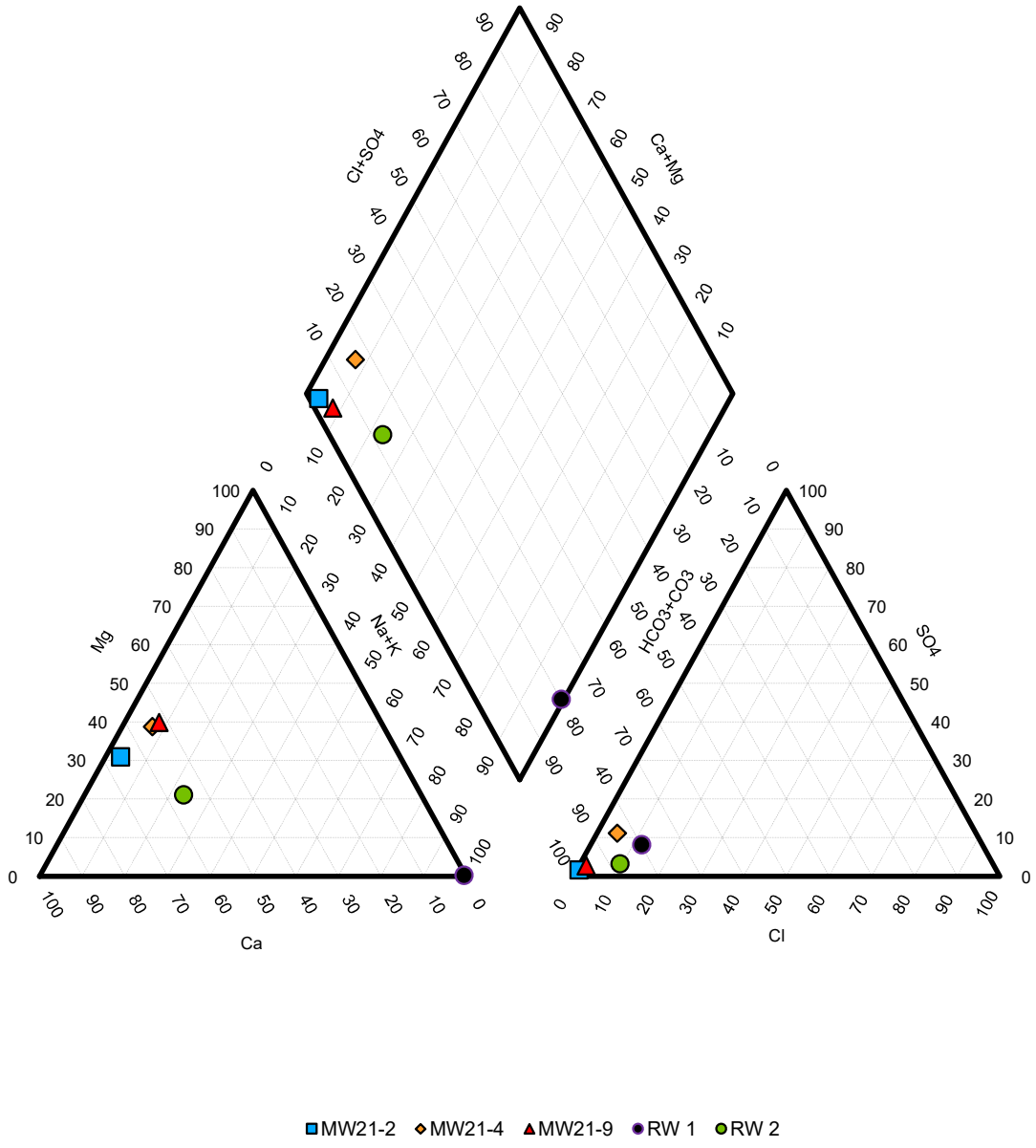
Project Location
City of Brockville

160401602 REVA
Prepared by PRM on 2021-10-04
Technical Review by SMD on 2021-10-04

Client/Project
NAUTICAL LANDS GENERAL CONTRACTORS INC.
WELLINGS OF BROCKVILLE
HYDROGEOLOGICAL INVESTIGATION

Figure No.
7

Title
Groundwater Flow Map



Notes:

Average concentration at each monitored point.

Client/Project

Proposed Wellings of Brockville Residential Subdivision
Nautical Lands General Contractors Inc.

Figure No.

8

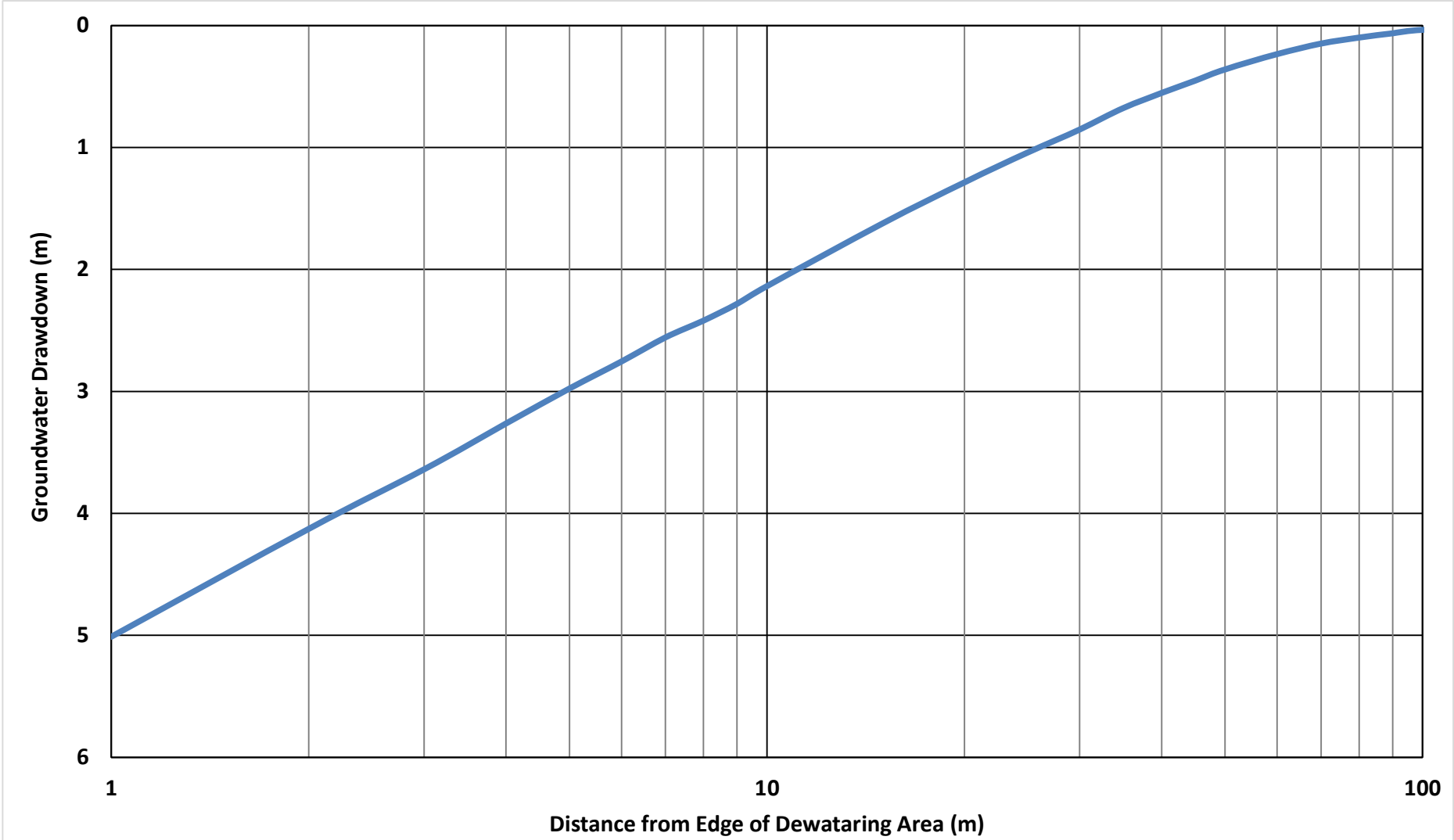
Title

Groundwater Chemistry - Piper Plot

Stantec

Predicted Water Table Drawdown vs. Distance (based on Theis Equation)

FIGURE 9



DATE: March 2022

PROJECT: 160401602

Stantec

Appendix B
Tables

Table 1
Monitoring Well Construction Details
Proposed Residential Subdivision at 3064 Parkedale Avenue, Brockville, Ontario
Nautical Lands General Contractors Inc.

Well ID	UTM Coordinates		Elevations		Well	Well Screen		Screened
	Northing	Easting	Top of Casing (m AMSL)	Ground Surface (m AMSL)	Base Elevation (m AMSL)	Top (m AMSL)	Bottom (m AMSL)	Material Description
MW21-2	4938754	443592	109.15	108.20	102.80	104.30	102.80	Sandstone
MW21-3	4938807	443638	109.68	108.50	103.40	104.90	103.40	Sandstone
MW21-4	4938743	443691	112.93	111.90	106.70	108.20	106.70	Silty Sand Till
MW21-5	4938699	443614	112.01	111.05	105.85	107.35	105.85	Silty Sand Till
MW21-6	4938694	443675	115.03	114.15	109.15	110.65	109.15	Silty Sand Till
MW21-9	4938620	443676	116.91	115.90	110.70	112.20	110.70	Silty Sand Till

Notes:

m AMSL = meters above mean sea level
m BGS = meters below ground surface
m BTOC = meters below top of well casing
- = data not available

Table 2
Water Level Monitoring Data
Proposed Residential Subdivision at 3064 Parkedale Avenue, Brockville, Ontario
Nautical Lands General Contractors Inc.

Well ID	Date	Well Depth		Top of Casing Elevation	Pipe Stick-up	Groundwater Elevation		Inferred Hydraulic Conductivity
		(m BTOC)	(m AMSL)	(m AMSL)	(m)	(m BTOC)	(m AMSL)	(m/s)
MW21-2	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	6.35	102.80	109.15	0.95	1.06 1.29 1.54 1.57	108.09 107.86 107.61 107.58	1×10^{-6}
MW21-3	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	6.28	103.40	109.68	1.18	1.33 1.55 1.77 1.78	108.36 108.13 107.92 107.90	4×10^{-7}
MW21-4	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	6.23	106.70	112.93	1.03	1.40 1.71 2.57 3.17	111.53 111.23 110.37 109.77	6×10^{-8}
MW21-5	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	6.16	105.85	112.01	0.96	1.41 1.68 2.45 2.84	110.60 110.33 109.56 109.17	1×10^{-8}
MW21-6	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	5.88	109.15	115.03	0.88	1.70 1.99 3.41 3.82	113.34 113.05 111.63 111.21	3×10^{-7}
MW21-9	20-Jan-21 27-Apr-21 22-Jul-21 2-Nov-21	6.21	110.70	116.91	1.01	1.66 1.87 3.31 3.95	115.26 115.05 113.61 112.96	3×10^{-7}

Notes:
m AMSL = meters above mean sea level
m BGS = meters below ground surface
m BTOC = meters below top of well casing
- = data not available

Table 3
Groundwater Quality Results
Proposed Residential Subdivision at 3064 Parkedale Avenue, Brockville, Ontario
Nautical Lands General Contractors Inc.

			Montioring Wells			Private Wells	
Sample Location			**MW21-2**	**MW21-4**	**MW21-9**	**RW 1**	**RW 2**
Sample Date			**21-Jan-21**	**21-Jan-21**	**21-Jan-21**	**27-Apr-21**	**27-Apr-21**
Sampling Company			**STANTEC**	**STANTEC**	**STANTEC**	**STANTEC**	**STANTEC**
Laboratory			**BV**	**BV**	**BV**	**BV**	**BV**
Laboratory Sample ID			**OQV744**	**OQV745**	**OQV746**	**PKR999**	**PKS000**
Sample Type	**Units**	**ODWS**					
General Chemistry							
Bicarbonate (as CaCO3)	mg/L	n/v	250	240	240	310	280
Carbonate (as CaCO3)	mg/L	n/v	2.8	2.5	2.9	2.8	2.1
Alkalinity, Total (as CaCO3)	mg/L	30-500[F]	250	240	240	310	280
Ammonia (as N)	mg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050
Anion Sum	me/L	n/v	5.33	7.11	5.40	10.2	7.85
Cation Sum	me/L	n/v	5.34	7.01	5.35	9.78	7.73
Chloride	mg/L	250[D]	2.8	24	7.7	82	53
Dissolved Organic Carbon	mg/L	5[D]	0.78	0.98	1.1	0.65	0.86
Electrical Conductivity, Lab	µmhos/cm	n/v	480	650	490	1000	750
Hardness (as CaCO3)	mg/L	80-100[F]	**260**	**330**	**250**	**3.4**	**300**
Ion Balance	%	n/v	0.0600	0.720	0.490	2.11	0.760
Langelier Index (at 20 C)	none	n/v	0.907	0.874	0.829	-1.09	0.848
Langelier Index (at 4 C)	none	n/v	0.658	0.626	0.579	-1.34	0.599
Nitrate (as N)	mg/L	10.0_d[C]	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite (as N)	mg/L	10.0_d[C]	<0.10	0.21	<0.10	0.34	2.49
Nitrite (as N)	mg/L	1.0_d[C]	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate(as P)	mg/L	n/v	<0.010	0.017	<0.010	<0.010	<0.010
pH, lab	S.U.	6.5-8.5[F]	8.07	8.05	8.11	7.98	7.91
Saturation pH (at 20 C)	none	n/v	7.17	7.18	7.28	9.07	7.06
Saturation pH (at 4 C)	none	n/v	7.42	7.42	7.53	9.32	7.31
Sulfate	mg/L	500_h[D]	10	76	16	76	25
Total Dissolved Solids (Calc)	mg/L	500[D]	280	380	280	**590**	420
Metals, Dissolved							
Aluminum	mg/L	0.1[F]	< 0.0049	< 0.0049	< 0.0049	0.0073	< 0.0049
Antimony	mg/L	0.006[C]	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	0.01[C]	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	1[C]	0.045	0.12	0.059	<0.002	0.067
Beryllium	mg/L	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Boron	mg/L	5[C]	0.01	0.021	0.022	0.016	0.017
Cadmium	mg/L	0.005[C]	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Calcium	mg/L	n/v	70	76	56	0.82	87
Chromium	mg/L	0.05[C]	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	n/v	0.0016	0.00067	0.0023	<0.0005	<0.0005
Copper	mg/L	1[D]	<0.0009	0.0026	<0.0009	0.019	0.08
Iron	mg/L	0.3[D]	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	mg/L	0.01[C]	<0.0005	0.00065	<0.0005	0.00083	0.0041
Magnesium	mg/L	n/v	20	33	26	0.32	20
Manganese	mg/L	0.05[D]	**0.067**	**0.12**	**0.23**	<0.002	<0.002
Molybdenum	mg/L	n/v	0.0019	0.0036	0.0042	0.0024	<0.0005
Nickel	mg/L	n/v	0.0019	0.002	0.0043	<0.001	<0.001
Phosphorus	mg/L	n/v	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium	mg/L	n/v	1.6	4.9	3.7	0.74	0.95
Selenium	mg/L	0.05[C]	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon	mg/L	n/v	7.3	7.2	6.5	8	6.4
Silver	mg/L	n/v	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Sodium	mg/L	200_g[D] 20_g[E]	3.3	8.5	7.8	**220**[D]	**41**[E]
Strontium	mg/L	n/v	0.15	0.28	0.14	0.0022	0.14
Thallium	mg/L	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Titanium	mg/L	n/v	<0.005	<0.005	<0.005	<0.005	<0.005
Uranium	mg/L	0.02[C]	0.00044	0.0016	0.00078	0.00095	0.00029
Vanadium	mg/L	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	5[D]	<0.160	0.014	0.0061	0.0075	0.031
Microbiology							
Background	CFU/100mL	-	-	-	-	0	0
Total Coliforms	CFU/100mL	0	-	-	-	0	0
Escherichia coli	CFU/100mL	0	-	-	-	0	0

Notes:

ODWS	O.Reg 169/03 - Ontario Drinking Water Quality Standards (January 1, 2018); Technical Support Document for Ontario Drinking Water Standards,Objectives and Guidelines (MOE, 2006), in support of O.Reg 169/03 (January 1, 2018)
C	Schedule 2 - Chemical Standards (expressed as a maximum concentration)
D	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Aesthetic Objectives
E	ODWS Table 4 - Medical Officer of Health Reporting Limit
F	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Operational Guidelines
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.

Table 4
Results of Local Private Water Well Survey
Proposed Residential Subdivision at 3064 Parkedale Avenue, Brockville, Ontario
Nautical Lands General Contractors Inc.

Properties Receiving Water Well Survey

3108 Parkedale Ave.
3110 Parkedale Ave.
3111 Parkedale Ave.
3114 Parkedale Ave.
3118 Parkedale Ave.
3126 Parkedale Ave.
3130 Parkedale Ave.
3134 Parkedale Ave.
3138 Parkedale Ave.
3146 Parkedale Ave.
3150 Parkedale Ave.
3156 Parkedale Ave.
3162 Parkedale Ave.

Water Well Survey Respondents

Private Well Identifier	Address	Well Tag No. or MECP Water Well Record No.	Well Type	Approximate Well Depth (m bgs)	History of Well Interference or Problems	History of Groundwater Quality Issues	Collection and Analysis of Groundwater Sample	Exceedance of Health Related Criteria of ODWS
RW1	3130 Parkedale Ave.	N/A	Dug	N/A	No	No	Yes	No
RW2	3162 Parkedale Ave.	N/A	Drilled	12.8	No	No	Yes	No

Notes:
m bgs - meters below ground surface
ODWS - Ontario Drinking Water Standards
N/A - data not available

TABLE 5
PRE-DEVELOPMENT MONTHLY WATER BALANCE

Monthly Water Balance Analysis - Thornthwaite and Mather model
PRE-DEVELOPMENT
Proposed Wellings of Brockville Development

Total Site Area (ha) 6.00

Land Description Factors	Existing Site Conditions								
Topography	0.05								
Soils	0.08								
Cover	0.15								
Sum (Infiltration Factor)	0.28								
Soil Moisture Capacity (mm)	250								
Site area (ha)	6.00								
Impervious Coefficient	0.00								
Impervious Area (ha)	0.00								0.00
Remaining Pervious Area (ha)	6.00								
Total Pervious Site Area (ha)	6.00								6.00
Percentage of Total Site Area	100%								100%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Brockville PCC Climate Station - 6100971, Ontario via Environment Canada Website - Climate Normals from 1981-2010)													
Average Daily Temperature (°C)	-7.8	-6.0	-1.0	6.7	13.1	18.2	21.2	20.3	16.0	9.4	3.4	-3.4	**7.5**
Precipitation (mm)	78	64	63	77	84	93	86	82	98	89	92	80	**987**
Evapotranspiration Analysis (Sub-Area A)													
Heat Index	0.0	0.0	0.0	1.6	4.3	7.1	8.9	8.3	5.8	2.6	0.6	0.0	**39**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	29.1	61.3	88.5	104.8	99.9	76.6	42.4	13.7	0.0	**516**
Potential Evapotranspiration Adjusting Factor for Latitude	0.81	0.92	1.06	1.18	1.27	1.29	1.22	1.11	0.98	0.86	0.76	0.74	
Adjusted Potential Evapotranspiration (mm)	0	0	0	34	78	114	128	111	75	36	10	0	**587**
PET (Malstrom, 1969) (mm/month)	0	0	0	34	78	114	128	111	75	36	10	0	**587**
Precipitation - PET (mm)	78	64	63	43	6	-21	-42	-29	23	53	82	80	**400**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-21	-63	-91	-61	-1	0	0	
Storage (S)	250	250	250	250	250	230	194	173	196	249	250	250	
Change in Storage	0	0	0	0	0	-20	-35	-21	23	53	1	0	
Actual Evapotranspiration (mm)	**0**	**0**	**0**	**34**	**78**	**113**	**121**	**103**	**75**	**36**	**10**	**0**	**572**
Recharge/Runoff Analysis													
Water Surplus (mm)	78	64	63	43	6	0	0	0	0	0	80	80	**415**
Potential Infiltration (I)	22	18	18	12	2	0	0	0	0	0	22	22	**116**
Potential Direct Surface Water Runoff (R)	**56**	**46**	**45**	**31**	**4**	**0**	**0**	**0**	**0**	**0**	**58**	**57**	**299**
Infiltration (mm)	**0**	**0**	**0**	**92**	**2**	**0**	**0**	**0**	**0**	**0**	**22**	**0**	**116**
Pervious Evapotranspiration (m^3)	0	0	0	2060	4675	6794	7289	6198	4507	2188	624	0	34333
Pervious Runoff (m^3)	3387	2773	2722	1848	267	0	0	0	0	0	3466	3447	17910
Pervious Infiltration (m^3)	0	0	0	5513	104	0	0	0	0	0	1348	0	6965
Impervious Evapotranspiration (mm)	8	6	6	8	8	9	9	8	10	9	9	8	99
Impervious Runoff (mm)	71	58	57	69	76	84	78	74	88	80	83	72	888
Volumetric Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre-Development Infiltration	6,965	(m^3/yr)	116	mm/yr	0.22	L/s

