



**Hydrogeological Assessment,  
Strohvest Subdivision, Township of  
Wellesley, Ontario**

FINAL REPORT

June 2024

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First Submission: January 2022

File No. 161413217

## Sign-off Sheet

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## **Abbreviations**

AMSL	above mean sea level
AO	Aesthetic Objective
Applicant Lands	Lands Owned by the Applicant (Strohvest Ontario Inc.)
ASTM	American Society for Testing and Materials
BGS	below ground surface
Client	Ron Stroh
EASR	Environmental Activity and Sector Registry
GRCA	Grand River Conservation Authority
GUDI	Groundwater under the direct influence of surface water
HDPE	High density polyethylene
HVA	Highly Vulnerable Area
IPZ	Intake Protection Zone
LERSPC	Lake Erie Region Source Protection Committee
m	meters
m <sup>3</sup>	cubic meters
m/s	meters per second
m <sup>3</sup> /year	cubic meters per year
MECP	Ministry of the Environment, Conservation and Parks
MOH	Medical Officer of Health
ODWQS	Ontario Drinking Water Quality Standards
OG	Operational Guideline



## HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO

OGS	Ontario Geological Survey
PVC	Polyvinyl chloride
PTTW	Permit to Take Water
SGRA	Significant Groundwater Recharge Area
SPP	Source Protection Plan
Stantec	Stantec Consulting Ltd.
Subject Lands	Plan 1148, Part Lot 80, Registered Plan 58R-3548, Part 1, Township of Wellesley, Regional Municipality of Waterloo
WHPA	Well Head Protection Area



## **1.0 INTRODUCTION**

Strohvest Ontario Inc. (Applicant) retained Stantec Consulting Ltd. (Stantec) to complete a hydrogeological assessment of a land parcel located to the north of Gerber Road in the Village of Wellesley. The Lands Owned by the Applicant (Applicant Lands) cover an area of 16.4 hectares (ha); however, the portion of these lands currently being proposed for development at this time (Phase 1) cover an area of 10.2 ha and are legally described as Plan 1148, Part Lot 80, Registered Plan 58R-3548, Part 1, Township of Wellesley, Regional Municipality of Waterloo (Subject Lands) (Figure 1). The Subject Lands are bounded to the south by Gerber Road, to the west and north by active agricultural lands, and to the east by existing low-rise residential development. The Subject Lands will be developed with full municipal servicing.

This hydrogeological assessment has been prepared to support Zoning By-law Amendment and Draft Plan of Subdivision applications, with proposed development for the Subject Lands to consist of up to 169 residential units comprised of 57 single-detached units, 34 semi-detached units, 54 townhouse units, and either an additional 12 townhouse units or up to 24 apartment units on one block (Appendix A). A stormwater management block is currently planned for the south end of the Subject Lands fronting Gerber Road.

The hydrogeological work performed for the Subject Lands follows the *Conservation Authority Guidelines for Development Applications - Hydrogeological Assessment Submissions* (2013), as well as drawing upon Stantec's experience with the completing of hydrogeological assessments in support of land development projects throughout the Regional Municipality of Waterloo. Specifically, the objectives of the hydrogeological assessment are to:

1. Characterize the geological and hydrogeological conditions at the Subject Lands, including identifying hydrostratigraphic / aquifer units, seasonal positioning of the groundwater table, groundwater flow regimes, groundwater recharge and/or discharge zones / features, and the hydraulic conductivity of the subsurface deposits.
2. Identify local groundwater uses near the Subject Lands (i.e., municipal and private water well uses) and evaluate the potential for quantity and/or quality interference to these existing groundwater uses because of the proposed site development.
3. Assess whether proposed buildings and associated servicing infrastructure on the Subject Lands will intercept the groundwater table, evaluate the potential need for temporary construction dewatering and/or installation of a permanent drainage system (for long-term dewatering), and identify what mitigation measures could be employed at the site to minimize any potential disturbances to the groundwater flow system and, subsequently, groundwater availability to local water supply wells and surface water features.



# **HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO**

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4. Conduct a pre- and post-development water budget assessment to evaluate potential changes on local groundwater recharge.
5. Evaluate whether proposed land use activities conform to Source Water Protection requirements as stipulated in the Clean Water Act, S.O. 2006, Chapter 22.

The report is arranged into seven sections, including this introduction (Section 1.0). Section 2.0 presents the physical setting of the Applicant Lands at a regional scale, with Section 3.0 outlining the methods utilized to evaluate existing hydrogeological conditions within these lands. Section 4.0 presents the results of the hydrogeological field investigation and Section 5.0 provides an assessment of potential hydrogeological constraints associated with the proposed Site development and recommended mitigation measures to address these constraints. Report conclusions and references are listed in Sections 6.0 and 7.0, respectively.

Appendix A provides a copy of the Draft Plan of Subdivision, with all figures and tables referenced in this report being presented in Appendices B and C, respectively. Appendices D to J include Regional Groundwater Mapping, Source Water Protection Plan Mapping, Region of Waterloo Source Water Protection Land Use Categories, Borehole Logs, Hydraulic Conductivity Analytical Solutions, Laboratory Certificates of Analysis, and Test Pit Photographs, respectively.



## **2.0 PHYSICAL SETTING**

### **2.1 PHYSIOGRAPHY, SURFACE WATER FEATURES, AND TOPOGRAPHY**

The Applicant Lands are situated within the physiographic region referred to by Chapman and Putnam (1984) as the Stratford Till Plain, with these lands sitting upon undrained till plains composed predominantly of silty clay. Spillways lie immediately to the south of the Site (Figure 2).

The Applicant Lands are located within the Bamberg Creek-Nith River subwatershed. As shown in Figure 2, the closest surface water features to the Applicant Lands include Wellesley Pond and Firella Creek, which lie approximately 250 m to the northeast of the site, and a tributary positioned approximately 180 m to the southwest of the site. These previously mentioned watercourses flow into the Nith River, which generally flows southward and eventually discharges to the Grand River near Paris. Two wetlands exist to the northwest of the Applicant Lands: Firella Creek Swamp (660 m from site) and the Wellesley West Wetland Complex (830 m from site).

In the region containing the Applicant Lands, a topographic high point of 368 m AMSL exists near the T-intersection of Queens Bush Road and Hutchison Road, with the lands sloping to the east, south and west towards Wellesley Pond, Firella Creek, the Nith River, and the tributaries associated with these watercourses from this point (Figure 3). In the Applicant Lands (Figure 1), a surface water drainage divide is shown to run in a southwest to northeast direction in the northern portion of the property. The lands slope from an elevation of 363.5 m AMSL at the divide to 360.2 m AMSL near MW03-21, with this area of the property draining overland to the north towards Queens Bush Road. To the south of the divide, the lands slope from an elevation of 363.5 m AMSL to 353.5 m AMSL along Gerber Road, with most of the Applicant Lands (including the full area of the Subject Lands) draining overland to the south to an existing culvert that crosses the road and ultimately discharges to the Nith River. Some external flows also enter the Applicant Lands through the existing agricultural fields located to the west of the property.

### **2.2 REGIONAL GEOLOGY AND HYDROGEOLOGY**

The Applicant Lands are located immediately to the north of the Waterloo Hills (Figure 2), also commonly known as the Waterloo Moraine, a kame moraine formed between ice lobes extending from the Lake Ontario-Erie, Huron, and Georgian bay areas (Karrow 1993). Numerous advances and retreats of the ice lobes during the Wisconsin glacial period resulted in a complex deposit of ice-contact and glacial outwash sands and gravels separated by silt- and clay-rich tills. The conceptual hydrogeologic model for the Waterloo Moraine comprises four main aquifers and aquitards after Terraqua Investigations Ltd. (1995), which was broken down further into 19 hydrostratigraphic units after Bajc and Shirota (2007). The model generally does not include more recent deposits shown on surficial geology mapping such as modern alluvial deposits (Figure 4, unit 19), which are found in wetlands and creek / river valleys.



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The hydrostratigraphic units expected to be encountered in the subsurface where the Applicant Lands occur are described below. The units are described from ground surface downward, with Bajc and Shiota (2007) unit names shown in parentheses.

**Outwash Deposits (AFA2):** Referred to as the Grand River glaciofluvial deposits and equivalent aquifers that consist of well bedded sands and gravels restricted to the valleys of the Conestogo, Grand, and Nith rivers (Figure 4, Unit 7).

**Aquitard 1 (ATB1):** Surficial and spatially discontinuous glacial till units found predominantly along the flanks of the Waterloo Moraine. Along the western flank of the moraine Aquitard 1 corresponds to the Mornington Till (silty clay till; Figure 4, Unit 5d), Stratford Till (sandy silt till; Figure 4, Unit 5b), and Tavistock Till (clayey silt till); whereas along the eastern flank of the Moraine this unit corresponds to the Upper Maryhill (clay till) and Port Stanley Tills (sandy to silty till) (Bajc and Shiota, 2007). Aquitard 1 is characterized by low permeability and forms a relatively impermeable barrier that effectively limits the downward movement of groundwater to the deeper aquifer systems.

**Aquifer 1 (AFB1/ATB2/AFB2):** This hydrostratigraphic unit represents the main water supply aquifer in the core areas of the Waterloo Moraine. Depending on the depositional environment, the composition of Aquifer 1 varies from a layered silt and fine sand to coarse sand and gravel. Throughout the core areas of the moraine, Aquifer 1 corresponds to a thick, laterally extensive sand and/or gravel aquifer overlying Aquitard 2 and is often exposed at surface. In some areas, Aquifer 1 is interpreted to be bisected by the Middle Maryhill Till (ATB2), which effectively separates Aquifer 1 into two units: AFB1 and AFB2. Where Aquifer 1 is overlain by Aquitard 1, the aquifer behaves as a confined to semi-confined aquifer system. Where Aquitard 1 is absent and the sediments of Aquifer 1 are exposed at ground surface, these deposits represent an important source of groundwater recharge to this aquifer system.