TABLE 6
POST-DEVELOPMENT MONTHLY WATER BALANCE

Monthly Water Balance Analysis - Thornthwaite and Mather model
POST-DEVELOPMENT
Proposed Wellings of Brockville Development

Total Site Area (ha) 6.00

Land Description Factors	**Site**								
Topography	0.10								
Soils	0.08								
Cover	0.15								
Sum (Infiltration Factor)	0.33								
Soil Moisture Capacity (mm)	250								
Site area (ha)	6.00								
Impervious Coefficient	0.90								
Impervious Area (ha)	2.20								2.20
Remaining Pervious Area (ha)	3.80								
Total Pervious Site Area (ha)	3.80								3.80
Percentage of Total Site Area	63%								63%

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Climate Data (Brockville PCC Climate Station - 6100971, Ontario via Environment Canada Website - Climate Normals from 1981-2010)													
Average Daily Temperature (°C)	-7.8	-6.0	-1.0	6.7	13.1	18.2	21.2	20.3	16.0	9.4	3.4	-3.4	**7.5**
Precipitation (mm)	78	64	63	77	84	93	86	82	98	89	92	80	**987**
Evapotranspiration Analysis (Sub-Area A)													
Heat Index	0.0	0.0	0.0	1.6	4.3	7.1	8.9	8.3	5.8	2.6	0.6	0.0	**39**
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	29.1	61.3	88.5	104.8	99.9	76.6	42.4	13.7	0.0	**516**
Potential Evapotranspiration Adjusting Factor for Latitude	0.81	0.92	1.06	1.18	1.27	1.29	1.22	1.11	0.98	0.86	0.76	0.74	
Adjusted Potential Evapotranspiration (mm)	0	0	0	34	78	114	128	111	75	36	10	0	**587**
PET (Malstrom, 1969) (mm/month)	0	0	0	34	78	114	128	111	75	36	10	0	**587**
Precipitation - PET (mm)	78	64	63	43	6	-21	-42	-29	23	53	82	80	**400**
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-21	-63	-91	-61	-1	0	0	
Storage (S)	250	250	250	250	250	230	194	173	196	249	250	250	
Change in Storage	0	0	0	0	0	-20	-35	-21	23	53	1	0	
Actual Evapotranspiration (mm)	**0**	**0**	**0**	**34**	**78**	**113**	**121**	**103**	**75**	**36**	**10**	**0**	**572**
Recharge/Runoff Analysis													
Water Surplus (mm)	78	64	63	43	6	0	0	0	0	0	80	80	**415**
Potential Infiltration (I)	26	21	21	14	2	0	0	0	0	0	26	26	**137**
Potential Direct Surface Water Runoff (R)	**53**	**43**	**42**	**29**	**4**	**0**	**0**	**0**	**0**	**0**	**54**	**53**	**278**
Infiltration (mm)	**0**	**0**	**0**	**108**	**2**	**0**	**0**	**0**	**0**	**0**	**26**	**0**	**137**
Pervious Evapotranspiration (m^3)	0	0	0	1304	2961	4303	4616	3925	2854	1386	395	0	21744
Pervious Runoff (m^3)	1996	1635	1604	1089	158	0	0	0	0	0	2043	2032	10555
Pervious Infiltration (m^3)	0	0	0	4115	78	0	0	0	0	0	1006	0	5199
Impervious Evapotranspiration (mm)	8	6	6	8	8	9	9	8	10	9	9	8	99
Impervious Runoff (mm)	71	58	57	69	76	84	78	74	88	80	83	72	888
Volumetric Impervious Runoff (m^3)	1552	1271	1247	1527	1665	1839	1707	1630	1934	1762	1824	1580	19539

Pre-Development Infiltration	**6,965**	**(m^3/yr)**	**116**	**mm/yr**	**19**	**m^3/day**
Post-Development Infiltration	**5,199**	**(m^3/yr)**	**87**	**mm/yr**	**14**	**m^3/day**
Infiltration Deficit	**1,766**	**(m^3/yr)**	**29**	**mm/yr**	**5**	**m^3/day**

Appendix C
Borehole Logs, Grain Size Analysis

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4-8
Stiff	1.0 - 2.0	50 – 100	8-15
Very Stiff	2.0 - 4.0	100 - 200	15-30
Hard	>4.0	>200	>30

ROCK DESCRIPTION

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor Quality*
25-50	*Poor Quality*
50-75	*Fair Quality*
75-90	*Good Quality*
90-100	*Excellent Quality*

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	*Crushed*
Severely Fractured	*Shattered or Very Blocky*
Fractured	*Blocky*
Moderately Jointed	*Sound*
Intact	*Very Sound*

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 – 5
Weak	R2	5 – 25
Medium Strong	R3	25 – 50
Strong	R4	50 – 100
Very Strong	R5	100 – 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.

Boulders Cobbles Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Meta-morphic Bedrock | Sedi-mentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

measured in standpipe, piezometer, or well

inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

MONITORING WELL RECORD

MW21-2

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-2
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 13, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**108.20**							
	107.6	TOPSOIL			SS	1	325	2
1	106.8	Dense brown-grey Silty SAND (SM)			SS	2	525	47
2		Very dense grey silty SAND with gravel (SM)			SS	3	300	58/ 150 mm
					SS	4	225	50/ 75 mm
3	104.5				SS	5	200	50/ 150 mm
4		Medium grey Limestone and medium to light grey Sandstone - Poor to good quality			NQ	6	100%	77%
5	102.8	(See Field Bedrock Core Log for detailed description)			NQ	7	92%	49%
		End of Borehole Monitoring Well Installed - Screen from 5.4 m to 3.9 m - Sand to 3.6 m - Bentonite hole plug to ground surface - Stick up well cap						
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa
50 100 150 200
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level
▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa
□ Remoulded Vane Test, kPa
△ Pocket Penetrometer Test, kPa

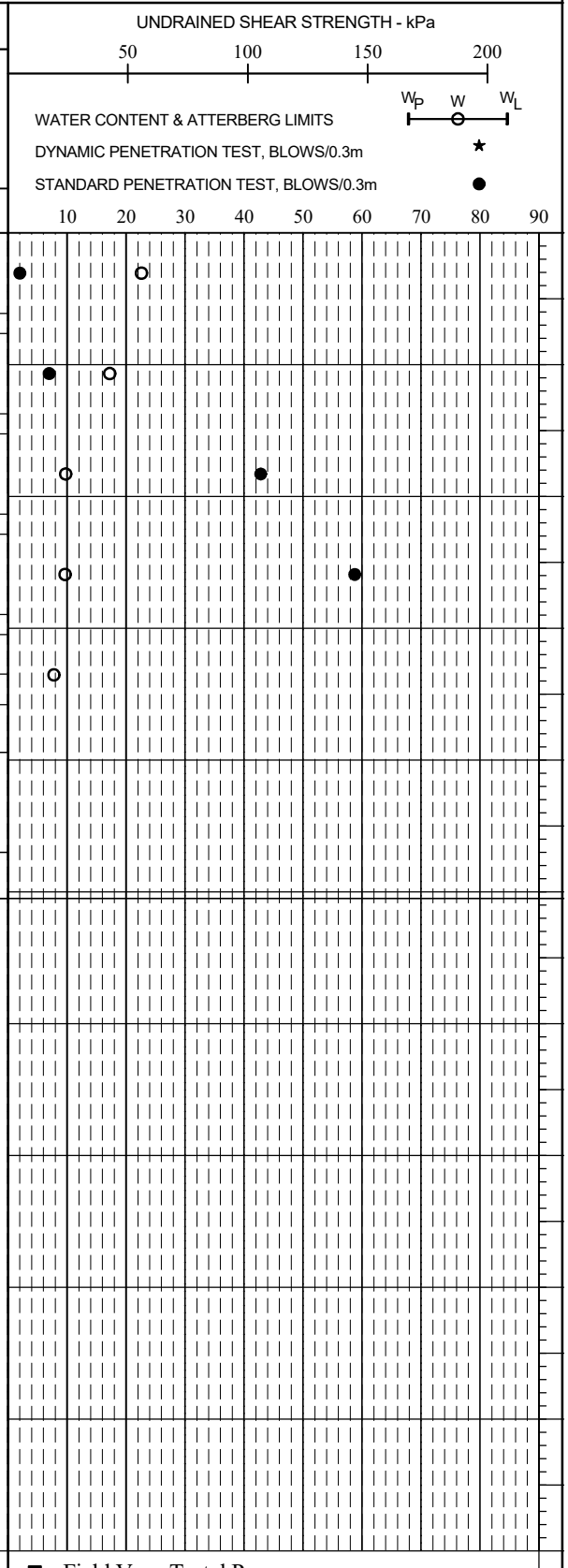
STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

MONITORING WELL RECORD

MW21-3

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-3
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 13, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**108.50**							
	108.3	TOPSOIL						
		Very loose to loose brown silty SAND (SM) - wet			SS	1	375	2
1					SS	2	475	7
	107.0							
		Dense to very dense brown-grey silty SAND with gravel (SM)			SS	3	375	43
2					SS	4	600	59
3					SS	5	150	
	105.2							
		Medium to light grey Limestone and Sandstone - Good to excellent quality (See Field Bedrock Core Log for detailed description)			NQ	6	100%	100%
4					NQ	7	100%	77%
					NQ	8	100%	100%
5	103.5							
		End of Borehole Monitoring Well Installed - Screen from 5.1 m to 3.6 m - Sand to 3.3 m - Bentonite hole plug to ground surface - Stick up well cap						
6								
7								
8								
9								
10								



Inferred Groundwater Level
Groundwater Level Measured in Standpipe

Field Vane Test, kPa
Remoulded Vane Test, kPa
Pocket Penetrometer Test, kPa

STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

MONITORING WELL RECORD

MW21-4

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-4
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 14, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**111.90**							
		TOPSOIL		▼	SS	1	125	2
	111.3							
1		Compact yellow-brown silty SAND (SM) (POSSIBLE FILL) - wet			SS	2	375	20
2					SS	3	350	12
	109.4							
		Very dense grey silty SAND with gravel (SM)			SS	4	375	106
3					SS	5	225	50/ 75 mm
4					SS	6	175	50/ 75 mm
					SS	7	610	50/ 75 mm
5	106.7							
	106.6	Start DCPT						
		End of Borehole						
6		DCPT Refusal at 5.3 m						
		Monitoring Well Installed - Screen from 5.2 m to 3.7 m - Sand to 3.4 m - Bentonite hole plug to ground surface - Stick up well cap						
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa
50 100 150 200
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
10 20 30 40 50 60 70 80 90

106
100

▽ Inferred Groundwater Level
▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa
□ Remoulded Vane Test, kPa
△ Pocket Penetrometer Test, kPa

STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

Stantec

MONITORING WELL RECORD

MW21-5

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-5
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 12, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**111.05**							
	110.9	TOPSOIL						
		Very loose yellow-brown silty SAND (SM) (POSSIBLE FILL) - wet		▼	SS	1	425	2
1	110.1	Compact to very dense brown-grey silty SAND (SM)			SS	2	450	29
2					SS	3	75	50/ 75 mm
	108.8	Very dense brown-grey silty SAND (SM)			SS	4	450	102
3					SS	5	275	50/ 125 mm
4					SS	6	50	50/ 50 mm
	106.5	Very dense grey silty sand (SM) TILL			SS	7	75	50/ 75 mm
5	105.9	End of Borehole Monitoring Well Installed - Screen from 5.2 m to 3.7 m - Sand to 3.4 m - Bentonite hole plug to ground surface - Stick up well cap						
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa
50 100 150 200
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50 60 70 80 90

102

▽ Inferred Groundwater Level
▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa
□ Remoulded Vane Test, kPa
△ Pocket Penetrometer Test, kPa

STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

MONITORING WELL RECORD

MW21-6

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-6
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 14, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**114.15**							
	113.6	TOPSOIL			SS	1	375	4
1		Loose brown silty SAND (SM) (POSSIBLE FILL) - wet		▼	SS	2	600	4
2					SS	3	525	4
	111.9	Very dense grey silty SAND (SM)			SS	4	100	50/ 100 mm
3					SS	5	225	50/ 75 mm
4					SS	6	125	50/ 125 mm
5	109.1				SS	7	250	50/ 100 mm
		End of Borehole Auger Refusal on inferred bedrock at 5.0 m Monitoring Well Installed - Screen from 5.0 m to 3.5 m - Sand to 3.2 m - Bentonite hole plug to ground surface - Stick up well cap						
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa
50 100 150 200
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level
▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa
□ Remoulded Vane Test, kPa
△ Pocket Penetrometer Test, kPa

STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

Stantec

BOREHOLE RECORD

BH21-7

CLIENT Nautical Lands General Contractors Inc. BOREHOLE No. BH21-7

LOCATION 3064 Parkedale Ave, Brockville, ON PROJECT No. 160401602

DATES: BORING January 14, 2021 WATER LEVEL DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**115.10**							
	114.9	TOPSOIL			SS	1	300	13
	114.5	Black/brown sand						
	114.2	TOPSOIL						
1		Loose to very dense grey-brown silty SAND (SM)			SS	2	450	9
2					SS	3	475	58
	112.8							
		Very dense grey silty SAND with gravel (SM)			SS	4	400	50/ 100 mm
3					SS	5	325	50/ 25 mm
4					SS	6	200	50/ 105 mm
	110.7							
		Very dense grey silty SAND with gravel (SM) - dry			SS	7	75	50/ 75 mm
5	109.9	End of Borehole						
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST, BLOWS/0.3m

STANDARD PENETRATION TEST, BLOWS/0.3m

10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level

▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa

□ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

BH21-8

CLIENT Nautical Lands General Contractors Inc. BOREHOLE No. BH21-8

LOCATION 3064 Parkedale Ave, Brockville, ON PROJECT No. 160401602

DATES: BORING January 14, 2021 WATER LEVEL DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**114.30**							
	114.2	TOPSOIL			SS	1	525	5
		Loose to very dense brown silty SAND (SM) - wet - some gravel below 2.0 m			SS	2	375	23
2					SS	3	375	32
					SS	4	150	50/ 25 mm
3	111.3							
		Very dense grey-brown silty SAND with gravel (SM)			SS	5	150	50/ 150 mm
4					SS	6	75	50/ 75 mm
					SS	7	50	50/ 60 mm
5	109.1							
		End of Borehole						
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level

▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa

□ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

MONITORING WELL RECORD

MW21-9

CLIENT Nautical Lands General Contractors Inc.
BOREHOLE No. MW21-9
LOCATION 3064 Parkedale Ave, Brockville, ON
PROJECT No. 160401602
DATES: BORING January 12, 2021 WATER LEVEL January 20, 2021
DATUM Geodetic

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	**115.90**							
	115.3	TOPSOIL		▼	SS	1	150	4
1		Very loose to compact yellow-brown silty SAND (SM) (POSSIBLE FILL) - wet			SS	2	375	3
2	113.6				SS	3	500	21
		Compact brown silty SAND (SM)			SS	4	375	21
3	112.1				SS	5	275	50/ 125 mm
4		Very dense grey silty sand with gravel (SM) TILL			SS	6	125	50/ 125 mm
5	110.7				SS	7	75	50/ 75 mm
		End of Borehole Monitoring Well Installed - Screen from 5.2 m to 3.7 m - Sand to 3.4 m - Bentonite hole plug to ground surface - Stick up well cap						
6								
7								
8								
9								
10								

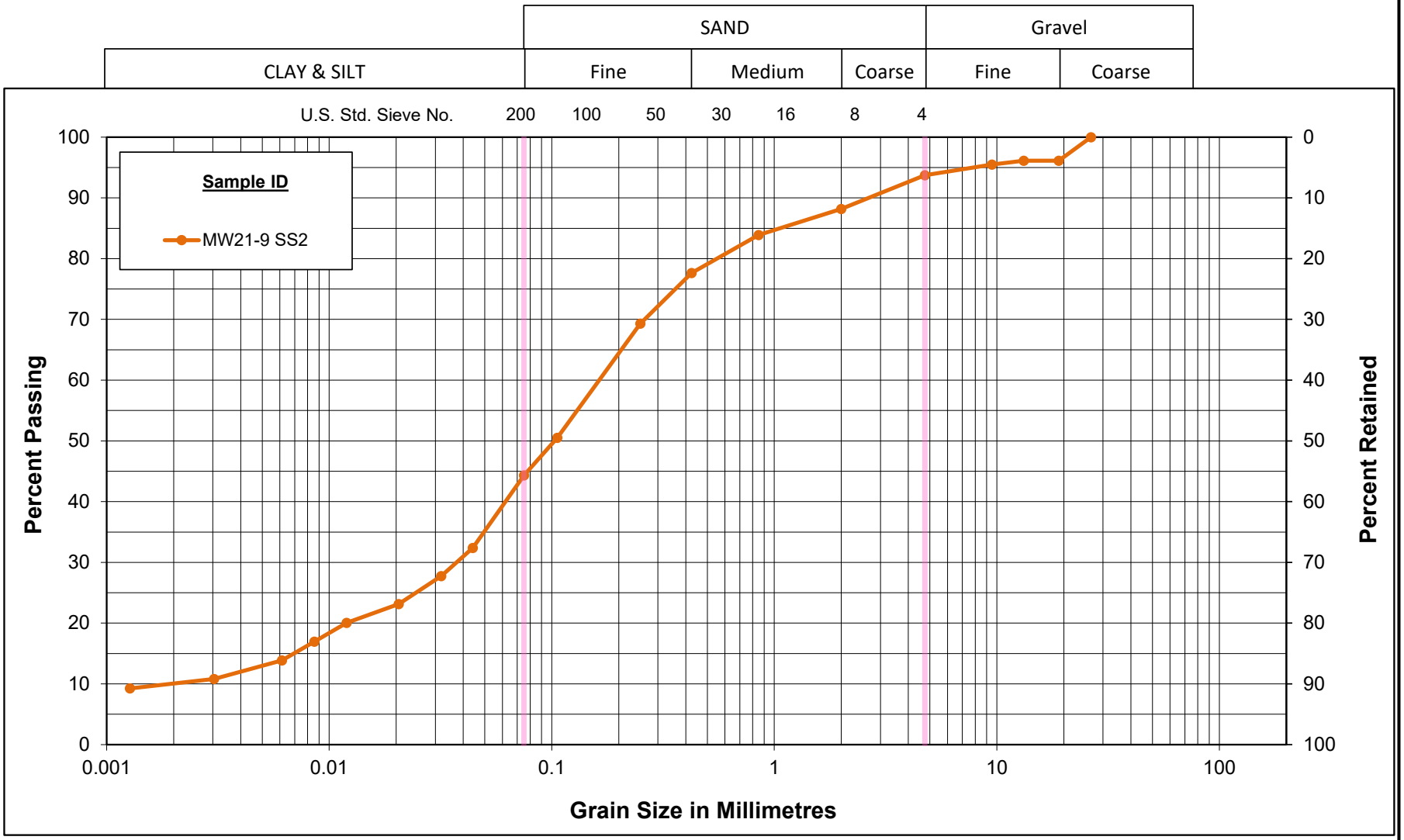
UNDRAINED SHEAR STRENGTH - kPa
50 100 150 200
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level
▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa
□ Remoulded Vane Test, kPa
△ Pocket Penetrometer Test, kPa

STN13-STAN-GEO 160401602-WELLINGSBROCKVILLE.GPJ SMART.GDT 2/12/21

Unified Soil Classification System



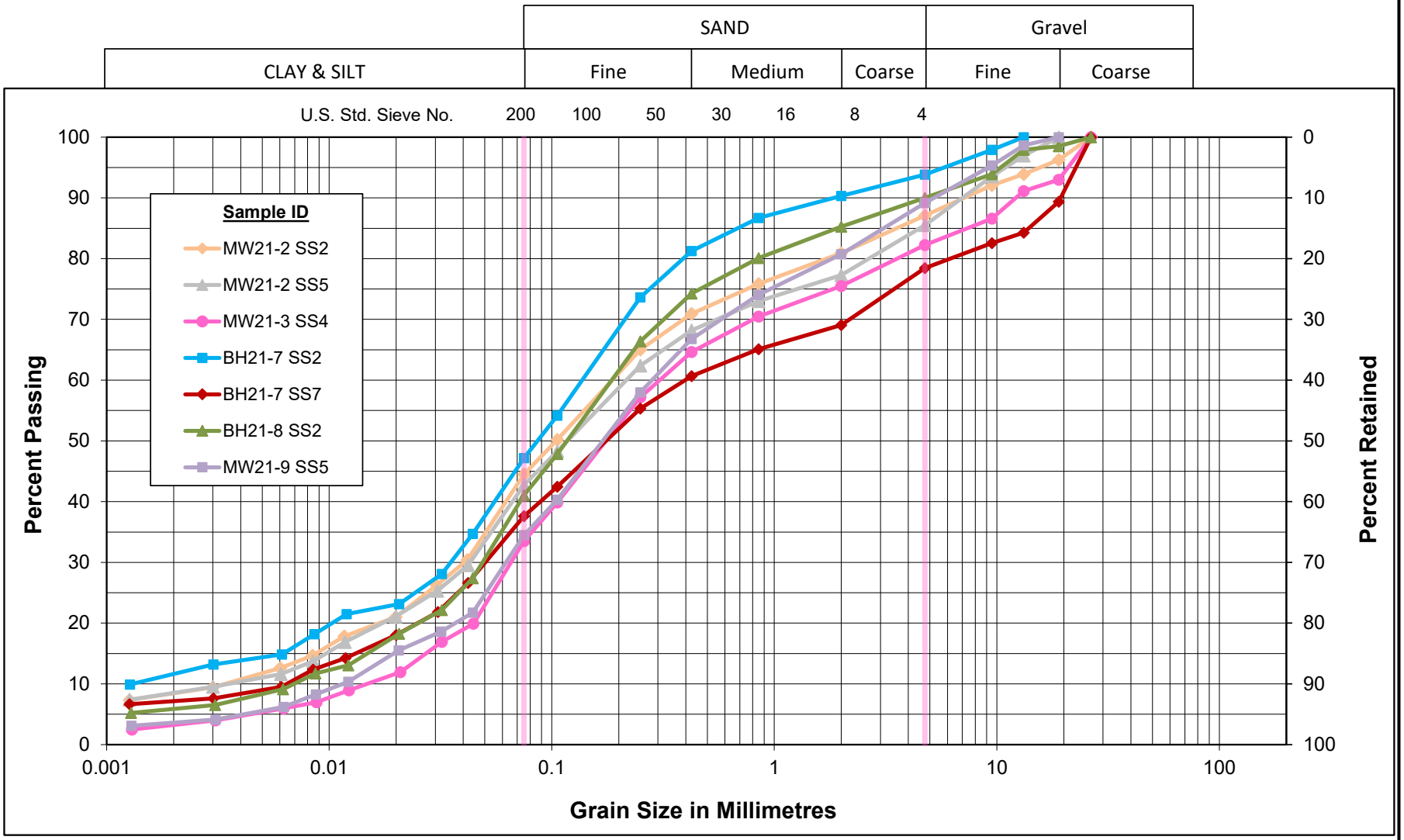
Stantec

GRAIN SIZE DISTRIBUTION
FILL: Silty Sand (SM)

Figure No. 1

Project No. 160401602

Unified Soil Classification System



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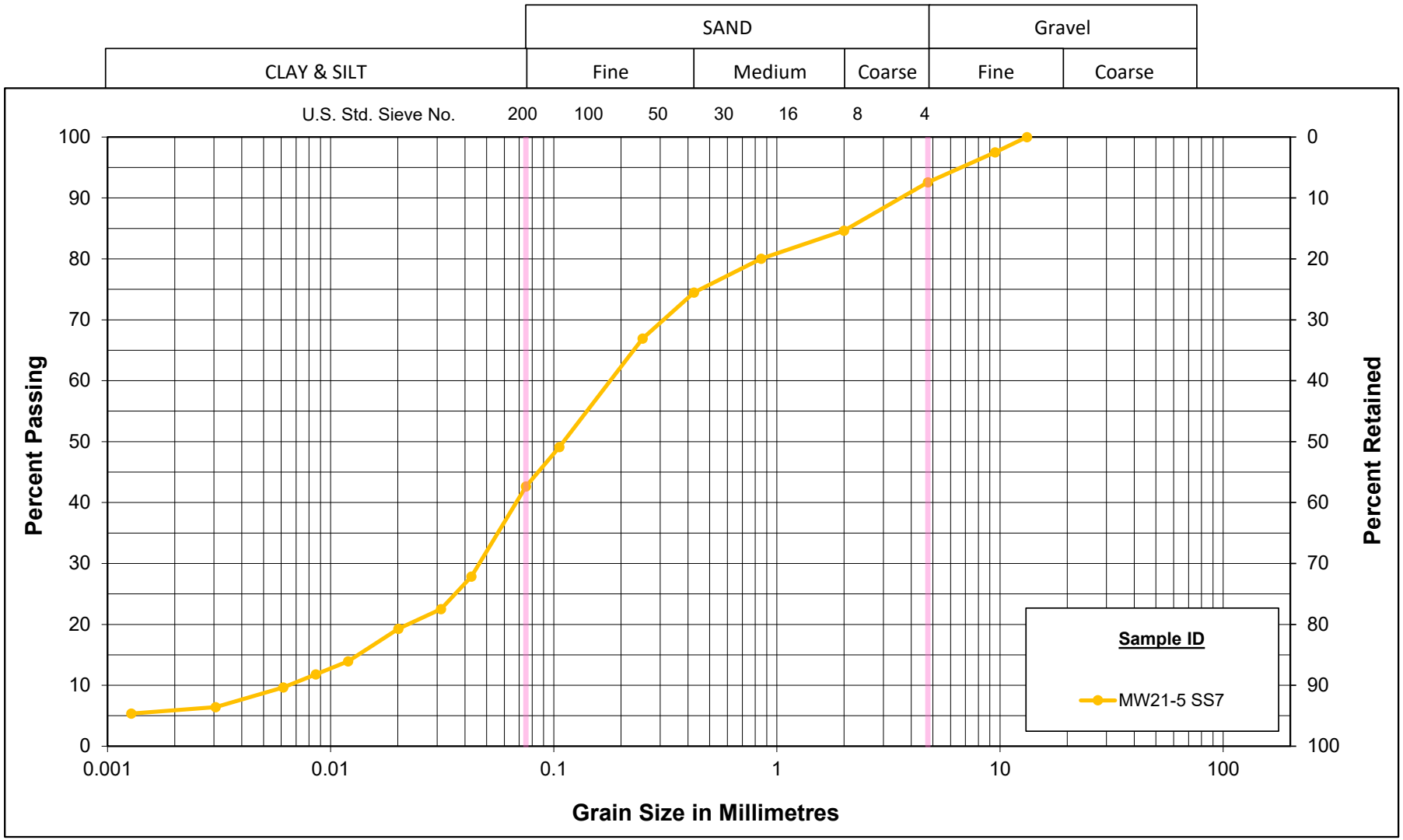
GRAIN SIZE DISTRIBUTION

Silty SAND to Silty Sand with Gravel (SM)

Figure No. 2

Project No. 160401602

Unified Soil Classification System



GRAIN SIZE DISTRIBUTION
Silty Sand (SM) TILL

Figure No. 3

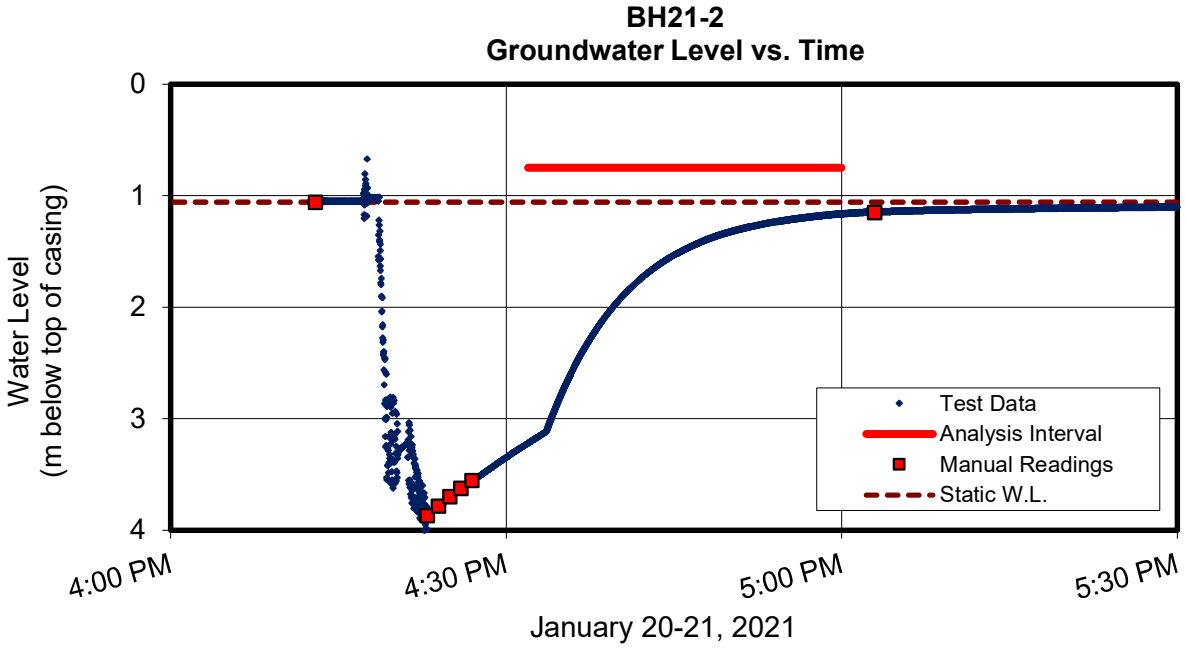
Project No. 160401602

Appendix D
In-Situ Hydraulic Conductivity Test Reports

In-Situ Hydraulic Conductivity Test Report

Monitoring Well BH21-2

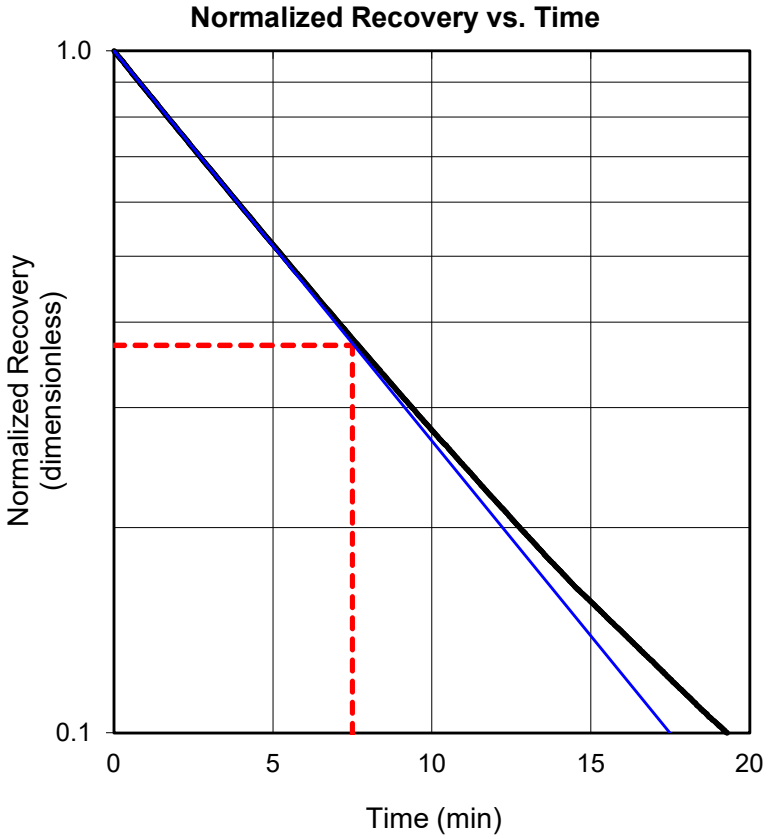
FIGURE D-1



January 20-21, 2021

Sand Pack Interval (below ground surface)

3.6 m - 5.4 m



Time Lag (T_0) = 7.5 min

Sand Pack Length (L) = 1.82 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R)}{2T_0L} =$$ 1E-06 m/s

Soil Type

Sandstone

DATE: Jan. 22, 2021

PROJECT: 160401602

Stantec

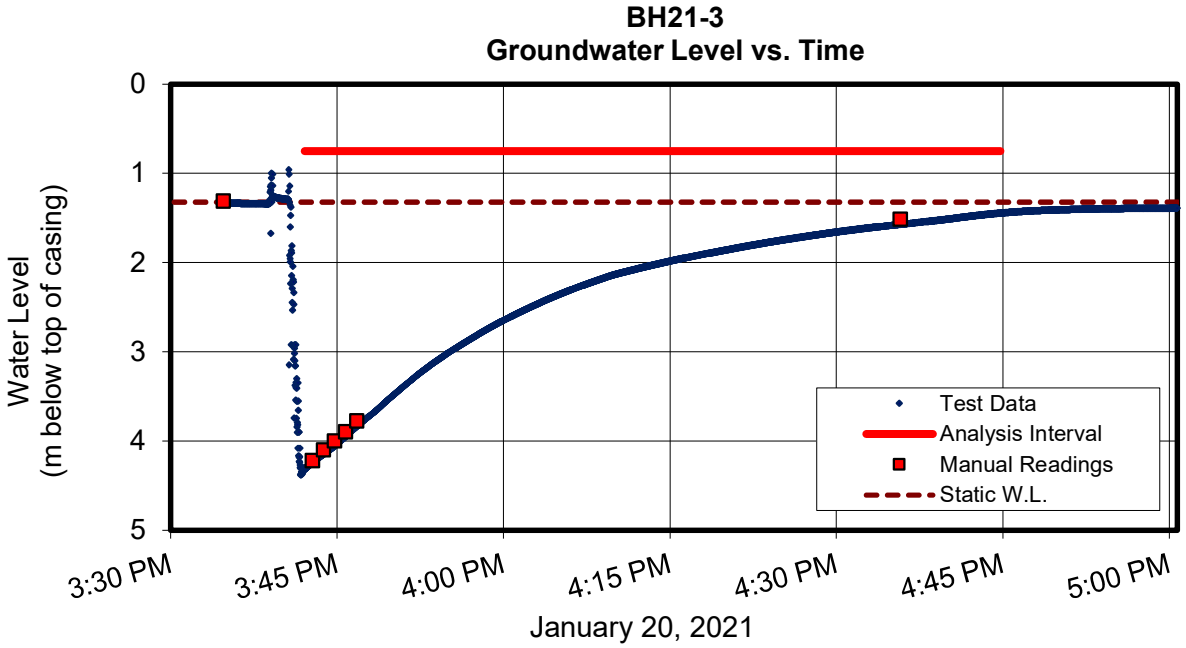
prepared by: AW

reviewed by: SMD

In-Situ Hydraulic Conductivity Test Report

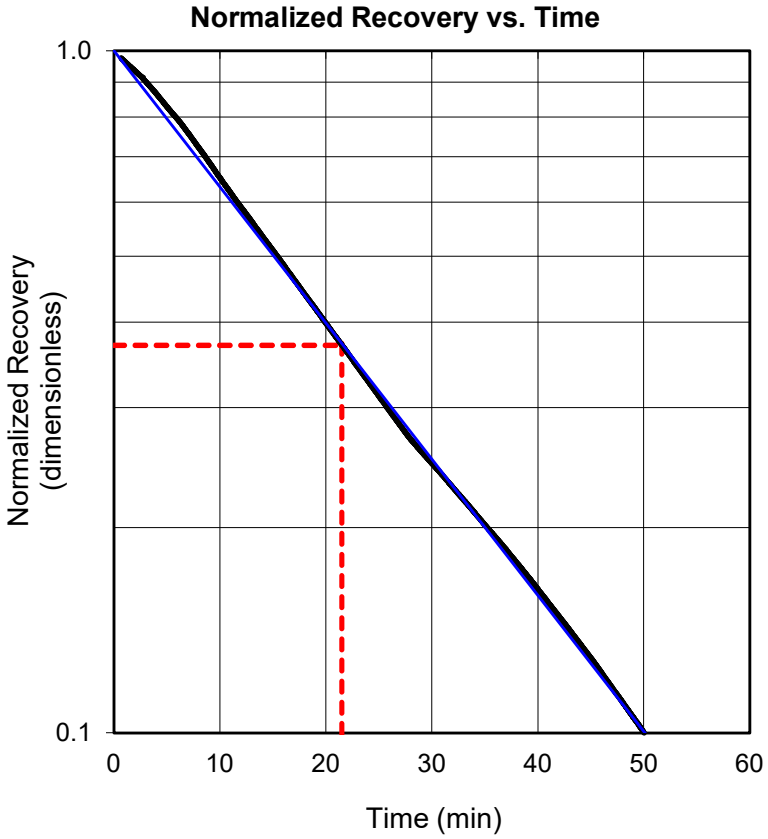
Monitoring Well BH21-3

FIGURE D-2



Sand Pack Interval (below ground surface)

3.3 m - 5.1 m



Time Lag (T_0) = 21.5 min

Sand Pack Length (L) = 1.82 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R)}{2T_0L} = \text{4E-07 m/s}$$