**Aquitard 2 (ATB3):** Aquitard 2 corresponds to the Lower Maryhill Till, an overconsolidated, stony, clayey silt till, that represents one of the primary regional hydrostratigraphic units (Bajc and Shiota, 2007). Along the flanks of the Waterloo Moraine, the Lower Maryhill Till is often found to be discontinuous.

**Aquifer 2/3 (AFB3/AFD1):** Associated with reworked layers of gravel, sand and silt associated with the Catfish Creek Till (Aquifer 2) and Pre-Catfish Creek sand and gravel (Aquifer 3), with these aquifers being separated by the Catfish Creek Till (stony, silty to sandy till) (Aquitard 3, ATC1/ATC2). These units are discontinuous through the Waterloo Moraine. The municipal production wells of the Wellesley Wellfield (i.e., WY1, WY5 and WY6; Figure 5) are partially screened within these aquifer units (LERSPC, 2021a).

**Bedrock:** Bedrock in this region is comprised of limestone, dolostone, and sandstone corresponding to the Bois Blanc Formation (Armstrong and Dodge 2007). According to available MECP water well records, bedrock is encountered between 295 m AMSL and 307 m AMSL. Municipal production wells in Wellesley are screened partially within this unit (LERSPC, 2021a).



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The regional study completed by the Grand River Conservation Authority (2001) indicates that groundwater flow through the overburden deposits of the unconfined aquifer (i.e., using static water levels in wells constructed less than 25 m deep) is generally from northwest to southeast and moves towards the Nith River, which is identified as a potential groundwater discharge feature (Figure ST-7, Appendix D).

Mapping created using the Grand River Information Network (GRIN) (GRCA, 2021) indicates that annual groundwater recharge rates across the Applicant Lands range between 100 to 200 mm/year, for an average of 139 mm/year (Figure D-1, Appendix D), in those areas where silty to sand till is mapped as occurring at ground surface (Figure 4). However, in the southern portion of the Applicant Lands where silty to clayey till is exposed at ground surface (Figure 4), annual recharge rates are identified as being lower with values ranging from 50 to 100 mm/year, for an average of 52 mm/year (Figure D-1, Appendix D).

## 2.3 SOURCE WATER PROTECTION

### 2.3.1 Ontario Clean Water Act

As established under the Ontario *Clean Water Act*, 2006, S.O., 2006, c. 22, source protection areas and associated land use restrictions exist for all municipal drinking water sources located throughout the Lake Erie Source Protection Area.

The Ontario Ministry of the Environment (now the MECP) introduced the *Clean Water Act* as a means of ensuring the protection of drinking water sources in the Province. The *Clean Water Act* requires that a detailed Assessment Report be prepared for each municipal drinking water system, with this Assessment Report incorporating numerous components as outlined in the document “Technical Rules: Assessment Report, *Clean Water Act* (2006), November 16, 2009”. This legislation provides a basic framework for communities to follow in developing an approach to protecting their municipal water supplies, with the key components of this approach being as follows:

- Identification and assessment of risks to the quality and quantity of municipal drinking water sources and determine which risks are significant and require immediate action, which risks need monitoring to ensure they do not become significant, or which pose low to negligible risk. This information is presented in a detailed Assessment Report, with the content of this report consisting of (i) the defining of Well Head Protection Areas (WHPA) for groundwater drinking water sources and Intake Protection Zones (IPZ) for surface water drinking water sources, (ii) completion of a vulnerability assessment for each WHPA and IPZ, and (iii) identification of drinking water issues and threats.
- Preparation of a Source Protection Plan (SPP) that addresses identified drinking water threats, particularly significant threats.
- Carry out the SPP through existing land use planning and regulatory requirements.
- Perform ongoing monitoring and reporting to measure the effectiveness of the actions taken to protect drinking water sources and ensure that they are protected in the future.



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Within the Lake Erie Source Protection Area and specifically the Grand River Source Protection Area, the MECP has designated the following types of vulnerable areas that apply to drinking water sources:

**Wellhead Protection Area (WHPA):** an area delineated on the ground surface that represents the capture zone for the underlying aquifer in which a given municipal well draws its water. The zone represents the total amount of time it would take for groundwater to flow through the aquifer system and reach the intake of a given municipal well. The zones are defined as follows:

- WHPA-A: 100 m radius around the municipal well.
- WHPA-B: Horizontal time-of-travel to the municipal well is two years or less.
- WHPA-C: Horizontal time-of-travel to the municipal well is equal to or less than five years and greater than two years.
- WHPA-D: Horizontal time-of-travel to the municipal well is equal to or less than 25 years and greater than five years.
- WHPA-E: Area where groundwater is under the direct influence of surface water (GUDI), where horizontal time-of-travel of this groundwater from the surface water body to the municipal well is two hours or less.

The water supply for the Village of Wellesley is obtained from production wells of the Wellesley Wellfield, which are located approximately 250 m to the east of the Applicant Lands (Figure 5). These wells draw their groundwater supply from Aquifer 2 (AFB3) and Aquifer 3 (AFD1), and potentially from the Bedrock Aquifer (Paragon Engineering Limited 1991; LERSPC, 2021a; MECP, 2021a). Based on a review of the online MECP Source Water Protection Information Atlas (2021b) and as shown in Figure 5, most of the Applicant Lands are located in the WHPA-B of the Wellesley Wellfield, with the northern and southern extents of these lands occurring in WHPA-C and WHPA-D of the same wellfield. The vulnerability scoring for WHPA-B to WHPA-D that intercepts the Applicant Lands is 6 (Map A1, Appendix E).

**Intake Protection Zone (IPZ):** An IPZ is a zone established around a drinking / surface water intake in which a spill or leak may get to the intake too quickly for the operators of the municipal water treatment plant to shut the intake down until the pollutant passes by. These zones also include land adjacent to streams and storm sewers where surface water runoff can quickly reach the intake. Based on a review of the online MECP Source Water Protection Information Atlas (2021b) and as shown in Figure 5, the proposed Applicant Lands do not intercept any surface water system IPZs.

**Significant Groundwater Recharge Area (SGRA):** Groundwater recharge represents the proportion of precipitation and/or surface water run-off that infiltrates to the subsurface and reaches the groundwater table. Recharge areas are classified as “significant” when they supply more water to an aquifer used as a drinking water source than the surrounding area. The volume of water that infiltrates to the subsurface is largely influenced by site topography, the physical properties of the soil, and land cover characteristics. The LERSPC (2021a) defines a significant groundwater recharge area (SGRA) to be an area where the annual recharge rate is greater than the average plus 15% or more across the source protection region.





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As per the Assessment Report (LERSPC, 2021a), lands in the Grand River Source Protection Area (i.e., the Grand River Watershed) are deemed to be SGRA when the annual recharge rate is greater than 176 mm/year. Based on a review of the online MECP Source Water Protection Information Atlas (2021b) and as shown in Figure 5, the Applicant Lands are not designated as SGRA.

**Highly Vulnerable Aquifer (HVA):** Defined as subsurface, geologic formations that are sources of drinking water, which could be easily affected by the release of pollutants on the ground surface. The HVA is identified using variables that include depth to the aquifer, physical properties of the overlying soil and/or rock, and the aquifer composition. In general, an HVA will consist of granular aquifer materials (i.e., sands and gravels) that are exposed near the ground surface and where a relatively shallow water table is present. Based on a review of the online MECP Source Water Protection Information Atlas (2021b) and as shown in Figure 5, the Applicant Lands do not occur in an area designated as HVA.

**Water Quantity Vulnerable Area:** Water quantity vulnerable areas are determined through a tiered process of water budget analyses as set out in the Technical Rules under O. Reg. 287/07. WHPA-Q is defined as an area where an activity can occur and pose a threat to drinking water quantities. Any activity that takes water without returning it to the same source or an activity which reduces recharge may be a threat in WHPA-Q. Based on a review of the online MECP Source Water Protection Information Atlas (2021b) (Figure E-1, Appendix E), the Applicant Lands do not occur in an area designated as WHPA-Q.

## 2.3.2 Region of Waterloo Official Plan

In the Region of Waterloo, sensitivity rankings were developed for the municipal well fields, with these rankings being based on modeled time-of-travel capture zones and the vulnerability of the groundwater to contamination at each individual well head. A Sensitive Area 1 designation represented an area surrounding the well head that has the highest potential for groundwater contamination, whereas a Sensitivity Area 8 designation represents the lowest. As per the Region of Waterloo Official Plan (ROP) (2015), Wellhead Protection Sensitivity Areas (WPSA) are categorized under eight categories (WPSA 1 to WPSA 8). This range of classifications allows for varying degrees of management relative to the vulnerability of the underlying groundwater to contamination, the importance of the subject well to the capacity of the municipal drinking-water supply system, and the length of time groundwater in the WPSA will take to reach the municipal well.

As shown in Figure 6, the Applicant Lands occur in what appears to be the WPSA of the Wellesley Wellfield. The specific WPSA include:



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WPSA-4: Where covering the Applicant Lands, this WPSA indicates that groundwater takes less than two years to flow to the intake of a given municipal production well. As per the ROP (2015) Schedule B, Category 'A' (Very High Risk) land uses are not permitted in this zone, whereas Category 'B' (High Risk), 'C' (Moderate Risk) and 'D' (i.e., underground parking garages, individual wastewater treatment systems, pipelines, sewers, stormwater management ponds (or other ponds), and plans of subdivision or vacant land condominiums) land uses may be permitted subject to further study in accordance with Policy 8.A.4<sup>1</sup>. A copy of Schedule B from the ROP (2015) that lists the various land uses associated with each Category is provided in Appendix F.

WPSA-5: Where covering the Applicant Lands, this WPSA indicates that groundwater takes between two to 10 years to flow to the intake of a given municipal production well. Category 'A' land uses are not permitted in this zone, nor are Category 'B' and 'C' land uses located outside of the Built-Up Area (note that the Applicant Lands do not fall within this area). However, Category 'B' and 'C' land uses already permitted by existing Area Municipal official plans may be permitted subject to further study in accordance with Policy 8.A.4. Category 'D' land uses and plans of subdivision or vacant land condominiums may also be permitted subject to further study in accordance with Policy 8.A.4.