Soil Type

Sandstone

DATE: Jan. 22, 2021

PROJECT: 160401602

Stantec

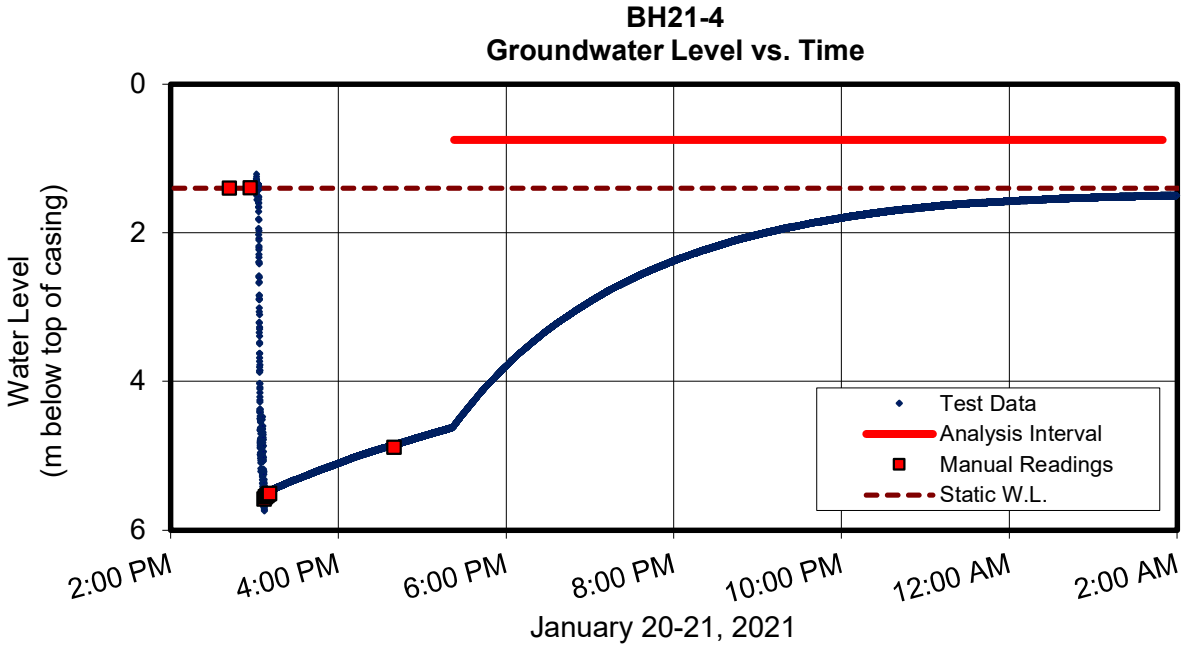
prepared by: AW

reviewed by: SMD

In-Situ Hydraulic Conductivity Test Report

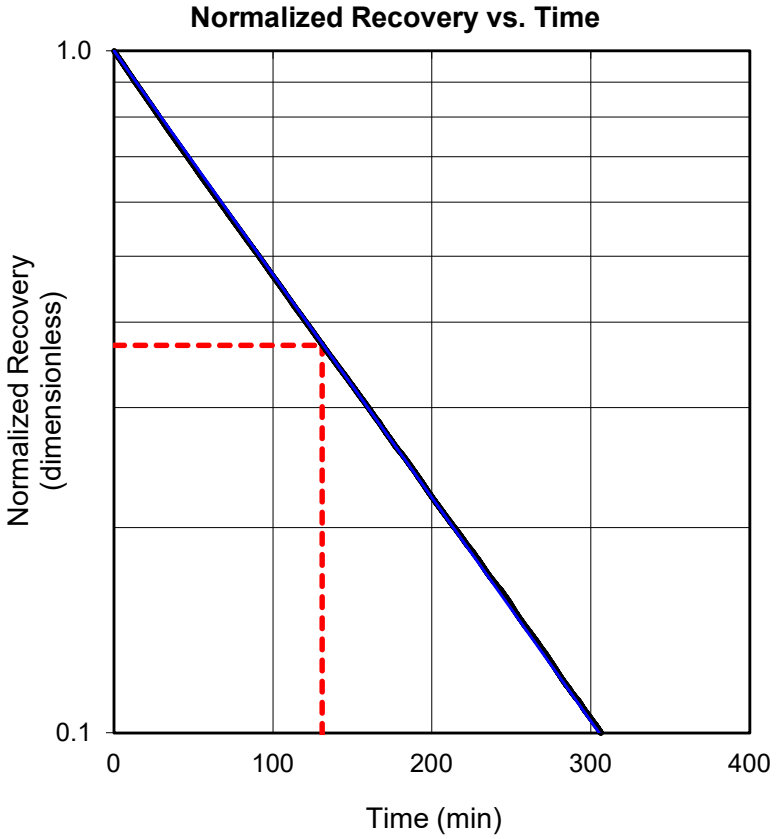
Monitoring Well BH21-4

FIGURE D-3



Sand Pack Interval (below ground surface)

3.29 m - 5.11 m



Time Lag (T_0) = 131 min

Sand Pack Length (L) = 1.82 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R) =}{2T_0L}$$ 6E-08 m/s

Soil Type

Clayey Silt, some Sand and Gravel

DATE: Jan. 22, 2021

PROJECT: 160401602

Stantec

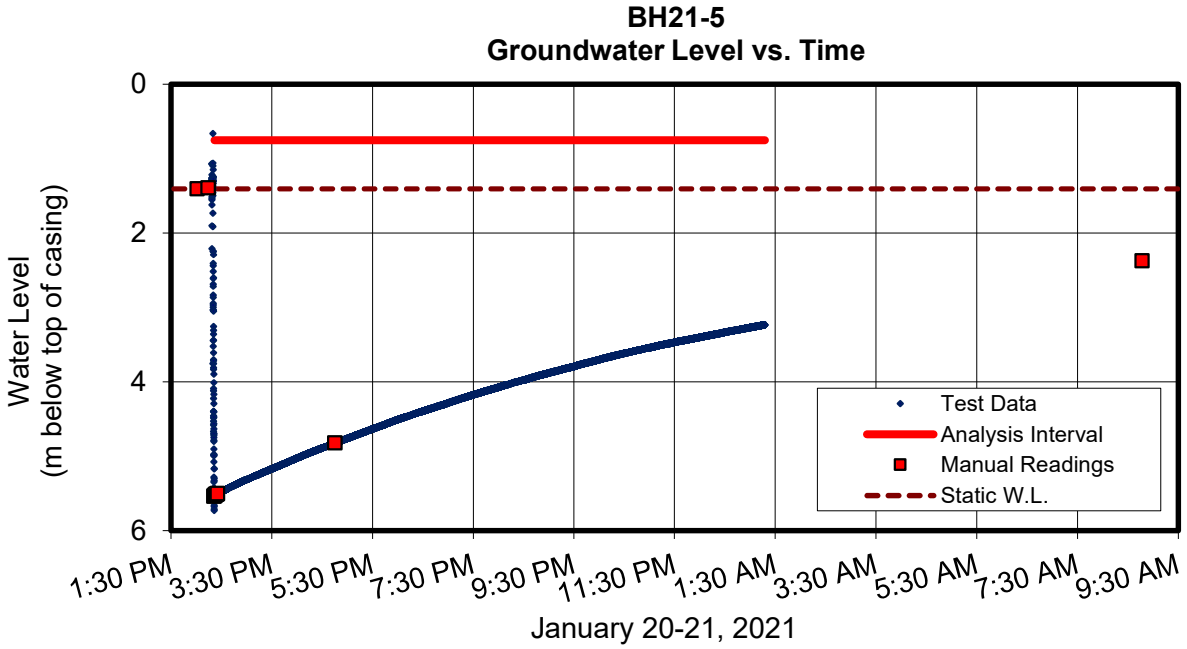
prepared by: AW

reviewed by: SMD

In-Situ Hydraulic Conductivity Test Report

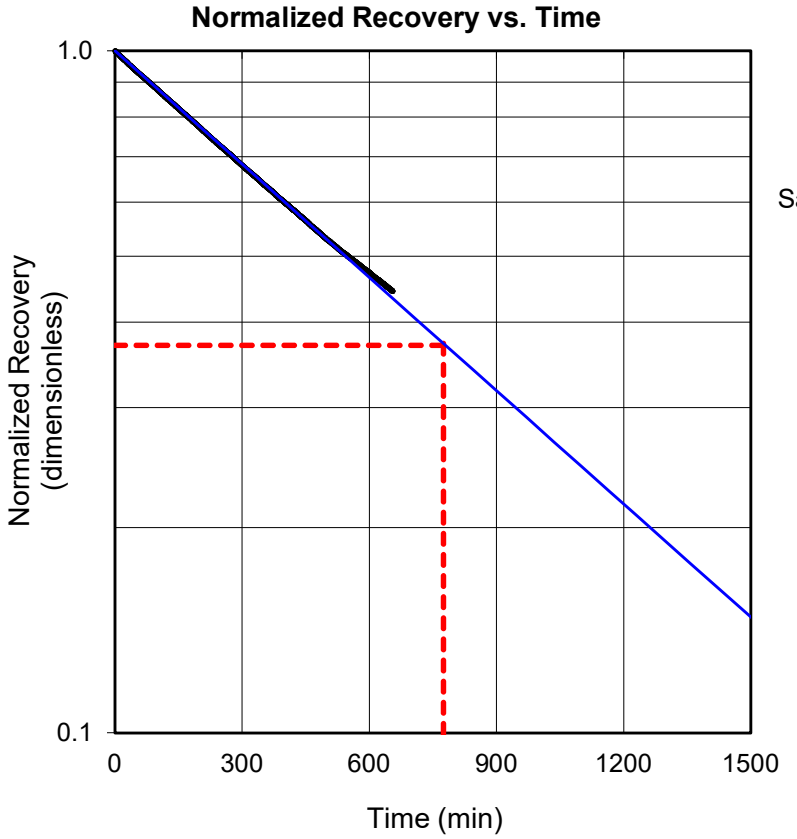
Monitoring Well BH21-5

FIGURE D-4



Sand Pack Interval (below ground surface)

3.04 m - 4.87 m



Time Lag (T_0) = 775 min

Sand Pack Length (L) = 1.83 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R)}{2T_0L} =$$ 1E-08 m/s

Soil Type

Clayey Silt with Gravel (Till)

DATE: Jan. 25, 2021

PROJECT: 160401602

Stantec

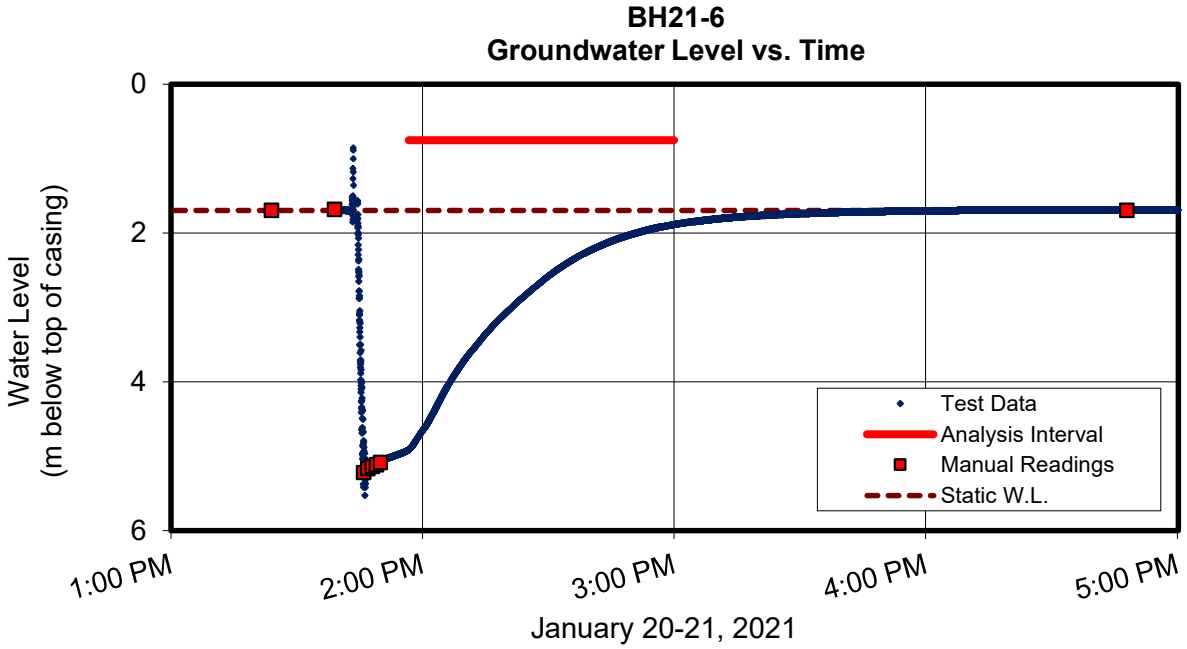
prepared by: AW

reviewed by: SMD

In-Situ Hydraulic Conductivity Test Report

Monitoring Well BH21-6

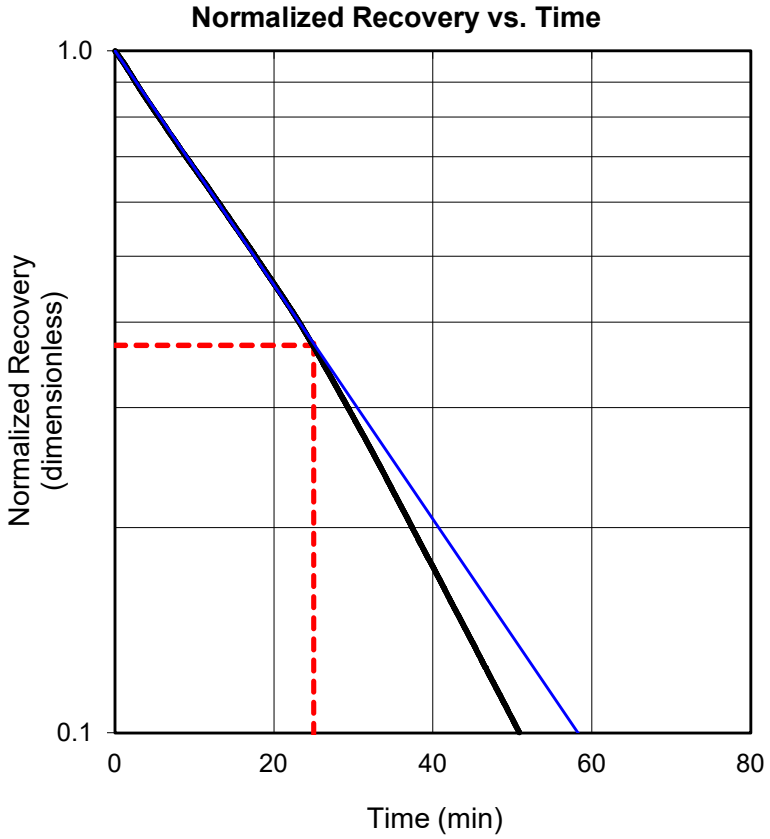
FIGURE D-5



January 20-21, 2021

Sand Pack Interval (below ground surface)

3.10 m - 4.93 m



Time Lag (T_0) = 25 min

Sand Pack Length (L) = 1.83 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R)}{2T_0L} =$$ 3E-07 m/s

Soil Type

Clayey Silt with Sand and Gravel

DATE: Jan. 26, 2021

PROJECT: 160401602

Stantec

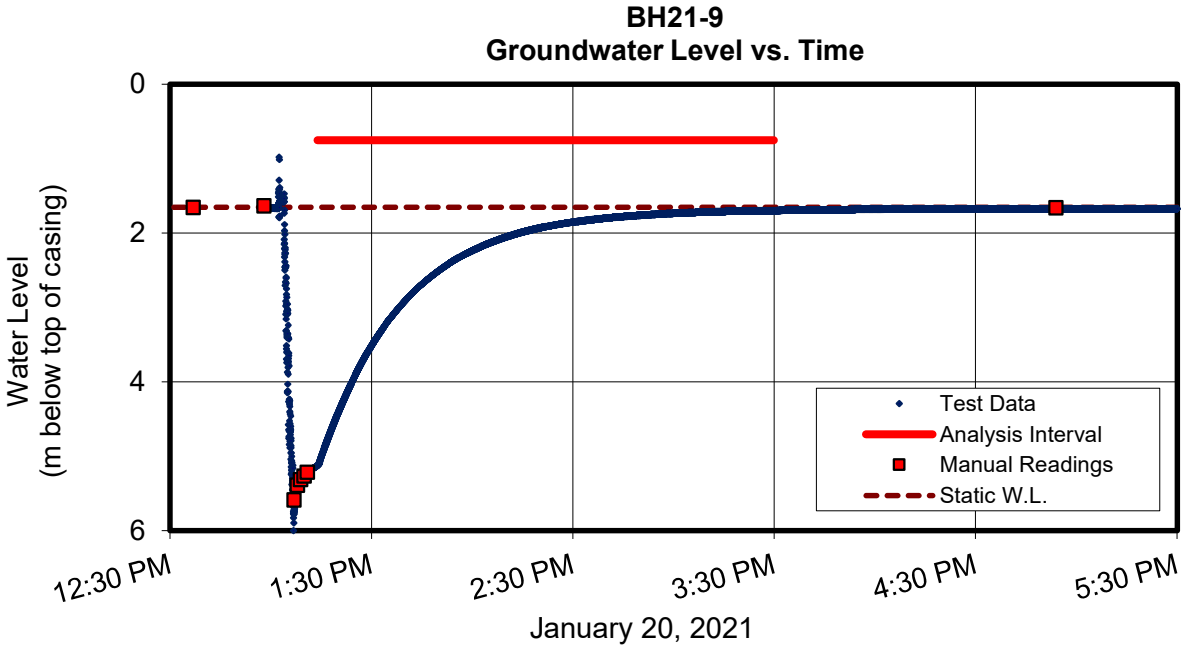
prepared by: AW

reviewed by: SMD

In-Situ Hydraulic Conductivity Test Report

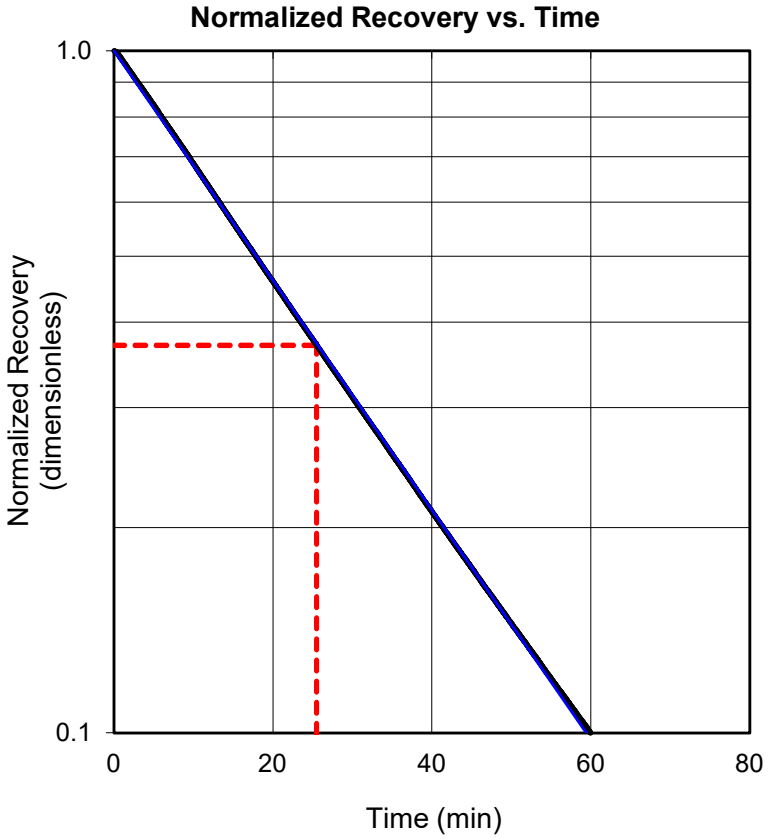
Monitoring Well BH21-9

FIGURE D-6



Sand Pack Interval (below ground surface)

3.26 m - 5.09 m



Time Lag (T_0) = 25.5 min

Sand Pack Length (L) = 1.83 m

Well Radius (r) = 0.0254 m

Hole Radius (R) = 0.105 m

Hvorslev Analysis

$$K = \frac{(r^2)\ln(L/R)}{2T_0L} =$$ 3E-07 m/s

Soil Type

Sandy Silt with Clay and Gravel (Till)

DATE: Jan. 26, 2021

PROJECT: 160401602

Stantec

prepared by: AW

reviewed by: SMD

Appendix E
Laboratory Certificates of Analyses

Your Project #: 160401602
Your C.O.C. #: 810121-01-01

Attention: Andy Weatherson

Stantec Consulting Ltd
675 Cochrane Dr W.
West Tower Suite 300
Markham, ON
CANADA L3R 0B8

Report Date: 2021/01/26
Report #: R6494623
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C117358
Received: 2021/01/21, 14:41

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	3	N/A	2021/01/22	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	3	N/A	2021/01/25	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	3	N/A	2021/01/25	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	3	N/A	2021/01/22	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2021/01/22	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	3	N/A	2021/01/26	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	3	N/A	2021/01/26	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	3	N/A	2021/01/26		
Anion and Cation Sum	3	N/A	2021/01/26		
Total Ammonia-N	3	N/A	2021/01/26	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	3	N/A	2021/01/22	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	3	2021/01/22	2021/01/22	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	3	N/A	2021/01/25	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	3	N/A	2021/01/26		Auto Calc
Sat. pH and Langelier Index (@ 4C)	3	N/A	2021/01/26		Auto Calc
Sulphate by Automated Colourimetry	3	N/A	2021/01/25	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	3	N/A	2021/01/26		Auto Calc

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs 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 BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and

Your Project #: 160401602
Your C.O.C. #: 810121-01-01

Attention: Andy Weatherson

Stantec Consulting Ltd
675 Cochrane Dr W.
West Tower Suite 300
Markham, ON
CANADA L3R 0B8

Report Date: 2021/01/26
Report #: R6494623
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C117358
Received: 2021/01/21, 14:41

use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, 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) 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

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas Laboratories
26 Jan 2021 15:36:02