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<sup>1</sup> Policy 8.A.4 states that studies submitted in support of a development application must be completed in accordance with the Regional Implementation Guideline for Source Water Protection Studies to the satisfaction of the Region. Studies submitted by the owner/applicant will demonstrate that the proposed use will not negatively impact the quantity and/or quality of drinking-water resources in Source Protection Areas for the development application to receive approval.



## **3.0 METHODOLOGY**

Section 3.0 provides the methodology used to obtain the data required to complete the hydrogeological investigation. The key components of the investigation included:

- borehole drilling
- installation and development of monitoring wells
- monitoring of groundwater levels
- performing hydraulic response (hydraulic conductivity) testing
- collection of groundwater samples from onsite monitoring wells and offsite private wells for quality testing
- test pit excavations.

The methodology for these tasks is described in Sections 3.1 to 3.6 below.

### **3.1 BOREHOLE DRILLING**

From May 5 to 6, 2021, boreholes were advanced at eight locations across the Applicant Lands (Figure 1) using a CME track-mounted drilling rig equipped with hollow-stem augers operated by a licensed drilling subcontractor (Geo-Environmental Drilling Inc.). The depth of the boreholes extended to 5.2 m to 6.7 m below ground surface (BGS), with six of the eight boreholes being equipped with a single monitoring well (i.e., MW01-21 to MW06-21). Soil sampling occurred using a 0.6 m long stainless-steel split spoon sampler at 0.75 m (2.5 feet) intervals for the first 3.6 m (12 feet) of drilling depth, followed by sample collection occurring at approximately every 1.5 m (5 feet) to the termination depth of the borehole. Stantec personnel directed the drilling, soil sampling operations, and logging of the borehole stratigraphy. The borehole logs contain descriptions (where relevant and possible) of soil type, texture, colour, structure, consistency, plasticity, moisture content, and other visual and olfactory observations as per the procedures outlined in American Society for Testing and Materials (ASTM 2009) specification D2488-09a. Overall, the boreholes were strategically positioned throughout the Applicant Lands to confirm shallow soil conditions, seasonal groundwater depths, and the direction of horizontal groundwater flow. Further details on the borehole drilling and monitoring well installations are provided in the Geotechnical Investigation Report (Stantec, 2021). Copies of the borehole logs are provided in Appendix G.



Between October 16 and 17, 2023, an additional borehole was advanced directly adjacent to MW05-21, with the purpose of this borehole to confirm the potential depth of Aquitard 1 (ATB1) and whether groundwater monitoring results obtained from the initial investigation were indicative of a perched groundwater system. Stantec retained a licensed drilling contractor (Aardvark Drilling Inc.) on behalf of the Applicant to drill the borehole. Aardvark Drilling Inc. drilled the borehole to a depth of approximately 25 m BGS (i.e., elevation of 337 m AMSL) using a CME 850 track-mounted drilling rig equipped with hollow-stem augers. Soil sampling and logging of the borehole occurred using the same previously mentioned techniques. A copy of the borehole log is provided in Appendix G

### **3.2 MONITORING WELL INSTALLATION AND DEVELOPMENT**

Stantec observed the installation of monitoring wells in six of the eight initial boreholes advanced throughout the Applicant Lands (i.e., MW01-21 to MW06-21 between May 5 and 6, 2021) and the supplementary borehole drilled in October 2023 (i.e., MW105-23), with the wells being installed to allow for the measurement of groundwater levels / elevations, completion of in-situ hydraulic conductivity testing, and/or the collection of groundwater samples for quality analysis. The drilling contractor installed the monitoring wells adhering to the construction requirements as outlined under Ontario Regulation 903 (O. Reg. 903) (MECP, 1990). Installation details for each of the monitoring wells are summarized in Table 1. Each monitoring well is constructed of 50 mm inside diameter, Schedule 40 polyvinyl chloride (PVC) pipe, having a No. 10 slot screen (0.01-inch slot) measuring 3.0 m in length. Backfilling of the screened interval consisted of silica sand to a height of approximately 0.3 m above the top of screen, followed by granular bentonite to ground surface prevent a hydraulic connection from occurring between the screened formation and overlying soils. The completion of each monitoring well involved encasing the pipe stick-up within a lockable steel casing. Stantec Geomatics surveyed the ground surface and top-of-pipe elevations at each monitoring well location to a geodetic benchmark using Global Positioning System (GPS) having a spatial accuracy of  $\pm 0.03$  m and  $\pm 0.02$  m in the vertical and horizontal plane, respectively.

Following installation, Stantec developed each monitoring well to remove drilling fluids, solids, or other particulates that may have been introduced during drilling. Stantec purged each monitoring well using dedicated 16 mm inside diameter high density polyethylene (HDPE) tubing connected to a D-25 Waterra™ foot valve. Stantec purged ten standing column volumes from each monitoring well to clear out the drilling residues and any fine-grained sediments to establish a proper hydraulic connection with the native saturated material.

### **3.3 GROUNDWATER LEVEL MONITORING**

Stantec manually measured water levels in the monitoring wells multiple times between June 2021 and June 2024 using a battery operated Heron™ water level meter. Equipped with an electrode connected to a graduated polyethylene tape, Stantec used the meter to measure the depth to water by slowly lowering the electrode into the well until the buzzer sounded. Stantec recorded the water level measurements in meters to the nearest 0.01 m. A summary of the manual water level measurements measured at the monitoring wells by Stantec throughout the investigation is provided in Table 2.



The continuous recording of groundwater level fluctuations occurred in each onsite monitoring well from June 2021 to June 2024 using dataloggers (i.e., either Solinst® Levellogger 5® or vanEssen Instruments® TD-Diver®). Suspended into the water column at each monitoring well, the datalogger was programmed to record water levels at 60-minute intervals. Dataloggers are not vented to the atmosphere and, therefore, record total pressure (where total pressure is the sum of the atmospheric pressure and the height of water column). To obtain an accurate measurement of the groundwater level at each well, the water level data obtained from the dataloggers are corrected for atmospheric pressure using data obtained from a Solinst® Barologger 5® (Barologger), which was suspended in the air column within one of the onsite monitoring wells (i.e., MW01-21). Hydrographs showing groundwater level fluctuations in the monitoring wells over time are presented in Figures 7 to 9.

### **3.4 HYDRAULIC RESPONSE TESTING**

To estimate the horizontal hydraulic conductivity of the deposits beneath the Applicant Lands, Stantec performed in-situ hydraulic response testing on MW01-21 to MW05-21 on May 31, 2021, and at MW105-23 on April 2, 2024. The testing performed for this investigation consisted of creating an instantaneous change in the monitoring well water level by removing a known volume of water from the well (i.e., rising head / bail test), followed by recording the time taken for the resulting water level to return to static conditions using a combination manual and continuous (i.e., Levellogger) measurements. The testing results were analyzed using the Bouwer and Rice (1976) / Bouwer (1989) solution provided in the software package AQTESOLV™ Pro Version 4.5 (Duffield, 2014) to calculate the horizontal hydraulic conductivity of the aquifer sediments within the immediate vicinity of the screened interval of each monitoring well. Table 1 provides a summary of the calculated horizontal hydraulic conductivities, with the analytical solutions for the data being presented in Appendix H.

Stantec also used the in-situ hydraulic response testing results obtained from the monitoring wells to provide preliminary estimates of infiltration rates for the overburden soils (i.e., at depths between 2.8 m and 6.2 m BGS). Since hydraulic conductivity in the horizontal direction is generally an order (potentially two orders for clay-based deposits) of magnitude higher than hydraulic conductivity in the vertical direction (Todd 1980; Freeze and Cherry 1979), the vertical hydraulic conductivities for overburden deposits surrounding the well screens were assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities. The Credit Valley Conservation-Toronto and Region Conservation (CVC-TRCA) (2010) method for converting vertical hydraulic conductivity to an infiltration rate was then applied to these data, with the results being presented in Table 3.

### **3.5 GROUNDWATER SAMPLING AND QUALITY TESTING**

#### **3.5.1 Onsite Monitoring Wells**

On May 27, 2021, April 13 and December 5, 2023, Stantec personnel collected groundwater samples from the onsite monitoring wells for analysis and comparison against the Ontario Drinking Water Quality Standards (ODWQS) (MECP, 2018).



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Groundwater collected from the monitoring wells involved using the same dedicated tubing to develop the monitoring wells (Section 3.2). Prior to collecting the sample, Stantec personnel measured in-situ field parameters of pH, temperature, and specific conductivity using a Hanna HI 98129 waterproof pH/conductivity/TDS tester. The meter was calibrated prior to use according to the manufacturer's specification with the appropriate calibration standards. Sampled groundwater was poured directly from the HDPE tubing into lab supplied sample bottles. All groundwater samples were 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 an accredited laboratory (i.e., Bureau Veritas Laboratories) for the analysis of general inorganic chemistry, nutrients, and metals. Samples collected for metals were filtered in the field using dedicated disposable 0.45 µm in-line filters and, subsequently, reported concentrations represent dissolved metals.

Chain of custody forms were completed and included with the samples at the time of the laboratory submission. The quality results for groundwater sampled from the onsite monitoring wells are summarized in Table 4. A copy of the laboratory Certificate of Analysis is presented in Appendix I.

### 3.5.2 Offsite Private Wells

The Village of Wellesley primarily receives their drinking water from the municipal system (i.e., Wellesley Wellfield); however, there are residential properties on the surrounding edges of the Village that obtain their potable water supply from private wells. Stantec personnel delivered letters to homes surrounding the Applicant Lands that were identified as potentially having a private well, inviting the residents to participate in a voluntary, pre-construction well water quality monitoring program. The letter detailed that the monitoring program would consist of the completion of a well survey questionnaire, collection of a water quality sample, and an inspection of the well head, with the well water quality results being provided to the resident. Four letters were delivered to properties near the Applicant Lands, with two homeowners responding to the letter expressing their interest in participating in the pre-construction monitoring program. The locations of the properties participating in the program (i.e., RW01 and RW02) are shown on Figure 1.