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ronklin Gracian, Project Manager
Email: Ronklin.Gracian@bureauveritas.com
Phone# (905)817-5752
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C117358
Report Date: 2021/01/26

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

RCAP - COMPREHENSIVE (WATER)

BV Labs ID			OQV744			OQV744		
Sampling Date			2021/01/21 10:20			2021/01/21 10:20		
COC Number			810121-01-01			810121-01-01		
	UNITS	**Criteria**	**BH21-2**	**RDL**	**QC Batch**	**BH21-2 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	-	5.33	N/A	7161722			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	250	1.0	7161717			
Calculated TDS	mg/L	-	280	1.0	7161718			
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	2.8	1.0	7161717			
Cation Sum	me/L	-	5.34	N/A	7161722			
Hardness (CaCO3)	mg/L	-	260	1.0	7161720			
Ion Balance (% Difference)	%	-	0.0600	N/A	7161721			
Langelier Index (@ 20C)	N/A	-	0.907		7161715			
Langelier Index (@ 4C)	N/A	-	0.658		7161716			
Saturation pH (@ 20C)	N/A	-	7.17		7161715			
Saturation pH (@ 4C)	N/A	-	7.42		7161716			
Inorganics								
Total Ammonia-N	mg/L	-	<0.050	0.050	7167316			
Conductivity	umho/cm	-	480	1.0	7163727			
Dissolved Organic Carbon	mg/L	-	0.78	0.40	7163768			
Orthophosphate (P)	mg/L	-	<0.010	0.010	7164087	<0.010	0.010	7164087
pH	pH	6.5:8.5	8.07		7163743			
Dissolved Sulphate (SO4)	mg/L	-	10	1.0	7164083	10	1.0	7164083
Alkalinity (Total as CaCO3)	mg/L	-	250	1.0	7163689			
Dissolved Chloride (Cl-)	mg/L	-	2.8	1.0	7164077	2.9	1.0	7164077
Nitrite (N)	mg/L	-	<0.010	0.010	7163676			
Nitrate (N)	mg/L	-	<0.10	0.10	7163676			
Nitrate + Nitrite (N)	mg/L	-	<0.10	0.10	7163676			
Metals								
Dissolved Aluminum (Al)	ug/L	-	<4.9	4.9	7163829			
Dissolved Antimony (Sb)	ug/L	20	<0.50	0.50	7163829			
Dissolved Arsenic (As)	ug/L	100	<1.0	1.0	7163829			
Dissolved Barium (Ba)	ug/L	-	45	2.0	7163829			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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

BV Labs Job #: C117358
Report Date: 2021/01/26

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

RCAP - COMPREHENSIVE (WATER)

BV Labs ID			OQV744			OQV744		
Sampling Date			2021/01/21 10:20			2021/01/21 10:20		
COC Number			810121-01-01			810121-01-01		
	UNITS	**Criteria**	**BH21-2**	**RDL**	**QC Batch**	**BH21-2 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	11	<0.40	0.40	7163829			
Dissolved Boron (B)	ug/L	200	10	10	7163829			
Dissolved Cadmium (Cd)	ug/L	0.2	<0.090	0.090	7163829			
Dissolved Calcium (Ca)	ug/L	-	70000	200	7163829			
Dissolved Chromium (Cr)	ug/L	-	<5.0	5.0	7163829			
Dissolved Cobalt (Co)	ug/L	0.9	**1.6**	0.50	7163829			
Dissolved Copper (Cu)	ug/L	5	<0.90	0.90	7163829			
Dissolved Iron (Fe)	ug/L	300	<100	100	7163829			
Dissolved Lead (Pb)	ug/L	5	<0.50	0.50	7163829			
Dissolved Magnesium (Mg)	ug/L	-	20000	50	7163829			
Dissolved Manganese (Mn)	ug/L	-	67	2.0	7163829			
Dissolved Molybdenum (Mo)	ug/L	40	1.9	0.50	7163829			
Dissolved Nickel (Ni)	ug/L	25	1.9	1.0	7163829			
Dissolved Phosphorus (P)	ug/L	-	<100	100	7163829			
Dissolved Potassium (K)	ug/L	-	1600	200	7163829			
Dissolved Selenium (Se)	ug/L	100	<2.0	2.0	7163829			
Dissolved Silicon (Si)	ug/L	-	7300	50	7163829			
Dissolved Silver (Ag)	ug/L	0.1	<0.090	0.090	7163829			
Dissolved Sodium (Na)	ug/L	-	3300	100	7163829			
Dissolved Strontium (Sr)	ug/L	-	150	1.0	7163829			
Dissolved Thallium (Tl)	ug/L	0.3	<0.050	0.050	7163829			
Dissolved Titanium (Ti)	ug/L	-	<5.0	5.0	7163829			
Dissolved Uranium (U)	ug/L	5	0.44	0.10	7163829			
Dissolved Vanadium (V)	ug/L	6	<0.50	0.50	7163829			
Dissolved Zinc (Zn)	ug/L	30	<5.0	5.0	7163829			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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RCAP - COMPREHENSIVE (WATER)

BV Labs ID			OQV745		OQV746			OQV746		
Sampling Date			2021/01/21 10:00		2021/01/21 08:15			2021/01/21 08:15		
COC Number			810121-01-01		810121-01-01			810121-01-01		
	UNITS	**Criteria**	**BH21-4**	**QC Batch**	**BH21-9**	**RDL**	**QC Batch**	**BH21-9 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	-	7.11	7161722	5.40	N/A	7161722			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	240	7161717	240	1.0	7161717			
Calculated TDS	mg/L	-	380	7161718	280	1.0	7161718			
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	2.5	7161717	2.9	1.0	7161717			
Cation Sum	me/L	-	7.01	7161722	5.35	N/A	7161722			
Hardness (CaCO3)	mg/L	-	330	7161720	250	1.0	7161720			
Ion Balance (% Difference)	%	-	0.720	7161721	0.490	N/A	7161721			
Langelier Index (@ 20C)	N/A	-	0.874	7161715	0.829		7161715			
Langelier Index (@ 4C)	N/A	-	0.626	7161716	0.579		7161716			
Saturation pH (@ 20C)	N/A	-	7.18	7161715	7.28		7161715			
Saturation pH (@ 4C)	N/A	-	7.42	7161716	7.53		7161716			
Inorganics										
Total Ammonia-N	mg/L	-	<0.050	7167316	<0.050	0.050	7167316			
Conductivity	umho/cm	-	650	7163727	490	1.0	7163843	490	1.0	7163843
Dissolved Organic Carbon	mg/L	-	0.98	7163768	1.1	0.40	7163768	1.1	0.40	7163768
Orthophosphate (P)	mg/L	-	0.017	7164087	<0.010	0.010	7164087			
pH	pH	6.5:8.5	8.05	7163743	8.11		7163845	8.09		7163845
Dissolved Sulphate (SO4)	mg/L	-	76	7164083	16	1.0	7164083			
Alkalinity (Total as CaCO3)	mg/L	-	240	7163689	240	1.0	7163841	240	1.0	7163841
Dissolved Chloride (Cl-)	mg/L	-	24	7164077	7.7	1.0	7164077			
Nitrite (N)	mg/L	-	<0.010	7163676	<0.010	0.010	7163676			
Nitrate (N)	mg/L	-	0.21	7163676	<0.10	0.10	7163676			
Nitrate + Nitrite (N)	mg/L	-	0.21	7163676	<0.10	0.10	7163676			
Metals										
Dissolved Aluminum (Al)	ug/L	-	<4.9	7163829	<4.9	4.9	7163829			
Dissolved Antimony (Sb)	ug/L	20	<0.50	7163829	<0.50	0.50	7163829			
Dissolved Arsenic (As)	ug/L	100	<1.0	7163829	<1.0	1.0	7163829			
Dissolved Barium (Ba)	ug/L	-	120	7163829	59	2.0	7163829			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

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BV Labs Job #: C117358
Report Date: 2021/01/26

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

RCAP - COMPREHENSIVE (WATER)

BV Labs ID			OQV745		OQV746			OQV746		
Sampling Date			2021/01/21 10:00		2021/01/21 08:15			2021/01/21 08:15		
COC Number			810121-01-01		810121-01-01			810121-01-01		
	UNITS	**Criteria**	**BH21-4**	**QC Batch**	**BH21-9**	**RDL**	**QC Batch**	**BH21-9 Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	11	<0.40	7163829	<0.40	0.40	7163829			
Dissolved Boron (B)	ug/L	200	21	7163829	22	10	7163829			
Dissolved Cadmium (Cd)	ug/L	0.2	<0.090	7163829	<0.090	0.090	7163829			
Dissolved Calcium (Ca)	ug/L	-	76000	7163829	56000	200	7163829			
Dissolved Chromium (Cr)	ug/L	-	<5.0	7163829	<5.0	5.0	7163829			
Dissolved Cobalt (Co)	ug/L	0.9	0.67	7163829	**2.3**	0.50	7163829			
Dissolved Copper (Cu)	ug/L	5	2.6	7163829	<0.90	0.90	7163829			
Dissolved Iron (Fe)	ug/L	300	<100	7163829	<100	100	7163829			
Dissolved Lead (Pb)	ug/L	5	0.65	7163829	<0.50	0.50	7163829			
Dissolved Magnesium (Mg)	ug/L	-	33000	7163829	26000	50	7163829			
Dissolved Manganese (Mn)	ug/L	-	120	7163829	230	2.0	7163829			
Dissolved Molybdenum (Mo)	ug/L	40	3.6	7163829	4.2	0.50	7163829			
Dissolved Nickel (Ni)	ug/L	25	2.0	7163829	4.3	1.0	7163829			
Dissolved Phosphorus (P)	ug/L	-	<100	7163829	<100	100	7163829			
Dissolved Potassium (K)	ug/L	-	4900	7163829	3700	200	7163829			
Dissolved Selenium (Se)	ug/L	100	<2.0	7163829	<2.0	2.0	7163829			
Dissolved Silicon (Si)	ug/L	-	7200	7163829	6500	50	7163829			
Dissolved Silver (Ag)	ug/L	0.1	<0.090	7163829	<0.090	0.090	7163829			
Dissolved Sodium (Na)	ug/L	-	8500	7163829	7800	100	7163829			
Dissolved Strontium (Sr)	ug/L	-	280	7163829	140	1.0	7163829			
Dissolved Thallium (Tl)	ug/L	0.3	<0.050	7163829	<0.050	0.050	7163829			
Dissolved Titanium (Ti)	ug/L	-	<5.0	7163829	<5.0	5.0	7163829			
Dissolved Uranium (U)	ug/L	5	1.6	7163829	0.78	0.10	7163829			
Dissolved Vanadium (V)	ug/L	6	<0.50	7163829	<0.50	0.50	7163829			
Dissolved Zinc (Zn)	ug/L	30	14	7163829	6.1	5.0	7163829			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

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TEST SUMMARY

BV Labs ID: OQV744
Sample ID: BH21-2
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7163689	N/A	2021/01/22	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7161717	N/A	2021/01/25	Automated Statchk
Chloride by Automated Colourimetry	KONE	7164077	N/A	2021/01/25	Deonarine Ramnarine
Conductivity	AT	7163727	N/A	2021/01/22	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7163768	N/A	2021/01/22	Nimarta Singh
Hardness (calculated as CaCO3)		7161720	N/A	2021/01/26	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7163829	N/A	2021/01/26	Arefa Dabhad
Ion Balance (% Difference)	CALC	7161721	N/A	2021/01/26	Automated Statchk
Anion and Cation Sum	CALC	7161722	N/A	2021/01/26	Automated Statchk
Total Ammonia-N	LACH/NH4	7167316	N/A	2021/01/26	Alina Dobreanu
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7163676	N/A	2021/01/22	Chandra Nandlal
pH	AT	7163743	2021/01/22	2021/01/22	Surinder Rai
Orthophosphate	KONE	7164087	N/A	2021/01/25	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7161715	N/A	2021/01/26	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7161716	N/A	2021/01/26	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7164083	N/A	2021/01/25	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	7161718	N/A	2021/01/26	Automated Statchk

BV Labs ID: OQV744 Dup
Sample ID: BH21-2
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	7164077	N/A	2021/01/25	Deonarine Ramnarine
Orthophosphate	KONE	7164087	N/A	2021/01/25	Avneet Kour Sudan
Sulphate by Automated Colourimetry	KONE	7164083	N/A	2021/01/25	Deonarine Ramnarine

BV Labs ID: OQV745
Sample ID: BH21-4
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7163689	N/A	2021/01/22	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7161717	N/A	2021/01/25	Automated Statchk
Chloride by Automated Colourimetry	KONE	7164077	N/A	2021/01/25	Deonarine Ramnarine
Conductivity	AT	7163727	N/A	2021/01/22	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7163768	N/A	2021/01/22	Nimarta Singh
Hardness (calculated as CaCO3)		7161720	N/A	2021/01/26	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7163829	N/A	2021/01/26	Arefa Dabhad
Ion Balance (% Difference)	CALC	7161721	N/A	2021/01/26	Automated Statchk
Anion and Cation Sum	CALC	7161722	N/A	2021/01/26	Automated Statchk
Total Ammonia-N	LACH/NH4	7167316	N/A	2021/01/26	Alina Dobreanu
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7163676	N/A	2021/01/22	Chandra Nandlal
pH	AT	7163743	2021/01/22	2021/01/22	Surinder Rai
Orthophosphate	KONE	7164087	N/A	2021/01/25	Avneet Kour Sudan

BV Labs Job #: C117358
Report Date: 2021/01/26

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

TEST SUMMARY

BV Labs ID: OQV745
Sample ID: BH21-4
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sat. pH and Langelier Index (@ 20C)	CALC	7161715	N/A	2021/01/26	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7161716	N/A	2021/01/26	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7164083	N/A	2021/01/25	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	7161718	N/A	2021/01/26	Automated Statchk

BV Labs ID: OQV746
Sample ID: BH21-9
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7163841	N/A	2021/01/22	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7161717	N/A	2021/01/25	Automated Statchk
Chloride by Automated Colourimetry	KONE	7164077	N/A	2021/01/25	Deonarine Ramnarine
Conductivity	AT	7163843	N/A	2021/01/22	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7163768	N/A	2021/01/22	Nimarta Singh
Hardness (calculated as CaCO3)		7161720	N/A	2021/01/26	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7163829	N/A	2021/01/26	Arefa Dabhad
Ion Balance (% Difference)	CALC	7161721	N/A	2021/01/26	Automated Statchk
Anion and Cation Sum	CALC	7161722	N/A	2021/01/26	Automated Statchk
Total Ammonia-N	LACH/NH4	7167316	N/A	2021/01/26	Alina Dobreanu
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7163676	N/A	2021/01/22	Chandra Nandlal
pH	AT	7163845	2021/01/22	2021/01/22	Surinder Rai
Orthophosphate	KONE	7164087	N/A	2021/01/25	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7161715	N/A	2021/01/26	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7161716	N/A	2021/01/26	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7164083	N/A	2021/01/25	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	7161718	N/A	2021/01/26	Automated Statchk

BV Labs ID: OQV746 Dup
Sample ID: BH21-9
Matrix: Water

Collected: 2021/01/21
Shipped:
Received: 2021/01/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7163841	N/A	2021/01/22	Surinder Rai
Conductivity	AT	7163843	N/A	2021/01/22	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7163768	N/A	2021/01/22	Nimarta Singh
pH	AT	7163845	2021/01/22	2021/01/22	Surinder Rai