- Water samples were either collected from an outdoor tap attached to the house or garage, or from a kitchen faucet. Prior to collecting the water sample, the aerator, if present and easily accessible on the tap spout, was removed. Stantec personnel disinfected the tap spout with a dilute (10%) sterilene solution and allowed the water to run for a minimum of 10 minutes. While the water was running, Stantec personnel recorded quality parameters such as temperature, pH, specific conductivity, and turbidity using a Hanna pen® and the Hach 2100Q® turbidity meter. Once these parameter values stabilized, Stantec personnel proceeded to collect the water sample.



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Water samples were collected directly into labelled, laboratory supplied containers (as per MECP, 2009), and placed in coolers on ice for storage for transport and submission to Bureau Veritas Laboratories for analysis. Water samples collected from the private wells were analyzed for microbiological parameters (i.e., total coliform and *E.coli*), general inorganic chemistry, nutrients, and metals. The samples were not filtered in the field and, subsequently, metals results represent total concentrations (versus dissolved).

Chain of custody forms were completed and included with the samples at the time of the laboratory submission. The results of the groundwater quality testing are summarized in Table 5. A copy of the laboratory Certificate of Analysis is presented in Appendix I.

### 3.6 TEST PIT EXCAVATIONS

On May 2, 2024, the Applicant provided a rubber tire backhoe and proceeded to excavate five test pits (TP01-24 to TP05-24) throughout the Subject Lands under the observation of Stantec. The purpose of excavating the test pits was to confirm the positioning of the high groundwater table as suggested by water levels recorded in the onsite monitoring wells. Stantec strategically located the test pits near each monitoring well constructed in the Subject Lands (i.e., MW01-21, MW02-21, MW04-21, and MW05-21), with an additional test pit being excavated in the central-east portion of the property (i.e., TP03-24). The test pits were excavated to depths ranging from approximately 3.5 to 4.0 m BGS. Stantec classified the excavated soils using the ASTM guideline for visual-manual description and identification of soils (ASTM D2488-00), providing descriptions (where relevant and possible) of soil type, texture, colour, structure, moisture content, and other observations. Stantec also obtained soil grab samples from TP01-24 and TP04-24 and submitted these samples to Stantec's geotechnical laboratory for grain-size analysis, Atterberg limits, and moisture content testing.

Once excavated, Stantec instructed the Applicant to leave the test pits open for approximately 24 hours to observe / confirm the presence of potential groundwater seepage conditions in each test pit. After this period, the Applicant proceeded to backfill the test pits and return each location to its original ground surface elevation. Locations of the test pits are shown on Figure 1, with the ground surface elevation at each test pit being estimated based on the topographic contours provided on this figure (i.e., contours generated based on Stantec Geomatics survey results as previously mentioned in Section 3.2). Copies of the test pit logs and results of the geotechnical laboratory testing are provided in Appendix G.



## **4.0 LOCAL GEOLOGY AND HYDROGEOLOGY**

### **4.1 GEOLOGY AND HYDROSTRATIGRAPHY**

Figure 4 presents the surficial geology within and surrounding the Applicant Lands as mapped by the OGS (2010). Deposits of stone-poor, sandy silt to silty sand till, which is interpreted to represent the Stratford Till, covers most of the Applicant Lands with these deposits also covering the northern portion of the Subject Lands (Figure 4, Unit 5b). The remainder of the Subject Lands are covered with glaciolacustrine-derived deposits of silty clay till, which is interpreted to represent the Mornington Till (Figure 4, Unit 5d). Surrounding the Applicant Lands are glaciofluvial deposits of sand and gravel (AFA2), modern deposits of alluvium associated within the corridors of the Nith River and its associated tributaries, and ice-contact stratified deposits of gravel, sand, and silt that are potentially associated with Aquifer 1 (AFB1). Overall, the onsite drilling results completed as a part of this investigation support the OGS interpreted distribution of surficial soils that cover the Applicant Lands.

Figure 4 shows the locations of Cross Sections A-A' (Figure 10) and B-B' (Figure 11), which were constructed using the results of the onsite drilling investigation. A summary of these drilling results is shown on the borehole logs provided in Appendix G. The investigation results indicate that a 0.3 to 1.5 m thick mixture of fill and topsoil (sandy silt to silty sand) covers the Applicant Lands, with the fill being encountered mostly along the eastern and southern limits of these lands (e.g., MW01-21, MW04-21, MW06-21, and BH07-21). In general, these surficial deposits overlie a combination of sandy silt, silt, silty clay, and clay tills (i.e., Aquitard 1; ATB1), which form a horizontally and vertically contiguous unit that extends up to the termination depth of the shallow boreholes (i.e., 4.7 m BGS to 6.7 m BGS; approximately 350 m AMSL) and confirmed reach a depth of at least 25 m BGS (337 m AMSL) based on the drilling results recorded at MW105-23. Local MECP water well records (Appendix G) suggest that the Aquitard 1 unit extends to a depth of up to 50 m BGS near the Applicant Lands. Layers and seams of sand, silt, and sand and gravel are also present in the glacial till at variable depths, with notable pockets of these deposits being encountered at MW03-21 and MW05-21 (Figure 11).

### **4.2 HYDROGEOLOGY**

#### **4.2.1 Groundwater Levels**

Figures 7 to 9 and Table 2 present the continuous and manual water levels recorded in the monitoring wells between June 2021 and June 2024 (i.e., representing approximately three years of groundwater level monitoring data). Groundwater levels across the Applicant Lands were recorded at ground surface (at MW02-21) to 4.8 m BGS (at MW03-21) over the monitoring period, equating to elevations ranging from 353.1 m AMSL to 361.7 m AMSL. In the Subject Lands, groundwater levels ranged from at ground surface (at MW02-21) to 3.7 m BGS (at MW02-21), equating to elevations ranging from 353.1 m AMSL to 361.6 m AMSL.





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As shown in Figure 7, the groundwater table demonstrated a similar pattern in fluctuations across the Applicant Lands. Traditionally, high groundwater elevations in southern Ontario occur in the spring, with groundwater elevations typically beginning their steady rise in the late fall. This groundwater table rise is attributed to a reduction in soil moisture losses to evapotranspiration that occurs over the late fall to spring together with a melting snowpack that occurs during the spring, which in turn provides a greater volume of water available to infiltrate and recharge the groundwater system. In contrast, during the summer months the groundwater table reaches its lowest elevation due to more water being drawn from the subsurface to meet an increased evapotranspiration demand. Overall, the difference between the high and low groundwater table positioning (i.e., total fluctuation) beneath the Applicant Lands in each of the 2021 and 2023 monitoring periods ranged from 1.4 to 2.9 m.

Stantec notes that a pronounced drop in the groundwater table occurred across the Applicant Lands during the notably dry year experienced in 2022. In 2022, a lower-than-average amount of precipitation that fell over the region where total precipitation (rainfall + snowfall) equaled 580 mm compared to the corresponding 30-year average (1991 to 2020) of 850 mm (as recorded at the Kitchener/Waterloo Climate Station). As such, the resulting deficit of soil moisture available in the subsurface to meet local evapotranspiration demands resulted in water being drawn up from deeper portions of the groundwater system to satisfy these demands and, consequently, caused the groundwater table to decline by up to 4.6 m throughout the property.

As previously mentioned, groundwater levels recorded at the monitoring wells located in the Subject Lands indicate that the groundwater table can be positioned just below ground surface to 0.5 m BGS, with these high groundwater conditions typically occurring in early to mid-fall (i.e., September / October) and continuing into the late spring (i.e., May) (Figures 7 to 9). Results of the onsite test pitting provides supporting evidence that the water levels observed in the monitoring wells are true as the test pit walls (excavated on May 2, 2024, and left open for approximately 24 hours) were beaded with water indicating the slow seepage of groundwater from the low permeable deposits (i.e., geometric mean hydraulic conductivity of  $10^{-8}$  m/s; Table 1) of sandy silt, silt, silty clay, and clay till (i.e., Aquitard 1; ATB1), which comprise the subsurface of the Subject Lands (e.g., Photos 4, 8, and 18; Appendix J). In addition, varying degrees of soil sloughing off the test pits walls occurred while the excavations were open, pointing to soil saturation associated with a high groundwater table (e.g., Photos 2, 6, 12, and 19; Appendix J). Although relatively higher flowing seeps from saturated sand layers interbedded in the previously mentioned deposits of ATB1 resulted in the ponding of groundwater at the base of some test pits (e.g., TP03-24, Photos 10 to 12; TP04-24, Photos 13 and 14; TP05-24, Photo 18), the flow from these seeps slowed notably within the time that the pit remained open, indicating that these higher permeability deposits had largely drained out (i.e., after initial draining, recharge back into the sand layers was limited by the surrounding lower permeable silts and clays). The fact that flows from these sand layers slowed considerably suggests that these layers are also of limited extent in the subsurface of the Subject Lands.



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Stantec notes that the soil moisture / groundwater observations made in the onsite monitoring wells and test pits are not the result of a perched groundwater condition in the shallow overburden. Results from the drilling of MW105-23 indicate that ATB1 forms a continuous groundwater unit (i.e., no evidence of unsaturated zone pockets) extending up to at least the termination depth of the borehole at 25 m BGS (Appendix G).

## 4.2.2 Groundwater Flow

Figure 12 presents groundwater elevation contours and the interpreted direction of horizontal flow through the groundwater system beneath the Applicant Lands using water level measurements collected from the onsite monitoring wells in June 2021. In general, groundwater contours generally mimic the prevailing topography of the Applicant Lands, with an interpreted localized groundwater divide occurring somewhere in the northern portion of these lands and potentially being in line with the surface water flow divide that separates Catchments 100 and 101. In the Subject Lands, groundwater flows in a southern direction towards Gerber Road, with this interpretation being in general agreement with regional groundwater flow patterns (Figure ST-7, Appendix D).