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	0.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7163676	C_N	Matrix Spike	Nitrite (N)	2021/01/22		103	%	80 - 120
			Nitrate (N)	2021/01/22		96	%	80 - 120
7163676	C_N	Spiked Blank	Nitrite (N)	2021/01/22		104	%	80 - 120
			Nitrate (N)	2021/01/22		98	%	80 - 120
7163676	C_N	Method Blank	Nitrite (N)	2021/01/22	<0.010		mg/L	
			Nitrate (N)	2021/01/22	<0.10		mg/L	
7163676	C_N	RPD	Nitrite (N)	2021/01/22	NC		%	20
			Nitrate (N)	2021/01/22	NC		%	20
7163689	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2021/01/22		95	%	85 - 115
7163689	SAU	Method Blank	Alkalinity (Total as CaCO3)	2021/01/22	<1.0		mg/L	
7163689	SAU	RPD	Alkalinity (Total as CaCO3)	2021/01/22	1.8		%	20
7163727	SAU	Spiked Blank	Conductivity	2021/01/22		101	%	85 - 115
7163727	SAU	Method Blank	Conductivity	2021/01/22	<1.0		umho/cm	
7163727	SAU	RPD	Conductivity	2021/01/22	0		%	25
7163743	SAU	Spiked Blank	pH	2021/01/22		101	%	98 - 103
7163743	SAU	RPD	pH	2021/01/22	0.10		%	N/A
7163768	NS3	Matrix Spike [OQV746-03]	Dissolved Organic Carbon	2021/01/22		96	%	80 - 120
7163768	NS3	Spiked Blank	Dissolved Organic Carbon	2021/01/22		98	%	80 - 120
7163768	NS3	Method Blank	Dissolved Organic Carbon	2021/01/22	<0.40		mg/L	
7163768	NS3	RPD [OQV746-03]	Dissolved Organic Carbon	2021/01/22	3.1		%	20
7163829	ADA	Matrix Spike	Dissolved Aluminum (Al)	2021/01/25		113	%	80 - 120
			Dissolved Antimony (Sb)	2021/01/25		113	%	80 - 120
			Dissolved Arsenic (As)	2021/01/25		103	%	80 - 120
			Dissolved Barium (Ba)	2021/01/25		111	%	80 - 120
			Dissolved Beryllium (Be)	2021/01/25		104	%	80 - 120
			Dissolved Boron (B)	2021/01/25		106	%	80 - 120
			Dissolved Cadmium (Cd)	2021/01/25		107	%	80 - 120
			Dissolved Calcium (Ca)	2021/01/25		NC	%	80 - 120
			Dissolved Chromium (Cr)	2021/01/25		100	%	80 - 120
			Dissolved Cobalt (Co)	2021/01/25		98	%	80 - 120
			Dissolved Copper (Cu)	2021/01/25		103	%	80 - 120
			Dissolved Iron (Fe)	2021/01/25		100	%	80 - 120
			Dissolved Lead (Pb)	2021/01/25		101	%	80 - 120
			Dissolved Magnesium (Mg)	2021/01/25		NC	%	80 - 120
			Dissolved Manganese (Mn)	2021/01/25		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/01/25		110	%	80 - 120
			Dissolved Nickel (Ni)	2021/01/25		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/01/25		112	%	80 - 120
			Dissolved Potassium (K)	2021/01/25		112	%	80 - 120
			Dissolved Selenium (Se)	2021/01/25		102	%	80 - 120
			Dissolved Silicon (Si)	2021/01/25		110	%	80 - 120
			Dissolved Silver (Ag)	2021/01/25		51 (1)	%	80 - 120
			Dissolved Sodium (Na)	2021/01/25		105	%	80 - 120
			Dissolved Strontium (Sr)	2021/01/25		101	%	80 - 120
			Dissolved Thallium (Tl)	2021/01/25		102	%	80 - 120
			Dissolved Titanium (Ti)	2021/01/25		108	%	80 - 120
			Dissolved Uranium (U)	2021/01/25		104	%	80 - 120
			Dissolved Vanadium (V)	2021/01/25		104	%	80 - 120
			Dissolved Zinc (Zn)	2021/01/25		100	%	80 - 120
7163829	ADA	Spiked Blank	Dissolved Aluminum (Al)	2021/01/25		112	%	80 - 120
			Dissolved Antimony (Sb)	2021/01/25		108	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Arsenic (As)	2021/01/25		101	%	80 - 120
			Dissolved Barium (Ba)	2021/01/25		107	%	80 - 120
			Dissolved Beryllium (Be)	2021/01/25		103	%	80 - 120
			Dissolved Boron (B)	2021/01/25		105	%	80 - 120
			Dissolved Cadmium (Cd)	2021/01/25		105	%	80 - 120
			Dissolved Calcium (Ca)	2021/01/25		109	%	80 - 120
			Dissolved Chromium (Cr)	2021/01/25		98	%	80 - 120
			Dissolved Cobalt (Co)	2021/01/25		98	%	80 - 120
			Dissolved Copper (Cu)	2021/01/25		103	%	80 - 120
			Dissolved Iron (Fe)	2021/01/25		98	%	80 - 120
			Dissolved Lead (Pb)	2021/01/25		99	%	80 - 120
			Dissolved Magnesium (Mg)	2021/01/25		103	%	80 - 120
			Dissolved Manganese (Mn)	2021/01/25		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/01/25		105	%	80 - 120
			Dissolved Nickel (Ni)	2021/01/25		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/01/25		123 (1)	%	80 - 120
			Dissolved Potassium (K)	2021/01/25		111	%	80 - 120
			Dissolved Selenium (Se)	2021/01/25		103	%	80 - 120
			Dissolved Silicon (Si)	2021/01/25		109	%	80 - 120
			Dissolved Silver (Ag)	2021/01/25		99	%	80 - 120
			Dissolved Sodium (Na)	2021/01/25		106	%	80 - 120
			Dissolved Strontium (Sr)	2021/01/25		100	%	80 - 120
			Dissolved Thallium (Tl)	2021/01/25		99	%	80 - 120
			Dissolved Titanium (Ti)	2021/01/25		107	%	80 - 120
			Dissolved Uranium (U)	2021/01/25		101	%	80 - 120
			Dissolved Vanadium (V)	2021/01/25		103	%	80 - 120
			Dissolved Zinc (Zn)	2021/01/25		99	%	80 - 120
7163829	ADA	Method Blank	Dissolved Aluminum (Al)	2021/01/25	<4.9		ug/L	
			Dissolved Antimony (Sb)	2021/01/25	<0.50		ug/L	
			Dissolved Arsenic (As)	2021/01/25	<1.0		ug/L	
			Dissolved Barium (Ba)	2021/01/25	<2.0		ug/L	
			Dissolved Beryllium (Be)	2021/01/25	<0.40		ug/L	
			Dissolved Boron (B)	2021/01/25	<10		ug/L	
			Dissolved Cadmium (Cd)	2021/01/25	<0.090		ug/L	
			Dissolved Calcium (Ca)	2021/01/25	<200		ug/L	
			Dissolved Chromium (Cr)	2021/01/25	<5.0		ug/L	
			Dissolved Cobalt (Co)	2021/01/25	<0.50		ug/L	
			Dissolved Copper (Cu)	2021/01/25	<0.90		ug/L	
			Dissolved Iron (Fe)	2021/01/25	<100		ug/L	
			Dissolved Lead (Pb)	2021/01/25	<0.50		ug/L	
			Dissolved Magnesium (Mg)	2021/01/25	<50		ug/L	
			Dissolved Manganese (Mn)	2021/01/25	<2.0		ug/L	
			Dissolved Molybdenum (Mo)	2021/01/25	<0.50		ug/L	
			Dissolved Nickel (Ni)	2021/01/25	<1.0		ug/L	
			Dissolved Phosphorus (P)	2021/01/25	<100		ug/L	
			Dissolved Potassium (K)	2021/01/25	<200		ug/L	
			Dissolved Selenium (Se)	2021/01/25	<2.0		ug/L	
			Dissolved Silicon (Si)	2021/01/25	<50		ug/L	
			Dissolved Silver (Ag)	2021/01/25	<0.090		ug/L	
			Dissolved Sodium (Na)	2021/01/25	150, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2021/01/25	<1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2021/01/25	<0.050		ug/L	
			Dissolved Titanium (Ti)	2021/01/25	<5.0		ug/L	
			Dissolved Uranium (U)	2021/01/25	<0.10		ug/L	
			Dissolved Vanadium (V)	2021/01/25	<0.50		ug/L	
			Dissolved Zinc (Zn)	2021/01/25	<5.0		ug/L	
7163829	ADA	RPD	Dissolved Iron (Fe)	2021/01/25	0.36		%	20
			Dissolved Manganese (Mn)	2021/01/25	0.94		%	20
7163841	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2021/01/22		96	%	85 - 115
7163841	SAU	Method Blank	Alkalinity (Total as CaCO3)	2021/01/22	<1.0		mg/L	
7163841	SAU	RPD [OQV746-01]	Alkalinity (Total as CaCO3)	2021/01/22	0.44		%	20
7163843	SAU	Spiked Blank	Conductivity	2021/01/22		100	%	85 - 115
7163843	SAU	Method Blank	Conductivity	2021/01/22	<1.0		umho/cm	
7163843	SAU	RPD [OQV746-01]	Conductivity	2021/01/22	0.61		%	25
7163845	SAU	Spiked Blank	pH	2021/01/22		101	%	98 - 103
7163845	SAU	RPD [OQV746-01]	pH	2021/01/22	0.18		%	N/A
7164077	DRM	Matrix Spike [OQV744-01]	Dissolved Chloride (Cl-)	2021/01/25		96	%	80 - 120
7164077	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2021/01/25		103	%	80 - 120
7164077	DRM	Method Blank	Dissolved Chloride (Cl-)	2021/01/25	<1.0		mg/L	
7164077	DRM	RPD [OQV744-01]	Dissolved Chloride (Cl-)	2021/01/25	2.1		%	20
7164083	DRM	Matrix Spike [OQV744-01]	Dissolved Sulphate (SO4)	2021/01/25		108	%	75 - 125
7164083	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2021/01/25		104	%	80 - 120
7164083	DRM	Method Blank	Dissolved Sulphate (SO4)	2021/01/25	<1.0		mg/L	
7164083	DRM	RPD [OQV744-01]	Dissolved Sulphate (SO4)	2021/01/25	0.52		%	20
7164087	AKD	Matrix Spike [OQV744-01]	Orthophosphate (P)	2021/01/25		102	%	75 - 125
7164087	AKD	Spiked Blank	Orthophosphate (P)	2021/01/25		101	%	80 - 120
7164087	AKD	Method Blank	Orthophosphate (P)	2021/01/25	<0.010		mg/L	
7164087	AKD	RPD [OQV744-01]	Orthophosphate (P)	2021/01/25	NC		%	25
7167316	ADB	Matrix Spike	Total Ammonia-N	2021/01/26		98	%	75 - 125
7167316	ADB	Spiked Blank	Total Ammonia-N	2021/01/26		98	%	80 - 120
7167316	ADB	Method Blank	Total Ammonia-N	2021/01/26	<0.050		mg/L	
7167316	ADB	RPD	Total Ammonia-N	2021/01/26	18		%	20

N/A = Not Applicable

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

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

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

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

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

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

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

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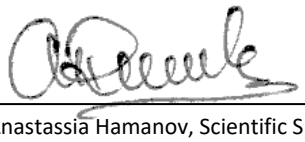
BV Labs Job #: C117358
Report Date: 2021/01/26

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, 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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STANTEC CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION(if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#3072 Stantec Consulting Ltd	Company Name:		Quotation #:	C01624	BV Labs Job #:	Bottle Order #: 810121
Contact Name:	Accounts Payable	Contact Name:	Andy Weatherson	Task #:			
Address:	675 Cochrane Dr W. West Tower Suite 300 Markham ON L3R 0B8	Address:		Project #:	160401602		
				Profit Centre:	1604	COC #: C#810121-01-01	Project Manager: Ronklin Gracian
Phone:	(905) 944-7777 Fax: (905) 479-9326	Phone:	(905) 944-6217 Fax:	Site #:			
Email:	SAPinvoices@Stantec.com	Email:	andy.weatherson@stantec.com	Sampled By:	Andy Weatherson		

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 ☐ Reg 406 Table ☐ Other

Special Instructions

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

Field Filtered (please circle): (Metals / Hg / Cr VI)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): RCAp - Comprehensive

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 #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	# of Bottles	Comments
1		BH21-2	2021/01/21	10:20am	GW	4	
2		BH21-4	2021/01/21	10:00am	GW	4	
3		BH21-9	2021/01/21	8:15am	GW	4	
4							
5							
6							
7							
8							
9							
10							

21-Jan-21 14:41
Ronklin Gracian
C117358
NP4 ENV-1375

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andy Weatherson / Andy Weatherson	21/01/21	2:35pm	[illegible]	2021/01/21	14:41	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	1/1/0	Present	✓	
		Intact	✓	

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

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

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

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 160401602
Your C.O.C. #: 822888-01-01

Attention: Andy Weatherson

Stantec Consulting Ltd
675 Cochrane Dr W.
West Tower Suite 300
Markham, ON
CANADA L3R 0B8

Report Date: 2021/04/30
Report #: R6616410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2074
Received: 2021/04/27, 16:38

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	2	N/A	2021/04/29	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2021/04/30	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2021/04/29	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	2	N/A	2021/04/29	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2021/04/29	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2021/04/30	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	2	N/A	2021/04/29	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2021/04/30		
Anion and Cation Sum	2	N/A	2021/04/30		
Total Coliforms/ E. coli, CFU/100mL	2	N/A	2021/04/27	CAM SOP-00551	MOE E3407
Total Ammonia-N	2	N/A	2021/04/30	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	2	N/A	2021/04/29	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2021/04/28	2021/04/29	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2021/04/29	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2021/04/30		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2021/04/30		Auto Calc
Sulphate by Automated Colourimetry	2	N/A	2021/04/29	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	2	N/A	2021/04/30		Auto Calc

Remarks:

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

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

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

Your Project #: 160401602
Your C.O.C. #: 822888-01-01

Attention: Andy Weatherson

Stantec Consulting Ltd
675 Cochrane Dr W.
West Tower Suite 300
Markham, ON
CANADA L3R 0B8

Report Date: 2021/04/30
Report #: R6616410
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2074
Received: 2021/04/27, 16:38

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
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) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Bureau Veritas
30 Apr 2021 16:11:53

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ronklin Gracian, Project Manager
Email: Ronklin.Gracian@bureauveritas.com
Phone# (905)817-5752
==========
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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1B2074
Report Date: 2021/04/30

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

RCAP - COMPREHENSIVE (WATER)

BV Labs ID				PKR999	PKS000		
Sampling Date				2021/04/27 11:30	2021/04/27 12:00		
COC Number				822888-01-01	822888-01-01		
	UNITS	**MAC**	**A/O**	**RW1**	**RW2**	**RDL**	**QC Batch**
Calculated Parameters							
Anion Sum	me/L	-	-	10.2	7.85	N/A	7321056
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	310	280	1.0	7321054
Calculated TDS	mg/L	-	500	**590**	420	1.0	7320393
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	2.8	2.1	1.0	7321054
Cation Sum	me/L	-	-	9.78	7.73	N/A	7321056
Hardness (CaCO3)	mg/L	-	80:100	**3.4**	**300**	1.0	7322203
Ion Balance (% Difference)	%	-	-	2.11	0.760	N/A	7321055
Langelier Index (@ 20C)	N/A	-	-	-1.09	0.848		7321057
Langelier Index (@ 4C)	N/A	-	-	-1.34	0.599		7321058
Saturation pH (@ 20C)	N/A	-	-	9.07	7.06		7321057
Saturation pH (@ 4C)	N/A	-	-	9.32	7.31		7321058
Inorganics							
Total Ammonia-N	mg/L	-	-	<0.050	<0.050	0.050	7323630
Conductivity	umho/cm	-	-	1000	750	1.0	7324223
Dissolved Organic Carbon	mg/L	-	5	0.65	0.86	0.40	7323993
Orthophosphate (P)	mg/L	-	-	<0.010	<0.010	0.010	7324288
pH	pH	-	6.5:8.5	7.98	7.91		7324226
Dissolved Sulphate (SO4)	mg/L	-	500	76	25	1.0	7324277
Alkalinity (Total as CaCO3)	mg/L	-	30:500	310	280	1.0	7324209
Dissolved Chloride (Cl-)	mg/L	-	250	82	53	1.0	7324274
Nitrite (N)	mg/L	1	-	<0.010	<0.010	0.010	7324269
Nitrate (N)	mg/L	10	-	0.34	2.49	0.10	7324269
Nitrate + Nitrite (N)	mg/L	10	-	0.34	2.49	0.10	7324269

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)
N/A = Not Applicable

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BV Labs Job #: C1B2074
Report Date: 2021/04/30

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID				PKR999	PKS000		
Sampling Date				2021/04/27 11:30	2021/04/27 12:00		
COC Number				822888-01-01	822888-01-01		
	UNITS	**MAC**	**A/O**	**RW1**	**RW2**	**RDL**	**QC Batch**
Metals							
Aluminum (Al)	ug/L	-	100	7.3	<4.9	4.9	7322755
Antimony (Sb)	ug/L	6	-	<0.50	<0.50	0.50	7322755
Arsenic (As)	ug/L	10	-	<1.0	<1.0	1.0	7322755
Barium (Ba)	ug/L	1000	-	<2.0	67	2.0	7322755
Beryllium (Be)	ug/L	-	-	<0.40	<0.40	0.40	7322755
Boron (B)	ug/L	5000	-	16	17	10	7322755
Cadmium (Cd)	ug/L	5	-	<0.090	<0.090	0.090	7322755
Calcium (Ca)	ug/L	-	-	820	87000	200	7322755
Chromium (Cr)	ug/L	50	-	<5.0	<5.0	5.0	7322755
Cobalt (Co)	ug/L	-	-	<0.50	<0.50	0.50	7322755
Copper (Cu)	ug/L	-	1000	19	80	0.90	7322755
Iron (Fe)	ug/L	-	300	<100	<100	100	7322755
Lead (Pb)	ug/L	10	-	0.83	4.1	0.50	7322755
Magnesium (Mg)	ug/L	-	-	320	20000	50	7322755
Manganese (Mn)	ug/L	-	50	<2.0	<2.0	2.0	7322755
Molybdenum (Mo)	ug/L	-	-	2.4	<0.50	0.50	7322755
Nickel (Ni)	ug/L	-	-	<1.0	<1.0	1.0	7322755
Phosphorus (P)	ug/L	-	-	<100	<100	100	7322755
Potassium (K)	ug/L	-	-	740	950	200	7322755
Selenium (Se)	ug/L	50	-	<2.0	<2.0	2.0	7322755
Silicon (Si)	ug/L	-	-	8000	6400	50	7322755
Silver (Ag)	ug/L	-	-	<0.090	<0.090	0.090	7322755
Sodium (Na)	ug/L	-	200000	**220000**	41000	100	7322755
Strontium (Sr)	ug/L	-	-	2.2	140	1.0	7322755
Thallium (Tl)	ug/L	-	-	<0.050	<0.050	0.050	7322755
Titanium (Ti)	ug/L	-	-	<5.0	<5.0	5.0	7322755
Uranium (U)	ug/L	20	-	0.95	0.29	0.10	7322755
Vanadium (V)	ug/L	-	-	<0.50	<0.50	0.50	7322755
Zinc (Zn)	ug/L	-	5000	7.5	31	5.0	7322755

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

MAC,A/O: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively
(Made under the Ontario Safe Drinking Water Act, 2002)

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BV Labs Job #: C1B2074
Report Date: 2021/04/30

Stantec Consulting Ltd
Client Project #: 160401602
Sampler Initials: AW

MICROBIOLOGY (WATER)

BV Labs ID			PKR999	PKS000	
Sampling Date			2021/04/27 11:30	2021/04/27 12:00	
COC Number			822888-01-01	822888-01-01	
	UNITS	**MAC**	**RW1**	**RW2**	**QC Batch**
Microbiological					
Background	CFU/100mL	-	0	0	7322287
Total Coliforms	CFU/100mL	0	0	0	7322287
Escherichia coli	CFU/100mL	0	0	0	7322287

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

QC Batch = Quality Control Batch

MAC: Ontario Drinking Water Standards - Maximum Acceptable Concentration [MAC] & Table 4-Chemical/Physical Objectives [A/O] - Not Health Related, respectively (Made under the Ontario Safe Drinking Water Act, 2002)

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TEST SUMMARY

BV Labs ID: PKR999
Sample ID: RW1
Matrix: Water

Collected: 2021/04/27
Shipped:
Received: 2021/04/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7324209	N/A	2021/04/29	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7321054	N/A	2021/04/30	Automated Statchk
Chloride by Automated Colourimetry	KONE	7324274	N/A	2021/04/29	Deonarine Ramnarine
Conductivity	AT	7324223	N/A	2021/04/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7323993	N/A	2021/04/29	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7322203	N/A	2021/04/30	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7322755	N/A	2021/04/29	Arefa Dabhad
Ion Balance (% Difference)	CALC	7321055	N/A	2021/04/30	Automated Statchk
Anion and Cation Sum	CALC	7321056	N/A	2021/04/30	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7322287	N/A	2021/04/27	Soham Patel
Total Ammonia-N	LACH/NH4	7323630	N/A	2021/04/30	Alina Dobreanu
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7324269	N/A	2021/04/29	Chandra Nandlal
pH	AT	7324226	2021/04/28	2021/04/29	Surinder Rai
Orthophosphate	KONE	7324288	N/A	2021/04/29	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7321057	N/A	2021/04/30	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7321058	N/A	2021/04/30	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7324277	N/A	2021/04/29	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	7320393	N/A	2021/04/30	Automated Statchk

BV Labs ID: PKS000
Sample ID: RW2
Matrix: Water

Collected: 2021/04/27
Shipped:
Received: 2021/04/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7324209	N/A	2021/04/29	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7321054	N/A	2021/04/30	Automated Statchk
Chloride by Automated Colourimetry	KONE	7324274	N/A	2021/04/29	Deonarine Ramnarine
Conductivity	AT	7324223	N/A	2021/04/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7323993	N/A	2021/04/29	Anna-Kay Gooden
Hardness (calculated as CaCO3)		7322203	N/A	2021/04/30	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7322755	N/A	2021/04/29	Arefa Dabhad
Ion Balance (% Difference)	CALC	7321055	N/A	2021/04/30	Automated Statchk
Anion and Cation Sum	CALC	7321056	N/A	2021/04/30	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7322287	N/A	2021/04/27	Soham Patel
Total Ammonia-N	LACH/NH4	7323630	N/A	2021/04/30	Alina Dobreanu
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7324269	N/A	2021/04/29	Chandra Nandlal
pH	AT	7324226	2021/04/28	2021/04/29	Surinder Rai
Orthophosphate	KONE	7324288	N/A	2021/04/29	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7321057	N/A	2021/04/30	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7321058	N/A	2021/04/30	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7324277	N/A	2021/04/29	Deonarine Ramnarine
Total Dissolved Solids (TDS calc)	CALC	7320393	N/A	2021/04/30	Automated Statchk