Available horizontal hydraulic conductivity estimates calculated from onsite hydraulic response testing completed at the monitoring wells in the shallow overburden deposits of the Subject Lands (i.e., MW01-21 to MW04-21) ranged from  $7.3 \times 10^{-6}$  m/s to  $5.8 \times 10^{-9}$  m/s (Table 1; Appendix H), for an estimated bulk (i.e., geometric mean) horizontal hydraulic conductivity of  $7.8 \times 10^{-8}$  m/s (Table 1).

The velocity at which groundwater horizontally flows through the subsurface is calculated through the application of Darcy's law, where:

$$v = \frac{K \nabla}{\theta}$$

where:  $v$  = velocity (m/s)  
 $K$  = hydraulic conductivity (m/s)  
 $\nabla$  = hydraulic gradient (m/m)  
 $\theta$  = effective porosity (unitless)

As discussed in Section 4.1, the Subject Lands are covered by the deposits of Aquitard 1 (ATB1; sandy silt, silt, silty clay, and clay tills) that vertically extend to a confirmed depth of up to 25 m BGS (approximately 337 m AMSL) but potentially up to a depth of 50 m BGS based on local MECP water well records, with the groundwater table being positioned within this unit. Assuming an effective soil porosity of 0.20 for glacial till (Fetter, 1994), a calculated average horizontal hydraulic gradient of 0.02 m/m, and geometric mean hydraulic conductivity of  $7.8 \times 10^{-8}$  m/s (Table 1), the estimated velocity of groundwater flowing in a southward direction through Aquitard 1 (ATB1) beneath the Subject Lands is calculated to be approximately 0.26 m/year (i.e., one meter every 3.9 years).



### **4.2.3 Infiltration Potential**

Estimated infiltration rates for the overburden deposits are provided in Table 3. Infiltration rates were calculated based on an established relationship between vertical hydraulic conductivity and infiltration rate presented in CVC-TRCA (2010), with vertical hydraulic conductivities being estimated based on in-situ hydraulic response testing completed at MW01-21 to MW05-21 (Section 3.4).

Vertical hydraulic conductivities for overburden deposits screened at depths between 2.8 m to 6.1 m beneath the Applicant Lands and tested via in-situ hydraulic response testing completed at the previously mentioned monitoring wells is assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities at these locations (Todd, 1980; Freeze and Cherry, 1979). For the deposits of Aquitard 1 (ATB1), vertical hydraulic conductivities are estimated to range from  $7.3 \times 10^{-7}$  m/s to  $5.4 \times 10^{-10}$  m/s, equating to infiltration rates ranging from 6 mm/hour to 42 mm/hour (Table 3).

### **4.2.4 Groundwater Quality**

#### Onsite Monitoring Wells

Groundwater samples were collected from the monitoring wells on May 27, 2021 (i.e., MW01-21, MW03-21, and MW05-21) and on April 13 and December 5, 2023 (i.e., MW01-21 to MW06-21), for the analysis of general inorganic chemistry, nutrients, and metals. The samples were compared to Ontario Drinking Water Quality Standards (ODWQS) for health and non-health related parameters (MECP, 2018). Groundwater sampled from across the Applicant Lands is identified as calcium-bicarbonate type water (Figure 13), which is typical of fresh shallow groundwater in southern Ontario. Overall, no analyzed parameters in the groundwater samples had concentrations detected above applicable ODWQS health related objectives (i.e., maximum acceptable concentrations) (Table 4), although some parameters did exceed their corresponding Aesthetic Objective (AO), Operational Guideline (OG), and/or Medical Officer of Health Reporting Limit (MOH) concentrations as outlined below.

- Aluminum exceeded the ODWQS OG (0.1 mg/L) at MW01-21 and MW04-21 in December 2023 with concentrations of 0.32 mg/L and 0.44 mg/L, respectively.
- Hardness exceeded the ODWQS OG (80 to 100 mg/L) at all sampling locations and events with concentrations ranging from 190 to 450 mg/L. Overall, the presence of elevated hardness is typical of groundwater in southern Ontario and not considered to be a concern.
- Iron exceeded the ODWQS AO (0.3 mg/L) with concentrations of 0.4 mg/L and 0.5 mg/L recorded at MW03-21 and MW04-21, respectively.
- Manganese exceeded the ODWQS AO (0.05 mg/L) at MW01-21 (0.052 to 0.054 mg/L), MW03-21 (0.065 mg/L), MW04-21 (0.053 to 0.085 mg/L), and at MW05-21 (0.076 mg/L). Overall, the presence of elevated manganese is typical of groundwater in southern Ontario and not considered to be a concern.



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- Sodium exceeded the ODWQS MOH reporting limit (20 mg/L) with concentrations ranging from 33 mg/L to 93 mg/L at MW01-21, MW02-21, and MW04-21. If the groundwater is utilized as a potable drinking-water source, the local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
- Total dissolved solids (TDS) exceeded the ODWQS AO (500 mg/L) with concentrations of 520 mg/L to 660 mg/L at MW01-21.
- Turbidity exceeded the ODWQS AO (5 mg/L) with concentrations of 1,800 mg/L at MW01-21, 2,100 to 3,500 mg/L at MW05-21, and 4,700 mg/L at MW03-21 in May 2021. This parameter is often elevated in groundwater samples collected from monitoring wells due to the presence of sediment in the samples from the sampling process.

### Offsite Private Wells

Groundwater quality results for those samples collected from the offsite private wells (i.e., RW01 and RW02; Figure 1) indicate that the groundwater is calcium-sulfate type water (Figure 13), suggesting that these wells draw their water supply from a deeper confined aquifer system (e.g., Aquifer 2/3 and/or the Bedrock Aquifer – refer to Section 2.2). Overall, no analyzed parameters in the groundwater samples had concentrations detected above applicable ODWQS health related objectives (i.e., maximum acceptable concentrations) (Table 5), although some parameters did exceed their corresponding Aesthetic Objective (AO) and Operational Guideline (OG) concentrations as outlined below:

- Hardness exceeded the ODWQS OG (80 to 100 mg/L) with concentrations of 420 mg/L (RW01) and 580 mg/L (RW02). The presence of elevated hardness is typical of groundwater in southern Ontario and not considered to be a concern.
- Iron exceeded the ODWQS AO (0.3 mg/L) with concentrations of 0.4 mg/L (RW01) and 5.9 mg/L (RW02). Manganese was also detected in the well water sample collected from RW02 at a concentration of 0.08 mg/L, exceeding the corresponding ODWQS AO of 0.05 mg/L. Elevated concentrations of iron and manganese in well water are often indicative of groundwater that is drawn from an aquifer that is characterized by anaerobic (i.e., reducing) conditions, which is often characteristic of a confined aquifer system.
- Total dissolved solids (TDS) exceeded the ODWQS AO with concentrations of 530 mg/L (RW01) and 780 mg/L (RW02). The presence of elevated TDS is typical of groundwater drawn from confined bedrock aquifer systems in Ontario and not considered to be a concern.
- Turbidity exceeded the ODWQS OG (5 mg/L) with a concentration of 49 mg/L at RW02.



## **5.0 EFFECTS ASSESSMENT AND MITIGATION MEASURES**

### **5.1 WATER BALANCE AND INFILTRATION**

Proposed development for the Applicant Lands will consist of future residential development and with this development will come the introduction of impervious surfaces (e.g., rooftops, concrete/asphalt roadways, parking lots, and walkways) and, subsequently, a corresponding reduction in the volume of water infiltrating to the subsurface.

As documented in Appendix F of Stantec's (2024) Functional Servicing Report, results of the water balance analyses indicate that the total volume of infiltration occurring across the Applicant Lands under the pre-development condition is approximately 33,660 m<sup>3</sup>/year, with this volume declining to 13,464 m<sup>3</sup>/year under an unmitigated post-development condition (i.e., infiltration deficit of 20,196 m<sup>3</sup>/year). To address this situation, the primary post-development infiltration augmentation measure proposed for the Applicant Lands will be to capture rooftop runoff and return this clean stormwater to the subsurface via a series of lot-level infiltration galleries designed to infiltrate and retain a 25 mm storm event, where possible.

A key constraint to the implementation of post-development infiltration augmentation measures is the positioning of a seasonally high groundwater table. As per CVC-TRCA (2010), the recommended vertical separation between the base of a given infiltration augmentation option and the high groundwater table is at least one meter; however, distances of less than one meter of separation in soils having higher infiltration potential may still be effective. Based on groundwater monitoring data presented in this report (i.e., from June 2021 to June 2024), groundwater levels are shown to fluctuate between just below existing grades to 4.8 m BGS throughout the Applicant Lands (Figures 8 and 9) with the subsurface deposits having estimated infiltration rates ranging from 6 mm/hour to 42 mm/hour (Table 3). Overall, the implementation of post-development infiltration augmentation measures across certain areas of the Applicant Lands may be challenging based on the high groundwater level and low soil permeability conditions mentioned above.

The utilization of the previously mentioned post-development low impact development (LID) infiltration augmentation option (i.e., lot-level infiltration galleries) throughout the Applicant Lands will be evaluated further during the detailed design stages of the development.



## **5.2 GROUNDWATER DEWATERING**

### **5.2.1 Construction Dewatering**

With the construction of below ground structures (e.g., basements) and servicing infrastructure (e.g., sewer and watermain, SWM pond facilities) comes the potential of intercepting the groundwater table and, consequently, the need for short-term construction dewatering and/or the installation of permanent drainage systems (in the absence of waterproofing). Where required, dewatering will result in the lowering of the groundwater table to the base of a given excavation and/or underground structure. The effects of local dewatering in general cannot be mitigated, since dewatering deliberately seeks to create an effect (i.e., lowering of groundwater levels).

For dewatering occurring in the moderate to low permeability deposits associated with ATB1, the dewatering zone of influence (ZOI) (i.e., horizontal extent of groundwater level declines / drawdown caused by dewatering activities at a point source) is expected to remain within relatively short distances around excavations and/or subsurface structures, given that these deposits are characterized by horizontal hydraulic conductivities ranging from  $7.3 \times 10^{-6}$  m/s to  $5.4 \times 10^{-9}$  m/s (geometric mean of  $8.0 \times 10^{-8}$  m/s) (Table 1; Appendix H). At these hydraulic conductivities, low volumes of groundwater are expected to discharge into temporary construction excavations, with conventional pumping from filtered sumps being capable of removing these anticipated volumes from a given excavation area.

Under O. Reg. 64/16 and O. Reg. 63/16A, if construction dewatering volumes are projected to exceed 50,000 L/day, registration of an MECP Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW) will be required for dewatering to occur. A PTTW is required when groundwater volumes for construction dewatering are expected to exceed 400,000 L/day or when groundwater collected and discharged from a permanent drainage system exceeds 50,000 L/day. An EASR is required when construction dewatering volumes are projected to range from 50,000 L to 400,000 L/day.

Stantec notes that recent amendments made to EASR requirements by the MECP for construction dewatering include the following:

The ability to register multiple dewatering pits for a single project under the same EASR.

- Allowing construction dewatering of up to 400,000 L/day for each dewatering pit as long as the dewatering area of influence do not overlap.
- Stormwater will no longer be counted in the 400,000 L/day water taking limit, however, registrants will at a minimum be required to keep a record of precipitation events, or if determined by a Qualified Person, detailed monitoring/documentation.
- EASRs will apply to linear projects including transit and pipelines.
- Registrants will be required to notify the local municipalities and conservation authorities if the water taking is intended to continue for more than 365 days.



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Dewatering assessments are recommended for completion during detailed design to specifically determine anticipated dewatering volumes and associated water taking permitting requirements.

When dewatering volumes are projected to be greater than 50,000 L/day, the following mitigation measures are likely to be required for either an EASR or PTTW application:

- **Groundwater Discharge Management** – Establishment of an appropriate dewatering system that will dissipate the energy and reduce the sediment content of discharging water for the purpose of limiting potential erosion effects if groundwater is to be discharged to a receiving surface water feature. Common measures include the use of sediment control basins, erosion pads, geotextile filter bags, and the positioning of straw bale/filter cloth barriers downgradient of the discharge point. The quality of the groundwater discharge must also meet Provincial Water Quality Objectives (PWQO) (MECP, 1994). If groundwater is to be discharged to the regional sewer system for disposal, the quality of this water must not exceed parameter concentrations as listed under Regional Municipality of Waterloo Sewer Use By-Law No. 1-90.
- **Private Well Monitoring** – The monitoring of private wells expected to be located within the dewatering ZOI (as estimated from the dewatering assessment) for drawdown interference, which could potentially affect the operation of private wells with regards to water quantities. The providing of affected well owners with temporary potable water supplies or reducing dewatering rates and/or duration would be required if notable interference effects are observed.

A review of the MECP water well records for wells located within 500 m of the Applicant Lands indicates that there are 37 wells identified as being utilized for water supply (i.e., domestic, commercial, livestock, or municipal). One well is located within 20 m of the Applicant Lands (i.e., MECP Well 7318145; Figure 4), with the remaining 36 wells being positioned between 170 m to 500 m away from these lands (Appendix G). The average constructed depth of these private wells is 53 m BGS, indicating that groundwater drawn into these wells originates from the deeper confined Aquifer 2/3 (AFB3/AFD1) and/or the Bedrock Aquifer. As such, construction dewatering activities potentially occurring at the Applicant Lands are highly unlikely to interfere with the yields of these local private wells, given that the shallow overburden where these activities will occur is hydraulically separated from these previously mentioned deeper aquifer systems by the low permeability silt to clay-based glacial tills of Aquitard 1 (ATB1).

### 5.2.2 Permanent Dewatering

As discussed in Section 4.2.1, during certain periods of the year (i.e., typically from early / mid-fall to the late spring), the groundwater table can be positioned just below ground surface to 0.5 m BGS. As such, future residential buildings constructed with basements on the Subject Lands are likely to be temporarily located below the groundwater table. However, constructing residential foundations below the groundwater table will be manageable using traditional groundwater control techniques (e.g., foundation damp proofing membranes, weeping tiles, and sump pits / pumps), largely due to the low permeability deposits that underlie the site and, subsequently, slow groundwater movement. Details on the groundwater dewatering mitigation strategy that will be employed at the Subject Lands for those



residential foundations that may occur below the groundwater table are discussed in Sections 2.4.1 and 2.4.2 of the Stantec (2024) Functional Servicing Report.

### **5.3 SOURCE WATER PROTECTION**

A drinking-water threat is an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water. The following activities are prescribed by the province of Ontario under O. Reg. 287/07 to be drinking water threats (i.e., Significant Drinking Water Threat Policy Categories):

1. The establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the *Environmental Protection Act*.
  - a) Untreated sewage
  - b) Waste disposal
  - c) Mine tailings
2. The establishment, operation, or maintenance of a system that collects, stores, transmits, treats, or disposes of sewage.
  - a) Stormwater management
  - b) Wastewater treatment plants/sewer systems
  - c) On-site sewage systems
  - d) Industrial effluent
3. The application of agricultural source material to land.
4. The storage of agricultural source material.
5. The management of agricultural source material.
6. The application of non-agricultural source material to land.
7. The handling and storage of non-agricultural source material.
8. The application of commercial fertilizer to land.
9. The handling and storage of commercial fertilizer.
10. The application of pesticide to land.
11. The handling and storage of pesticide.
12. The application of road salt.
13. The handling and storage of road salt.
14. The storage of snow.
15. The handling and storage of fuel.





## **HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO**

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16. The handling and storage of a dense non-aqueous phase liquid (DNAPL).
17. The handling and storage of an organic solvent.
18. The management of runoff that contains chemicals used in the de-icing of aircraft.
19. An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.
20. An activity that reduces the recharge of an aquifer.
21. The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard.
22. The establishment and operation of a liquid hydrocarbon pipeline as per O. Reg. 385/08, s. 3.

As shown in Figure 5, the Applicant Lands are largely intercepted by the WHPA-B, and to a lesser extent WHPA-C and WHPA-D, of the Wellesley Wellfield (Wells WY1, WY5, and WY6). The vulnerability score assigned to these WHPA is 6 (Map A1, Appendix E), indicating that the threat of an activity or condition occurring at ground surface within this area and subsequently adversely affecting the quality and/or quantity of the aquifer system in which these municipal production wells draw their groundwater supply is medium to low.

As per the SPP (LERSPC, 2021b) Map A1 (Appendix E), the Applicant Lands are only subject to the protection policies specified under Significant Drinking Water Threat Policy Category 16 (DNAPLs). Since the planned use for the Applicant Lands will not involve the onsite handling and storage of DNAPLs, the SPP policy under Category 16 does not apply.

Policies in the SPP that address significant threat activities that pose a risk to the quantity of source water available for municipal well use (i.e., Significant Drinking Water Threat Policies 19 and 20) only apply to WHPA-Q. As mentioned previously, no WHPA-Q intercepts the Applicant Lands (Figure E-1, Appendix E).

### **5.4 SERVICING ALIGNMENTS AND GROUNDWATER FLOW**

Proposed development for the Applicant Lands will include the installation of servicing (i.e., storm / sanitary sewers and watermains), with preliminary designs indicating that this servicing will be installed at depths ranging from 1.5 to 3.0 m BGS. Given that preliminary monitoring results indicate that the groundwater table ranges just below ground surface to 4.8 m BGS across the Applicant Lands (Section 4.2.1), these servicing installations are likely to intercept the groundwater table. In areas where site servicing extends below the groundwater table, Stantec recommends that anti-seepage (cut-off) collars be installed to prevent the preferential movement of groundwater along the servicing alignments. The use of anti-seepage collars will likely be required given that the subsurface of the Applicant Lands is characterized by low permeability deposits where groundwater movement is more restricted (e.g., silt to clay-based soils). An assessment for the need, total number, and exact placements of anti-seepage



collars along the servicing alignments can be explored in more detail during the detailed design phase of the project.

## **5.5 SPILL CONTAINMENT AND RESPONSE**

The potential exists for spills during any construction activity, with the most probable type of spill occurring being attributable to the refuelling of major construction equipment that cannot readily leave the Applicant Lands (e.g., earth movers). The potential impacts of a spill could be the contamination of soils, groundwater and/or surface water. By implementing proper protocols for the handling of fuels and lubricants during construction, the risk of a spill occurring will be greatly reduced. The procedures to be implemented to prevent onsite spills are as follows:

- All trucks or other road vehicles would be refuelled and maintained offsite, where practicable.
- Refuelling 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; and
- Implement best management practices and develop an emergency spill response plan.

Given that anticipated construction activities at the Applicant Lands are not expected to involve the storage or use of bulk chemicals or fuels, a potential spill that may occur would be localized and involve a small volume of material. If there were to be an accidental release of a deleterious substance, the low permeability of the soils that cover the Applicant Lands will prevent the rapid infiltration and movement of these substances through the subsurface, allowing response personnel sufficient time to contain and clean-up such a release before it causes potential harm to the quality of the groundwater system. Overall, standard containment facilities and emergency response materials are to be maintained onsite as required, with refuelling, equipment maintenance, and other potentially contaminating activities being confined to designated areas. As appropriate, spills are to be reported immediately to the MECP Spills Action Centre.