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7322755	ADA	Matrix Spike	Aluminum (Al)	2021/04/29		96	%	80 - 120
			Antimony (Sb)	2021/04/29		104	%	80 - 120
			Arsenic (As)	2021/04/29		98	%	80 - 120
			Barium (Ba)	2021/04/29		99	%	80 - 120
			Beryllium (Be)	2021/04/29		94	%	80 - 120
			Boron (B)	2021/04/29		89	%	80 - 120
			Cadmium (Cd)	2021/04/29		98	%	80 - 120
			Calcium (Ca)	2021/04/29		NC	%	80 - 120
			Chromium (Cr)	2021/04/29		94	%	80 - 120
			Cobalt (Co)	2021/04/29		95	%	80 - 120
			Copper (Cu)	2021/04/29		98	%	80 - 120
			Iron (Fe)	2021/04/29		94	%	80 - 120
			Lead (Pb)	2021/04/29		95	%	80 - 120
			Magnesium (Mg)	2021/04/29		NC	%	80 - 120
			Manganese (Mn)	2021/04/29		94	%	80 - 120
			Molybdenum (Mo)	2021/04/29		98	%	80 - 120
			Nickel (Ni)	2021/04/29		93	%	80 - 120
			Phosphorus (P)	2021/04/29		95	%	80 - 120
			Potassium (K)	2021/04/29		99	%	80 - 120
			Selenium (Se)	2021/04/29		98	%	80 - 120
			Silicon (Si)	2021/04/29		97	%	80 - 120
			Silver (Ag)	2021/04/29		96	%	80 - 120
			Sodium (Na)	2021/04/29		NC	%	80 - 120
			Strontium (Sr)	2021/04/29		95	%	80 - 120
			Thallium (Tl)	2021/04/29		96	%	80 - 120
			Titanium (Ti)	2021/04/29		98	%	80 - 120
			Uranium (U)	2021/04/29		96	%	80 - 120
			Vanadium (V)	2021/04/29		96	%	80 - 120
			Zinc (Zn)	2021/04/29		93	%	80 - 120
7322755	ADA	Spiked Blank	Aluminum (Al)	2021/04/29		96	%	80 - 120
			Antimony (Sb)	2021/04/29		102	%	80 - 120
			Arsenic (As)	2021/04/29		98	%	80 - 120
			Barium (Ba)	2021/04/29		99	%	80 - 120
			Beryllium (Be)	2021/04/29		100	%	80 - 120
			Boron (B)	2021/04/29		93	%	80 - 120
			Cadmium (Cd)	2021/04/29		99	%	80 - 120
			Calcium (Ca)	2021/04/29		98	%	80 - 120
			Chromium (Cr)	2021/04/29		93	%	80 - 120
			Cobalt (Co)	2021/04/29		97	%	80 - 120
			Copper (Cu)	2021/04/29		96	%	80 - 120
			Iron (Fe)	2021/04/29		94	%	80 - 120
			Lead (Pb)	2021/04/29		94	%	80 - 120
			Magnesium (Mg)	2021/04/29		96	%	80 - 120
			Manganese (Mn)	2021/04/29		94	%	80 - 120
			Molybdenum (Mo)	2021/04/29		97	%	80 - 120
			Nickel (Ni)	2021/04/29		94	%	80 - 120
			Phosphorus (P)	2021/04/29		95	%	80 - 120
			Potassium (K)	2021/04/29		97	%	80 - 120
			Selenium (Se)	2021/04/29		99	%	80 - 120
			Silicon (Si)	2021/04/29		96	%	80 - 120
			Silver (Ag)	2021/04/29		97	%	80 - 120
			Sodium (Na)	2021/04/29		95	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Strontium (Sr)	2021/04/29		95	%	80 - 120
			Thallium (Tl)	2021/04/29		98	%	80 - 120
			Titanium (Ti)	2021/04/29		97	%	80 - 120
			Uranium (U)	2021/04/29		96	%	80 - 120
			Vanadium (V)	2021/04/29		95	%	80 - 120
			Zinc (Zn)	2021/04/29		94	%	80 - 120
7322755	ADA	Method Blank	Aluminum (Al)	2021/04/29	<4.9		ug/L	
			Antimony (Sb)	2021/04/29	<0.50		ug/L	
			Arsenic (As)	2021/04/29	<1.0		ug/L	
			Barium (Ba)	2021/04/29	<2.0		ug/L	
			Beryllium (Be)	2021/04/29	<0.40		ug/L	
			Boron (B)	2021/04/29	<10		ug/L	
			Cadmium (Cd)	2021/04/29	<0.090		ug/L	
			Calcium (Ca)	2021/04/29	<200		ug/L	
			Chromium (Cr)	2021/04/29	<5.0		ug/L	
			Cobalt (Co)	2021/04/29	<0.50		ug/L	
			Copper (Cu)	2021/04/29	<0.90		ug/L	
			Iron (Fe)	2021/04/29	<100		ug/L	
			Lead (Pb)	2021/04/29	<0.50		ug/L	
			Magnesium (Mg)	2021/04/29	<50		ug/L	
			Manganese (Mn)	2021/04/29	<2.0		ug/L	
			Molybdenum (Mo)	2021/04/29	<0.50		ug/L	
			Nickel (Ni)	2021/04/29	<1.0		ug/L	
			Phosphorus (P)	2021/04/29	<100		ug/L	
			Potassium (K)	2021/04/29	<200		ug/L	
			Selenium (Se)	2021/04/29	<2.0		ug/L	
			Silicon (Si)	2021/04/29	<50		ug/L	
			Silver (Ag)	2021/04/29	<0.090		ug/L	
			Sodium (Na)	2021/04/29	<100		ug/L	
			Strontium (Sr)	2021/04/29	<1.0		ug/L	
			Thallium (Tl)	2021/04/29	<0.050		ug/L	
			Titanium (Ti)	2021/04/29	<5.0		ug/L	
			Uranium (U)	2021/04/29	<0.10		ug/L	
			Vanadium (V)	2021/04/29	<0.50		ug/L	
			Zinc (Zn)	2021/04/29	<5.0		ug/L	
7322755	ADA	RPD	Aluminum (Al)	2021/04/29	NC		%	20
			Antimony (Sb)	2021/04/29	NC		%	20
			Arsenic (As)	2021/04/29	NC		%	20
			Barium (Ba)	2021/04/29	0.14		%	20
			Beryllium (Be)	2021/04/29	NC		%	20
			Boron (B)	2021/04/29	2.3		%	20
			Cadmium (Cd)	2021/04/29	NC		%	20
			Calcium (Ca)	2021/04/29	0.29		%	20
			Chromium (Cr)	2021/04/29	NC		%	20
			Cobalt (Co)	2021/04/29	NC		%	20
			Copper (Cu)	2021/04/29	0.21		%	20
			Iron (Fe)	2021/04/29	NC		%	20
			Lead (Pb)	2021/04/29	NC		%	20
			Magnesium (Mg)	2021/04/29	3.6		%	20
			Manganese (Mn)	2021/04/29	NC		%	20
			Molybdenum (Mo)	2021/04/29	1.8		%	20
			Nickel (Ni)	2021/04/29	NC		%	20

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phosphorus (P)	2021/04/29	NC		%	20
			Potassium (K)	2021/04/29	0.16		%	20
			Selenium (Se)	2021/04/29	NC		%	20
			Silicon (Si)	2021/04/29	1.4		%	20
			Silver (Ag)	2021/04/29	NC		%	20
			Sodium (Na)	2021/04/29	0.79		%	20
			Strontium (Sr)	2021/04/29	0.28		%	20
			Thallium (Tl)	2021/04/29	NC		%	20
			Titanium (Ti)	2021/04/29	NC		%	20
			Uranium (U)	2021/04/29	6.1		%	20
			Vanadium (V)	2021/04/29	NC		%	20
			Zinc (Zn)	2021/04/29	1.2		%	20
7323630	ADB	Matrix Spike	Total Ammonia-N	2021/04/30		97	%	75 - 125
7323630	ADB	Spiked Blank	Total Ammonia-N	2021/04/30		99	%	80 - 120
7323630	ADB	Method Blank	Total Ammonia-N	2021/04/30	<0.050		mg/L	
7323630	ADB	RPD	Total Ammonia-N	2021/04/30	NC		%	20
7323993	AGD	Matrix Spike	Dissolved Organic Carbon	2021/04/29		96	%	80 - 120
7323993	AGD	Spiked Blank	Dissolved Organic Carbon	2021/04/29		99	%	80 - 120
7323993	AGD	Method Blank	Dissolved Organic Carbon	2021/04/29	<0.40		mg/L	
7323993	AGD	RPD	Dissolved Organic Carbon	2021/04/29	5.2		%	20
7324209	SAU	Spiked Blank	Alkalinity (Total as CaCO3)	2021/04/29		93	%	85 - 115
7324209	SAU	Method Blank	Alkalinity (Total as CaCO3)	2021/04/29	<1.0		mg/L	
7324209	SAU	RPD	Alkalinity (Total as CaCO3)	2021/04/29	0.0072		%	20
7324223	SAU	Spiked Blank	Conductivity	2021/04/29		101	%	85 - 115
7324223	SAU	Method Blank	Conductivity	2021/04/29	<1.0		umho/cm	
7324223	SAU	RPD	Conductivity	2021/04/29	0.33		%	25
7324226	SAU	Spiked Blank	pH	2021/04/29		102	%	98 - 103
7324226	SAU	RPD	pH	2021/04/29	0.23		%	N/A
7324269	C_N	Matrix Spike	Nitrite (N)	2021/04/29		105	%	80 - 120
			Nitrate (N)	2021/04/29		98	%	80 - 120
7324269	C_N	Spiked Blank	Nitrite (N)	2021/04/29		104	%	80 - 120
			Nitrate (N)	2021/04/29		98	%	80 - 120
7324269	C_N	Method Blank	Nitrite (N)	2021/04/29	<0.010		mg/L	
			Nitrate (N)	2021/04/29	<0.10		mg/L	
7324269	C_N	RPD	Nitrite (N)	2021/04/29	NC		%	20
			Nitrate (N)	2021/04/29	NC		%	20
7324274	DRM	Matrix Spike	Dissolved Chloride (Cl-)	2021/04/29		NC	%	80 - 120
7324274	DRM	Spiked Blank	Dissolved Chloride (Cl-)	2021/04/29		105	%	80 - 120
7324274	DRM	Method Blank	Dissolved Chloride (Cl-)	2021/04/29	<1.0		mg/L	
7324274	DRM	RPD	Dissolved Chloride (Cl-)	2021/04/29	3.1		%	20
7324277	DRM	Matrix Spike	Dissolved Sulphate (SO4)	2021/04/29		NC	%	75 - 125
7324277	DRM	Spiked Blank	Dissolved Sulphate (SO4)	2021/04/29		106	%	80 - 120
7324277	DRM	Method Blank	Dissolved Sulphate (SO4)	2021/04/29	<1.0		mg/L	
7324277	DRM	RPD	Dissolved Sulphate (SO4)	2021/04/29	1.1		%	20
7324288	AKD	Matrix Spike	Orthophosphate (P)	2021/04/29		111	%	75 - 125
7324288	AKD	Spiked Blank	Orthophosphate (P)	2021/04/29		100	%	80 - 120
7324288	AKD	Method Blank	Orthophosphate (P)	2021/04/29	<0.010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7324288	AKD	RPD	Orthophosphate (P)	2021/04/29	NC		%	25

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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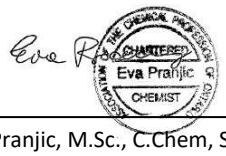
VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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

Soham N Patel

Soham Patel, Analyst I

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

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

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

STANTEC CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION(if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#3072 Stantec Consulting Ltd	Company Name:		Quotation #:	C01624	BV Labs Job #:	Bottle Order #: 822888
Contact Name:	Accounts Payable	Contact Name:	Andy Weatherson	Task #:			
Address:	675 Cochrane Dr W. West Tower Suite 300	Address:		Project #:	160401602		
	Markham ON L3R 0B8		c/o stephen.dibiase@stantec.com	Profit Centre:	1604	COC #: C#822888-01-01	Project Manager: Ronklin Gracian
Phone:	(905) 944-7777 Fax: (905) 479-9326	Phone:	(905) 944-6217 Fax:	Site #:			
Email:	SAPinvoices@Stantec.com	Email:	andy.weatherson@stantec.com	Sampled By:	Andy Weatherson		

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

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

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	RCAp - Comprehensive	Total Coliforms/ E. coli, CFU/100mL	# of Bottles	Comments
1		RW1	2021-04-27	11:30am	GW		✓	✓	5	Samples are non-reportable. Analyze as-received.
2		RW2	2021-04-27	12:00pm	GW		✓	✓	5	
3										
4										
5										
6										
7										
8										
9										
10										

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

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

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

27-Apr-21 16:38
Ronklin Gracian
C1B2074
ATM ENV-962

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Andy Weatherson	21/04/27	4:30pm		21/04/27	16:38	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	4.1 5.8	Present	✓	
		Intact	✓	

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

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

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

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Appendix F
Well Survey

Stantec Consulting Ltd.
300-675 Cochrane Drive, Markham ON L3R 0B8

January 18, 2021
File: 160401602

Dear Resident,

Reference: Hydrogeological Assessment – Private Well Monitoring Program, Proposed Residential Subdivision at 3064 Parkedale Avenue, Brockville, Ontario

Nautical Lands General Contractors Inc. (NLGCI) is in the process of conducting environmental studies in support of a residential subdivision development located at 3064 Parkedale Avenue in the community of Brockville, Ontario.

As part of these studies, Stantec Consulting Ltd. (Stantec) has been retained to establish a baseline of groundwater quality in nearby domestic water supply wells and provide recommendations to prevent potential effects on local water supplies. If interested, nearby private well owners may request to participate in the monitoring program. Participation is voluntary and at no cost to you. Final monitoring locations selected to be part of the program will be dependent on responses received.

As part of the monitoring program, Stantec will:

- review the completed questionnaire detailing any available information about your private well;
- collect a water quality sample from an exterior raw water tap and submit it to an accredited laboratory for analysis of metals, general chemistry, and bacteriological parameters; and
- provide you with a letter summarizing your results.

This water well monitoring will be completed in spring 2021. If you would like to request to be a part of this monitoring program, or have any questions or concerns regarding the residential sampling, please contact Andy Weatherson from Stantec at 905-409-7450 and send a completed copy of the included questionnaire to andy.weatherson@stantec.com.

Yours truly,

STANTEC CONSULTING LTD.

Andy Weatherson M.Env.Sc., EPt, CAPM
Environmental Scientist
Phone: (905) 409-7450
andy.weatherson@stantec.com

Stephen Di Biase P.Geo.
Senior Hydrogeologist
Phone (905) 415-6330
stephen.dibiase@stantec.com

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

(1) General Information

Owner's Name: _____

Tenant's Name: _____

Mailing Address: _____

911 Address of well: _____

Township, Con #, Lot #: _____

Telephone #: _____

Date of Inventory: _____

(2) Water Well Information

a) Do you have a private water well? ☐ Yes ☐ No

b) Are you connected to the municipal water supply system? ☐ Yes ☐ No

c) Do you use your private water well? ☐ Yes ☐ No

For what uses? ☐ Drinking ☐ Washing ☐ Lawn ☐ Other _____

d) Do you use any other sources of water? ☐ Yes ☐ No

Alternative Sources (cistern, bottled): _____

e) Do you have a copy of the driller's log for the well? ☐ Yes ☐ No

If so, please forward a copy of the well log along with this inventory form.

f) If you are unable to provide us a copy of the well log, please provide as much of the following information as you can.

This information may help us to locate your well record. If we are able to locate your well record, we will mail you a copy.

Original Well Owner: _____

Date Constructed: _____

Driller: _____

Well Type (drilled, dug/bored): _____

Casing Inside Diameter: _____

Depth (below ground surface): _____

Pump Type/Setting (bgs): _____

Water Level (below ground surface): _____

g) Please circle the terms that best describe the accessibility of your well:

buried in a pit or concrete chamber casing sticks above the ground

other (please describe): _____

h) If the well is in a pit or concrete chamber, please circle the type of lid:

single circular concrete slab two semi-circular concrete slabs square lid within a larger circular concrete slab

other (please describe): _____

i) Has the well ever gone dry? ☐ Yes ☐ No

When, how often? _____

j) What is the quality of the water? ☐ Poor ☐ Good ☐ Excellent

Comments (color, odor, taste , etc.) _____

k) Do you test the water quality through the Health Unit? ☐ Yes ☐ No

When, and what were the results? _____

l) Would you be interested in having the water level measured in your well? ☐ Yes ☐ No

(3) Water Well Treatment

(a) Do you treat your well water? ☐ Yes ☐ No

(b) If you answered yes, what method of treatment do you use? _____

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

(4) Septic System Information

a)	Do you have a private septic system?	☐ Yes	☐ No
b)	Are you connected to the municipal sewer system?	☐ Yes	☐ No
c)	Have you ever experienced problems with your septic system?	☐ Yes	☐ No
d)	Do you get your septic system pumped out?	☐ Yes	☐ No
	How regularly / frequency?		

Please provide us with a sketch showing the location of your well and septic system relative to the road, house and other structures on your property. Please include a north arrow.

Take a photo of the well, sampling tap and septic bed area. (Stantec staff only).

Please provide any other comments:

Thank you for taking the time to complete this inventory.

Please note that the completed form may be included as an appendix in Stantec's report to our client.

Signatures: _____ _____

(field personnel) (date)

Signatures: _____ _____

(project manager) (date)

Stantec

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

(1) General Information

Owner's Name: Diane Bateman

Tenant's Name:

Mailing Address: 3130 Parkedale Ave Brockville

911 Address of well:

Township, Con #, Lot #:

Telephone #: 905-409-1508

Date of Inventory:

(2) Water Well Information

a) Do you have a private water well? ☑ Yes ☐ No

b) Are you connected to the municipal water supply system? ☐ Yes ☑ No

c) Do you use your private water well? ☑ Yes ☐ No

For what uses? ☑ Drinking ☑ Washing ☑ Lawn ☐ Other

d) Do you use any other sources of water? ☐ Yes ☐ No

Alternative Sources (cistern, bottled): bottled

e) Do you have a copy of the driller's log for the well? ☐ Yes ☑ No

If so, please forward a copy of the well log along with this inventory form.

f) If you are unable to provide us a copy of the well log, please provide as much of the following information as you can. This information may help us to locate your well record. If we are able to locate your well record, we will mail you a copy.

unknown moved in 2019

Original Well Owner:

Date Constructed:

Driller:

Well Type (drilled, dug/bored):

Casing Inside Diameter:

Depth (below ground surface):

Pump Type/Setting (bgs):

Water Level (below ground surface):

g) Please circle the terms that best describe the accessibility of your well:

buried in a pit or concrete chamber

casing sticks above the ground

other (please describe):

h) If the well is in a pit or concrete chamber, please circle the type of lid:

single circular concrete slab two semi-circular concrete slabs square lid within a larger circular concrete slab

other (please describe):

i) Has the well ever gone dry? ☐ Yes ☑ No since Dec 2019

When, how often?

j) What is the quality of the water? ☐ Poor ☑ Good ☐ Excellent

Comments (color, odor, taste , etc.)

k) Do you test the water quality through the Health Unit? ☑ Yes ☐ No

When, and what were the results? Tested Dec. 2019 within limits

l) Would you be interested in having the water level measured in your well? ☐ Yes ☐ No

(3) Water Well Treatment

(a) Do you treat your well water? ☐ Yes ☑ No

(b) If you answered yes, what method of treatment do you use?

Stantec

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

) Septic System Information

a)	Do you have a private septic system?	☑ Yes	☐ No
b)	Are you connected to the municipal sewer system?	☐ Yes	☑ No
c)	Have you ever experienced problems with your septic system?	☐ Yes	☑ No
d)	Do you get your septic system pumped out?	☐ Yes	☐ No
	How regularly / frequency?	done prior to Dec 2019 (unknown)	

Please provide us with a sketch showing the location of your well and septic system relative to the road, house and other structures on your property. Please include a north arrow.

Take a photo of the well, sampling tap and septic bed area. (Stantec staff only).

Please provide any other comments:

Thank you for taking the time to complete this inventory.

Please note that the completed form may be included as an appendix in Stantec's report to our client.

Signatures:

Stantec

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

(1) General Information

Owner's Name: GARTH & MARILYN McGILL

Tenant's Name:

Mailing Address: 2142 PARKEDALE AV, BROCKVILLE ON K6V-3G6

911 Address of well: SAME

Township, Con #, Lot #: CITY OF BROCKVILLE

Telephone #: 613-345-5546 C 613-349-4065

Date of Inventory:

(2) Water Well Information

a) Do you have a private water well? ☑ Yes ☐ No

b) Are you connected to the municipal water supply system? ☐ Yes ☑ No

c) Do you use your private water well? ☑ Yes ☐ No

For what uses? ☑ Drinking ☑ Washing ☐ Lawn ☑ Other GARDEN

d) Do you use any other sources of water? ☐ Yes ☑ No

Alternative Sources (cistern, bottled): NONE

e) Do you have a copy of the driller's log for the well? ☐ Yes ☑ No

If so, please forward a copy of the well log along with this inventory form.

f) If you are unable to provide us a copy of the well log, please provide as much of the following information as you can.

This information may help us to locate your well record. If we are able to locate your well record, we will mail you a copy.

Original Well Owner: HOWARD BILLINGS

Date Constructed: 1950 - 1955.