Conclusions  
June 2024

## **6.0 CONCLUSIONS**

The following conclusions are provided based on the completed hydrogeological assessment:

1. Stratigraphic conditions beneath the Applicant Lands consist of a 0.3 m to 1.5 m thick mixture of topsoil and pockets of fill and topsoil (sandy silt to silty sand) that is predominantly underlain by a combination of sandy silt, silt, silty clay, and clay glacial till (i.e., Aquitard 1; ATB1), which form a horizontally and vertically contiguous unit that extends up to the termination depth of the boreholes (i.e., up to 25 m BGS; approximately 337 m AMSL). Local MECP water well records suggest that the Aquitard 1 unit extends to a depth of up to 50 m BGS near the Applicant Lands. Layers and seams of sand, silt, and sand and gravel are also present in the glacial till at variable depths.
2. Groundwater elevations across the Applicant Lands ranged from just below ground surface to 4.8 m BGS over the monitoring period (i.e., June 2021 to June 2024), equating to elevations ranging from 353.1 m to 361.7 m AMSL. High groundwater conditions typically occur in early to mid-fall (i.e., September / October) and continue into the late spring (i.e., May), with the groundwater table being positioned within 0.5 m of existing grades throughout the Subject Lands over this period.
3. In general, groundwater contours generally mimic the prevailing topography of the Applicant Lands, with an interpreted localized groundwater divide occurring somewhere in the northern portion of these lands and potentially being in line with the surface water flow divide that separates Catchments 100 and 101. In the Subject Lands, groundwater flows in a southern direction towards Gerber Road, with this interpretation being in general agreement with regional groundwater flow patterns.
4. The horizontal movement of groundwater through Aquitard 1 (ATB1) beneath the Subject Lands is calculated to be in the range of 0.26 m/year (i.e., one meter every 3.9 years) due to the low hydraulic conductivity associated with these deposits (i.e.,  $10^{-6}$  to  $10^{-9}$  m/s, for a geometric average of  $10^{-8}$  m/s).
5. Estimated vertical hydraulic conductivities for the deposits of Aquitard 1 (ATB1) range from  $7.3 \times 10^{-7}$  m/s to  $5.4 \times 10^{-10}$  m/s, equating to infiltration rates ranging from 6 mm/hour to 42 mm/hour.
6. Groundwater sampled from the onsite monitoring wells (screened in the upper deposits of Aquitard 1) is identified as calcium-bicarbonate type water, which is typical of fresh shallow groundwater in southern Ontario. Groundwater sampled from the offsite private wells is identified as calcium-sulfate type water, suggesting that these wells draw their water supply from a deeper confined aquifer system (e.g., Aquifer 2/3 and/or the Bedrock Aquifer). Overall, no analyzed parameters in the groundwater samples collected from the onsite and offsite wells had concentrations detected above applicable ODWQS health related objectives.



## HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO

### Conclusions June 2024

7. As documented in Stantec's (2024) Functional Servicing Report, results of the water balance analyses indicates that the total volume of infiltration occurring across the Applicant Lands under the pre-development condition is approximately 33,660 m<sup>3</sup>/year, with this volume declining to 13,464 m<sup>3</sup>/year under an unmitigated post-development condition (i.e., infiltration deficit of 20,196 m<sup>3</sup>/year). To address this situation, the primary post-development infiltration augmentation measure proposed for the Applicant Lands will be to capture rooftop runoff and return this clean stormwater to the subsurface via a series of lot-level infiltration galleries designed to infiltrate and retain a 25 mm storm event, where possible.
8. The Applicant Lands are intercepted by WHPA-B to WHPA-D of the Wellesley Wellfield, which are assigned with a vulnerability score of 6. As per the Source Protection Plan (SPP) (LERSPC, 2021b) Map A1 (Appendix E), the Applicant Lands are only subject to the protection policies specified under Significant Drinking Water Threat Policy Category 16 (DNAPLs). Since the planned use for the Applicant Lands will not involve the onsite handling and storage of DNAPLs, the SPP policy under Category 16 does not apply.
9. Construction dewatering will likely be required at the Applicant Lands due to an elevated groundwater table; however, for dewatering occurring in low permeability deposits such as Aquitard 1 (ATB1), the dewatering zone of influence (ZOI) (i.e., horizontal extent of groundwater level declines / drawdown caused by dewatering activities at a point source) is expected to be low and isolated to a small distance around excavations and/or subsurface structures, given that these deposits across these lands are characterized by hydraulic conductivities ranging from 10<sup>-6</sup> m/s to 10<sup>-9</sup> m/s. Dewatering assessments are recommended for completion during detailed design to specifically determine anticipated dewatering volumes and associated water taking permitting requirements for the proposed future development.
10. As discussed in Section 4.2.1, during certain periods of the year (i.e., typically from early / mid-fall to the late spring), the groundwater table can be positioned just below ground surface to 0.5 m BGS. As such, future residential buildings constructed with basements on the Applicant Lands are likely to be temporarily located below the groundwater table. However, constructing residential foundations below the groundwater table will be manageable using traditional groundwater control techniques (e.g., foundation damp proofing membranes, weeping tiles, and sump pits / pumps), largely due to the low permeability of those deposits that underlie the site and, subsequently, slow groundwater movement. Details on the groundwater dewatering mitigation strategy that will be employed at the Applicant Lands for those residential foundations occurring below the groundwater table are discussed in Sections 2.4.1 and 2.4.2 of the Stantec (2024) Functional Servicing Report.



## HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO

### Conclusions June 2024

11. A review of the MECP water well records for wells located within 500 m of the Applicant Lands indicates that there are 37 wells identified as being utilized for water supply (i.e., domestic, commercial, livestock, or municipal). One well is located within 20 m of the Applicant Lands, with the remaining 36 wells being positioned between 170 m to 500 m away from these lands. The average constructed depth of these private wells is 53 m BGS, indicating that groundwater drawn into these wells originates from the deeper confined Aquifer 2/3 (AFB3/AFD1) and/or the Bedrock Aquifer. As such, construction dewatering activities potentially occurring at the Applicant Lands are highly unlikely to interfere with the yields of these local private wells, given that the shallow overburden where these activities will occur is hydraulically separated from these previously mentioned deeper aquifer systems by the low permeability silt to clay-based glacial tills of Aquitard 1 (ATB1).
12. In areas where site servicing extends below the groundwater table, Stantec recommends that anti-seepage (cut-off) collars be installed to prevent the preferential movement of groundwater along the servicing alignments. The use of anti-seepage collars will likely be required given that most of the subsurface throughout the Applicant Lands is characterized by deposits where groundwater movement is more restricted (e.g., silt to clay-based soils). An assessment for the need, total number, and exact placements of anti-seepage collars along the servicing alignments can be explored in more detail during the detailed design phase of the project.



# HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO

References  
June 2024

## 7.0 REFERENCES

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## HYDROGEOLOGICAL ASSESSMENT, STROHVEST SUBDIVISION, TOWNSHIP OF WELLESLEY, ONTARIO

### References

June 2024

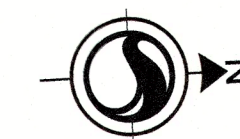
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## **APPENDIX A:**

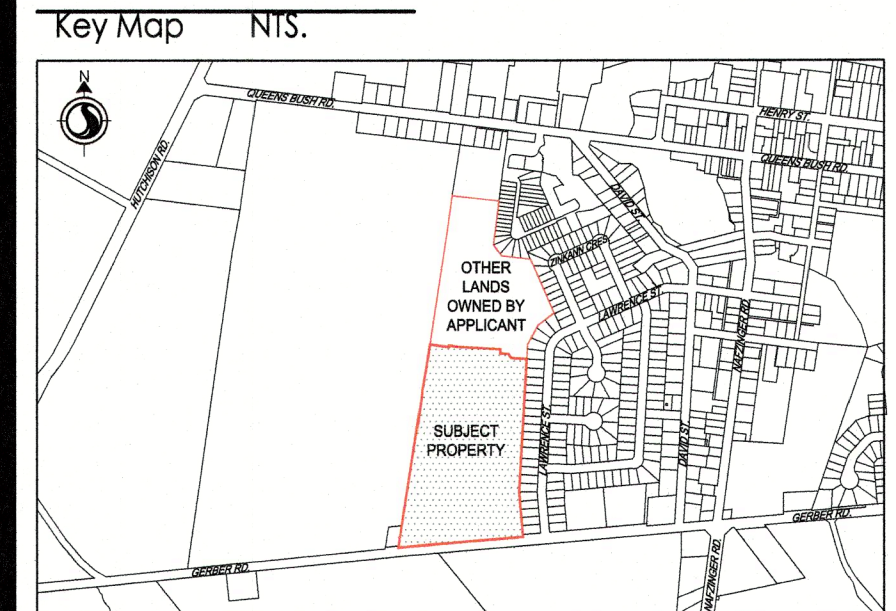
### **Development Plans**





Stantec Consulting Ltd.  
100-300 Hagey Boulevard  
Waterloo ON N2L 0A4  
Tel: (519) 579-4410  
www.stantec.com

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- any errors or omissions shall be reported to Stantec without delay.  
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**Legal Description**  
Plan 1148, Part Lot 80,  
Registered Reference Plan 588-3548, Part 1,  
Township of Wellesley,  
Regional Municipality of Waterloo

**Information Required**  
Under Section 51(17) of the Planning Act,  
R.S.O. 1990 c.P.13 as Amended  
a) - As Shown  
b) - As Shown  
c) - As Shown  
d) - As Listed Below  
e) - As Shown  
f) - As Shown  
g) - As Shown  
h) - Municipal Water  
i) - As Shown  
j) - Municipal Sanitary and Storm Sewers  
k) - None

**Surveyor's Certificate**  
I hereby certify the boundaries of the subject lands and their relationship to the  
adjoining lands have been accurately and correctly shown.  
Signed: *Merrill McLean*  
Merrill McLean, O.L.S.  
Stantec Geomatics Ltd.  
Date: 2024.05.22

**Owner's Certificate**  
I hereby authorize Stantec Consulting Ltd. to submit this Draft Plan of  
Subdivision on my behalf.  
Signed: *Ron Stron*  
Ron Stron  
Strohvest Ontario Inc.  
Date: 2024.05.24

Land Use Schedule			
Lots/Blocks	Land Use	Area (ha)	# of Units (Min - Max)
Lots 1-50, 65-67, 71-74	Single Detached	2.696	57
Lots 51-64, 68-70	Semi Detached	1.046	34
Blocks 1-10	Townhouse	1.316	54
Block 11	Townhouse/Apartment	0.283	12 - 24
Block 12	Park	0.518	
Block 13	Linear Park	0.248	
Block 14	6.0m Walkway	0.019	
Block 15	Stormwater Management	1.276	
Block 16	0.3m Reserve	0.001	
Blocks 17-18	Road Widening	0.134	
Roads		2.612	
TOTAL		10.149	157-169 Units