Driller:

Well Type (drilled, dug/bored): DRILLED

Casing Inside Diameter: 8"

Depth (below ground surface): 42"

Pump Type/Setting (bgs): JET (SHALLOW WELL)

Water Level (below ground surface):

g) Please circle the terms that best describe the accessibility of your well:

buried in a pit or concrete chamber ✓ casing sticks above the ground

other (please describe):

h) If the well is in a pit or concrete chamber, please circle the type of lid:

single circular concrete slab ✓ two semi-circular concrete slabs square lid within a larger circular concrete slab

other (please describe):

i) Has the well ever gone dry? ☐ Yes ☑ No

When, how often?

j) What is the quality of the water? ☐ Poor ☐ Good ☑ Excellent

Comments (color, odor, taste , etc.) EXCELLENT TASTE

k) Do you test the water quality through the Health Unit? ☑ Yes ☐ No

When, and what were the results? 0 CONIFORM / FALL 2020

l) Would you be interested in having the water level measured in your well? ☑ Yes ☐ No

(3) Water Well Treatment

(a) Do you treat your well water? ☐ Yes ☑ No

(b) If you answered yes, what method of treatment do you use? SOFTENER FOR DRINKING

Stantec

ERFF2.13 - PRIVATE WATER WELL INVENTORY FORM

Stantec Project Reference: _____

Stantec Assigned Well ID Number: _____

(4) Septic System Information

a)	Do you have a private septic system?	☑ Yes	☐ No
b)	Are you connected to the municipal sewer system?	☐ Yes	☑ No
c)	Have you ever experienced problems with your septic system?	☐ Yes	☑ No
d)	Do you get your septic system pumped out?	☑ Yes	☐ No

How regularly / frequency? 5-6 YEARS.

Please provide us with a sketch showing the location of your well and septic system relative to the road, house and other structures on your property. Please include a north arrow.

SEE ATTACHED.

Take a photo of the well, sampling tap and septic bed area. (Stantec staff only).

Please provide any other comments:

Thank you for taking the time to complete this inventory.

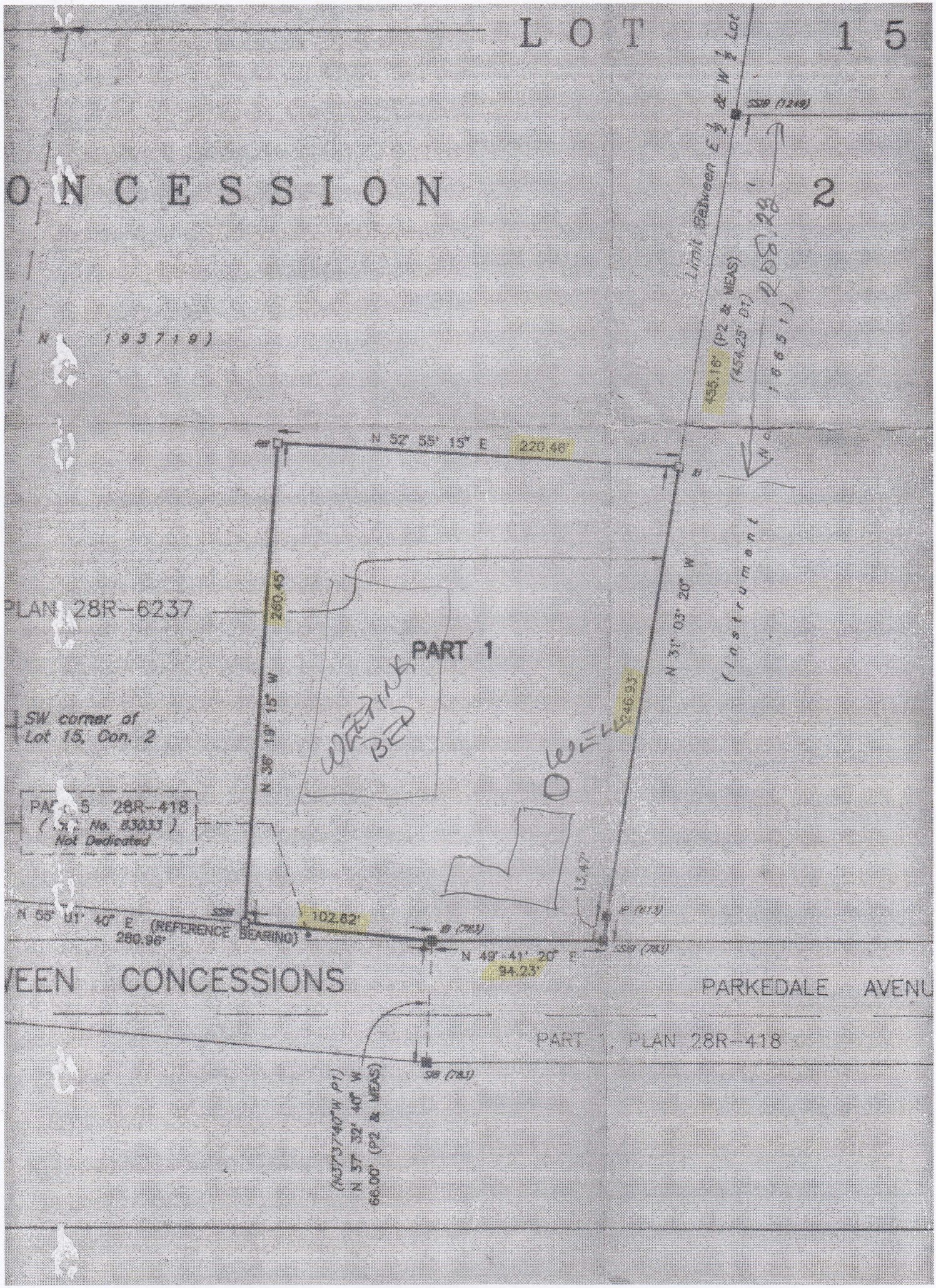
Please note that the completed form may be included as an appendix in Stantec's report to our client.

Signatures: _____ _____

(field personnel) (date)

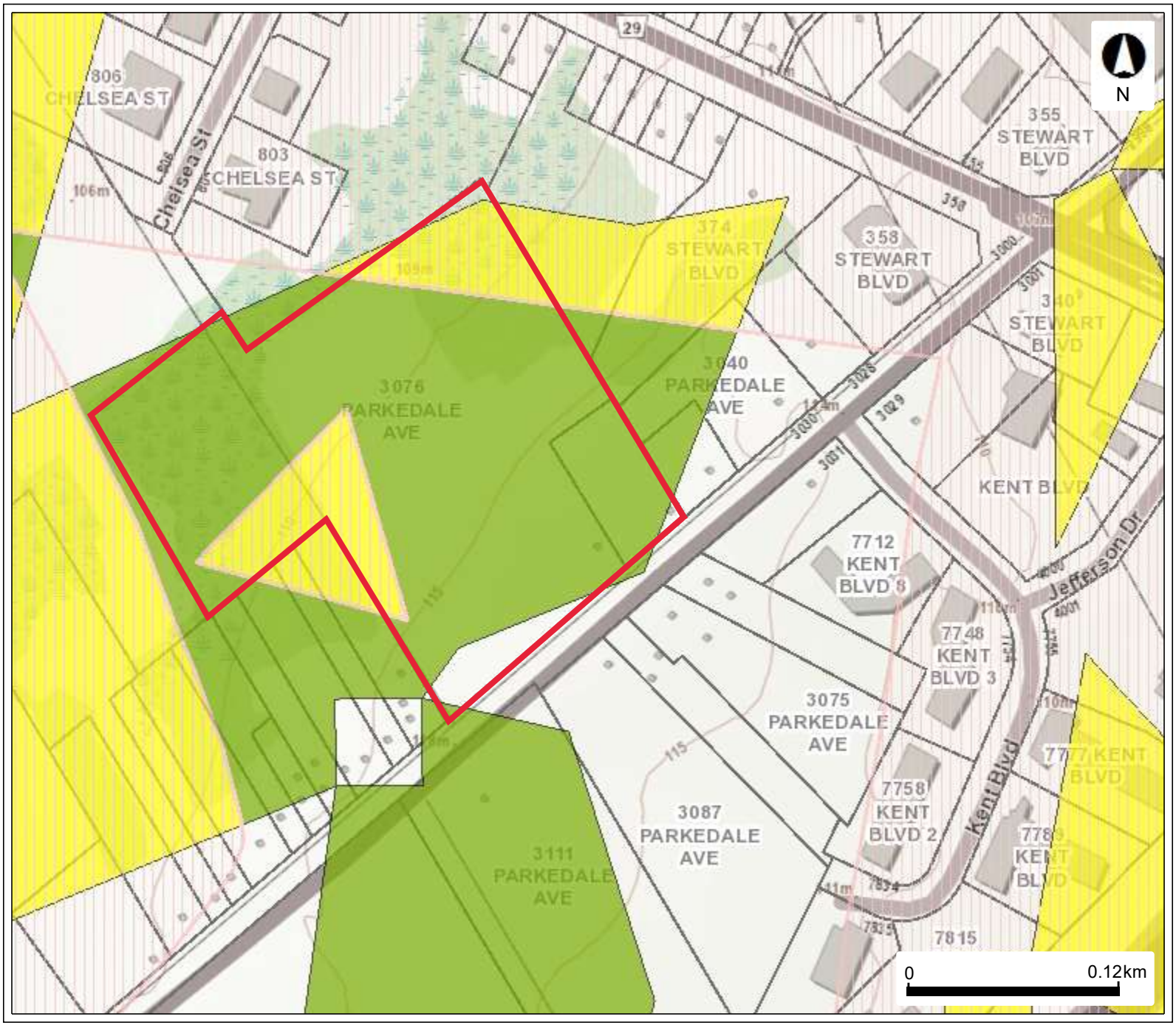
Signatures: _____ _____

(project manager) (date)


LOT 15
CONCESSION 2
N 193719)
Limit Between E ½ & W ½ Lot
SSIB (1248)
435.16' (P2 & MEAS)
(434.23' D1)
RDS. 28
16651)
N 52° 55' 15" E 220.46'
N 31° 03' 20" W
(Instrument
PLAN 28R-6237
260.45'
N 38° 19' 15" W
PART 1
WELL
246.93'
SW corner of
Lot 15, Con. 2
PART 5 28R-418
(Inst. No. 83033)
Not Dedicated
13.47'
N 55° 01' 40" E (REFERENCE BEARING)
280.96'
102.82'
N 49° 41' 20" E
94.23'
SSIB (781)
(N37°37'40"W P1)
N 37° 32' 40" W
66.00' (P2 & MEAS)
PARKEDALE AVENU
PART 1, PLAN 28R-418
CONCESSIONS

Appendix G
MECP Source Protection Mapping

Figure G-1: Groundwater Source Protection



Legend

- Permits To Take Water: Active
- Intake Protection Zone Q
- Wellhead Protection Area Q1
- Wellhead Protection Area Q2
- Wellhead Protection Area Nam
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
  - 0
  - 2
  - 4
  - 6
- WHPA Groundwater Under Direct Influence (WHPA-E)
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Vulnerable Scoring Area - Groundwater Under Direct Influence
  - 4.1 - 7.9
  - 8 - 8.9
  - 9 - 10
- Vulnerable Scoring Area - Groundwater
  - 2

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

Ontario

Map Created: 10/3/2021
Map Center: 44.59938 N, -75.70873 W

Figure G-2: Surface Water Source Protection

Legend

- Watercourse Direction
- Intake Protection Zone Name
- Issue Contributing Areas
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2
- Intake Protection Zone 3
- Vulnerable Scoring Area - Surface Water
  - 0 - 3.9
  - 4 - 7.9
  - 8 - 8.9
  - 9 - 10
- Assessment Parcel

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

Ontario

Map Created: 10/3/2021
Map Center: 44.59938 N, -75.70873 W

Appendix H
Proposed Site Development Plans

LAND AREA & LOT COVERAGE SUMMARY

ORIGINAL LAND AREA = 55,887 SQM (13.8 ACRES)
ADDITIONAL LAND ADDED TO WEST = 4,090 SQM (1.0 ACRES)

TOTAL LAND AREA = 59,977 SQM (14.8 ACRES) – TOTAL COVERAGE = 100.000%

DEVELOPMENT E.P. ZONE & PHASE AREAS :

PHASE 1 AREA = 23,974 SQM
PHASE 2 AREA = 9,797 SQM
PHASE 3A AREA = 5,302 SQM
PHASE 3B AREA = 20,888 SQM

O.P. E.P. ZONE = 17,709 SQM

BUILDING AREAS AND LOT COVERAGES:

AREA OF BLOCK OF 2 TWNHOUSES	= 179.75 SQM (0.044 ACRES) x 0 BLOCKS	= 000.00 SQM	= 0.000%
AREA OF BLOCK OF 4 TWNHOUSES	= 312.28 SQM (0.077 ACRES) x 17 BLOCKS	= 5,309 SQM	= 8.8%
AREA OF BLOCK OF 5 TWNHOUSES	= 401.55 SQM (0.099 ACRES) x 9 BLOCKS	= 3,614 SQM	= 6.0%
AREA OF BLOCK OF 6 TWNHOUSES	= 444.82 SQM (0.110 ACRES) x 2 BLOCK	= 890 SQM	= 1.5%
AREA OF CLUBHOUSE	= 546.20 SQM (0.135 ACRES)		= 0.9%
TOTAL LOT COVERAGE BY ALL BUILDINGS (BLOCKS + CLUBHOUSE)		= 10,359.2 SQM	= 17.2%

PARKING SPACES:

CLUBHOUSE: 38 TOTAL SPACES (4 ACCESSIBLE CLOSE TO BUILDING INCLUDED)

RESIDENTIAL VISITOR PARKING:
P1: 9 SPACES
P2: 5 SPACES
P3: 4 SPACES
P4: 5 SPACES
P5: 9 SPACES
TOTAL: 32 PROVIDED (32 REQ'D BASED ON 0.25 SPACES PER UNIT)

RESIDENTIAL UNIT & TOTAL AREA COUNT SUMMARY

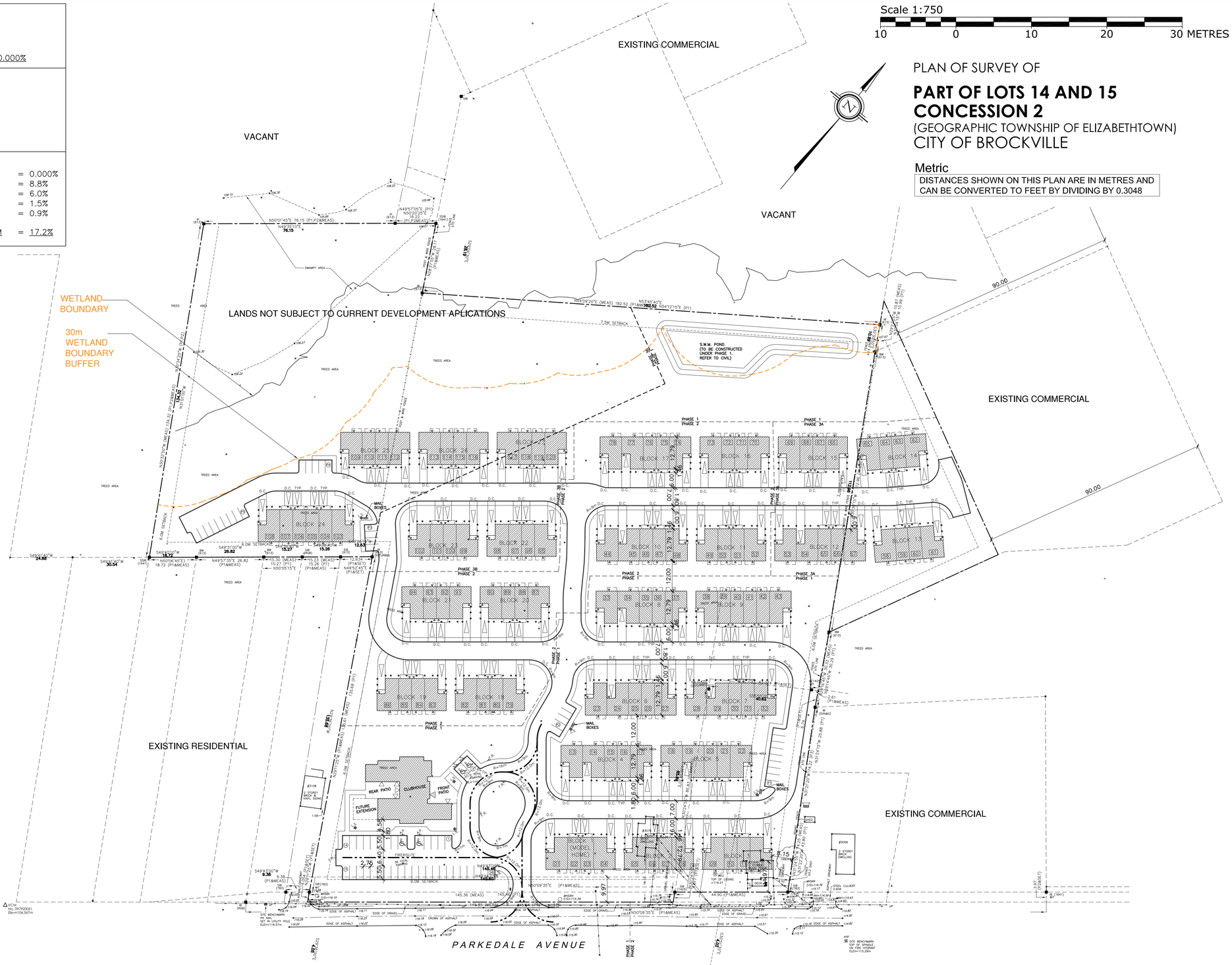
TOTAL RESIDENTIAL UNITS = 120 UNITS
58 = 1–BEDROOM = 48%
62 = 2–BEDROOM = 52%

CLUBHOUSE IN PHASE 1

ALL UNITS AND CLUBHOUSE ARE 1–STOREY

RESIDENTIAL UNIT BREAKDOWN

	BLOCK #	1 BDRM	2 BDRM	TOTALS
PHASE 1	BLOCK 1	2	2	4
	BLOCK 2	2	2	4
	BLOCK 3	2	2	4
	BLOCK 4	2	3	5
	BLOCK 5	2	3	5
	BLOCK 6	2	3	5
	BLOCK 7	2	3	5
	BLOCK 8	2	3	5
	BLOCK 9	4	2	6
	PHASE 1 TOTAL	20	23	43
PHASE 2	BLOCK 10	2	3	5
	BLOCK 11	2	2	4
	BLOCK 16	2	2	4
	BLOCK 17	2	3	5
	BLOCK 18	2	2	4
	BLOCK 19	2	2	4
	BLOCK 20	2	2	4
	BLOCK 21	2	2	4
	PHASE 2 TOTAL	16	18	34
PHASE 3A	BLOCK 12	2	3	5
	BLOCK 13	2	2	4
	BLOCK 14	2	2	4
	BLOCK 15	2	2	4
	PHASE 3A TOTAL	8	9	17
PHASE 3B	BLOCK 22	2	2	4
	BLOCK 23	2	2	4
	BLOCK 24	4	2	6
	BLOCK 25	2	2	4
	BLOCK 26	2	2	4
	BLOCK 27	2	2	4
	PHASE 3B TOTAL	14	12	26
	TOTAL	58	62	120



PLAN OF SURVEY OF

PART OF LOTS 14 AND 15 CONCESSION 2

(GEOGRAPHIC TOWNSHIP OF ELIZABETHTOWN)
CITY OF BROCKVILLE

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Wellings® CAREFREEDOM LIVING

DEVELOPER INFORMATION:
NLGC Inc.
2962 Carp Road, Ottawa, ON., K0A 1L0

OWNER INFORMATION:

ARCHITECT'S INFORMATION:

REVISIONS		
1	ISSUED FOR CONCEPTUAL REVIEW	JAN15'21
2	ISSUED FOR CONCEPTUAL REVIEW	MAR2'21
3	REVISED PER STANTEC COMMENTS	APR7'21
4	REVISED PER STANTEC COMMENTS	AUG26'21
5	REV'D W/ ADD'L LAND AT NW CORNER	AUG26'21
6	REV'D TO SUITE EXIST GRADING	NOV5'21
7	REV'D PER DTM MEETING	NOV9'21
8	REV'D PER CIVIL	JAN10'22
9	PH 3B REVD FOR 30M WETLAND BUFFER	JAN21'22
9	STM PND SERVICE ACCESS, BLKS 9 & 27 REVS	JAN24'22

PROJECT:
WELLINGS OF BROCKVILLE

DRAWING:
CONCEPTUAL SITE PLAN

ISSUE DATE: MAR 2020
SCALE: 1:750
DRAWN BY: M.W./T.S.L.
PROJECT NO.: 1913

DRAWING NO.
A101