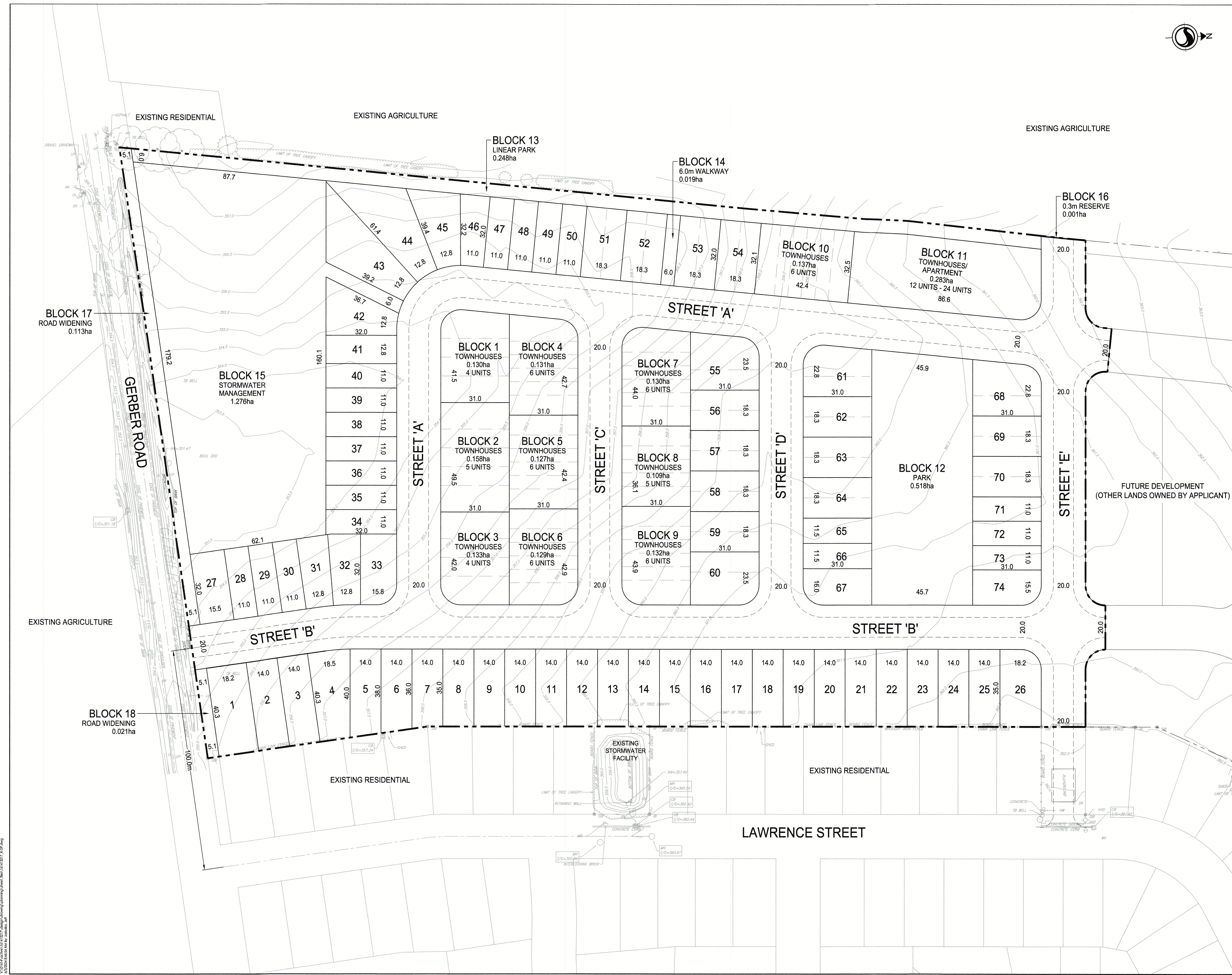
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1. REVISED AS PER TOWNSHIP COMMENTS	JJ	GR	2023.07.26
ISSUED FOR CLIENT REVIEW	JJ	GR	2021.06.14
Revision	By	Appd	YYYY.MM.DD
File Name: 161413217_R-CP	JJ	JJ	2021.04.21
	Dwn.	Dsgn.	Chkd.
			YYYY.MM.DD

**Permit-Seal**  
  
APPROVED: *Geo Romanick* DATE: 2024.05.31  
I hereby certify that the plan was prepared under the supervision of a Registered Professional Planner,  
within the meaning of the Ontario Professional Planners Institute Act, 1994.

**Client/Project**  
STROHVEST ONTARIO INC.  
  
WELLESLEY PROPERTY  
GERBER ROAD  
TOWNSHIP OF WELLESLEY, ON

**Title**  
DRAFT PLAN OF SUBDIVISION

Project No.  
161413217  
Scale  
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1:750  
Revision Sheet  
1 of 1  
Drawing No.  
DP-1



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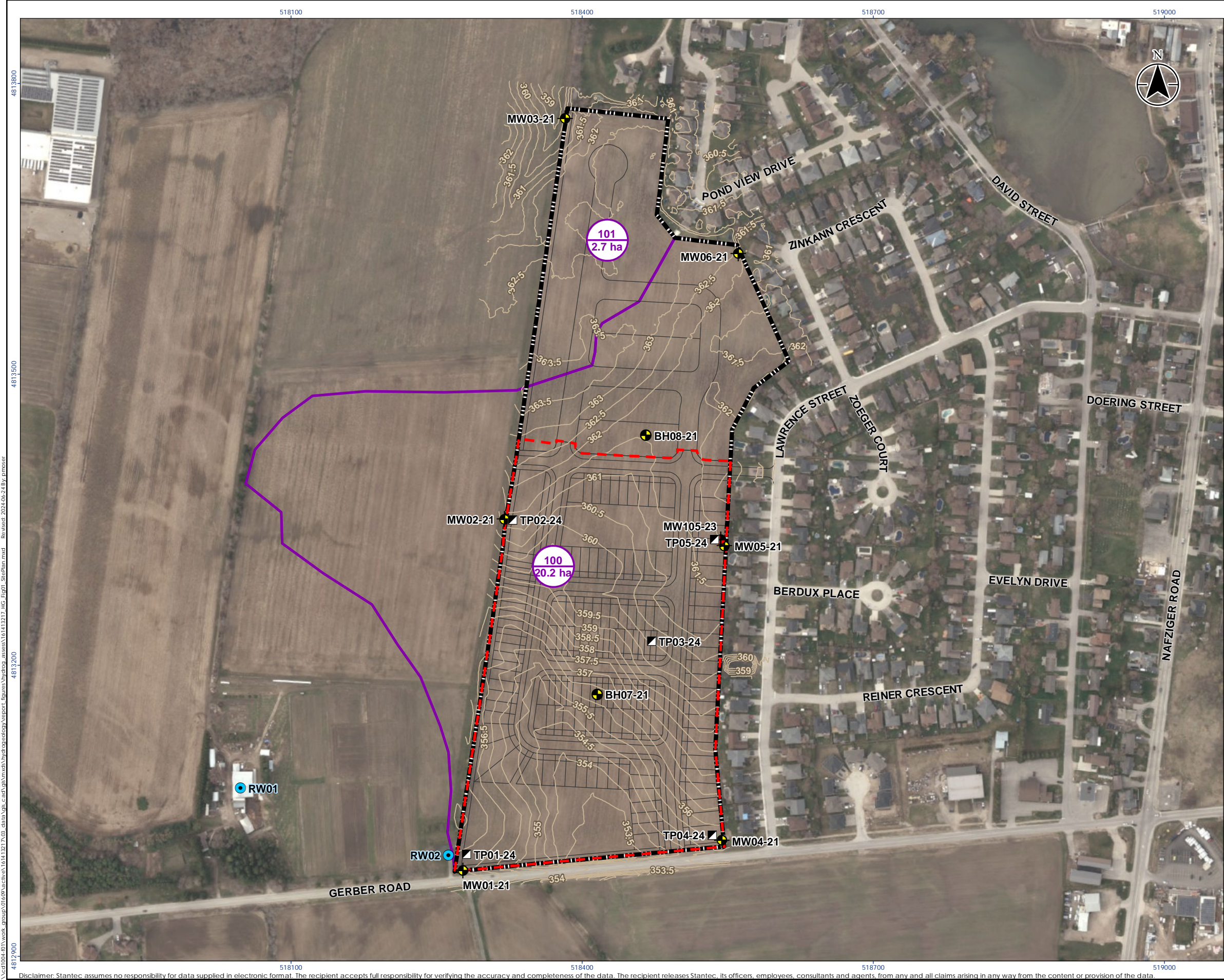
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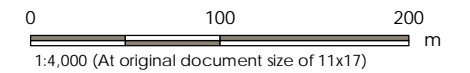
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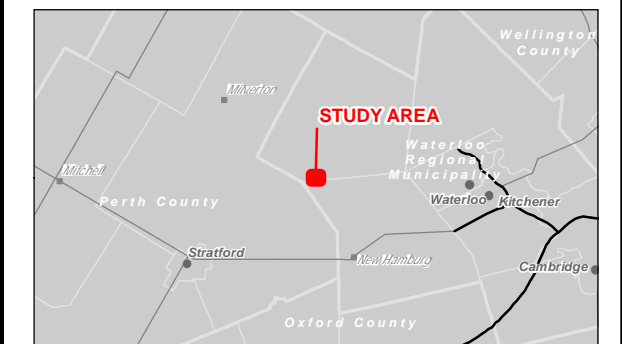


#### Legend

- Subject Lands
- Boundary of Lands Owned by the Applicant (Strohvest Ontario Inc.)
- Monitoring Well (Stantec, 2023)
- Monitoring Well (Stantec, 2021)
- Borehole (Stantec, 2021)
- Test Pit (Stantec, 2024)
- Private Well Sampling Location
- Topographic Contour (m AMSL)
- Proposed Development Plan
- Stormwater Catchment (Existing Conditions)



- Notes
- Coordinate System: NAD 1983 UTM Zone 17N
  - Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
  - Orthomagey © First Base Solutions, 2024. Imagery Date, 2022.



Project Location  
Township of Wellesley

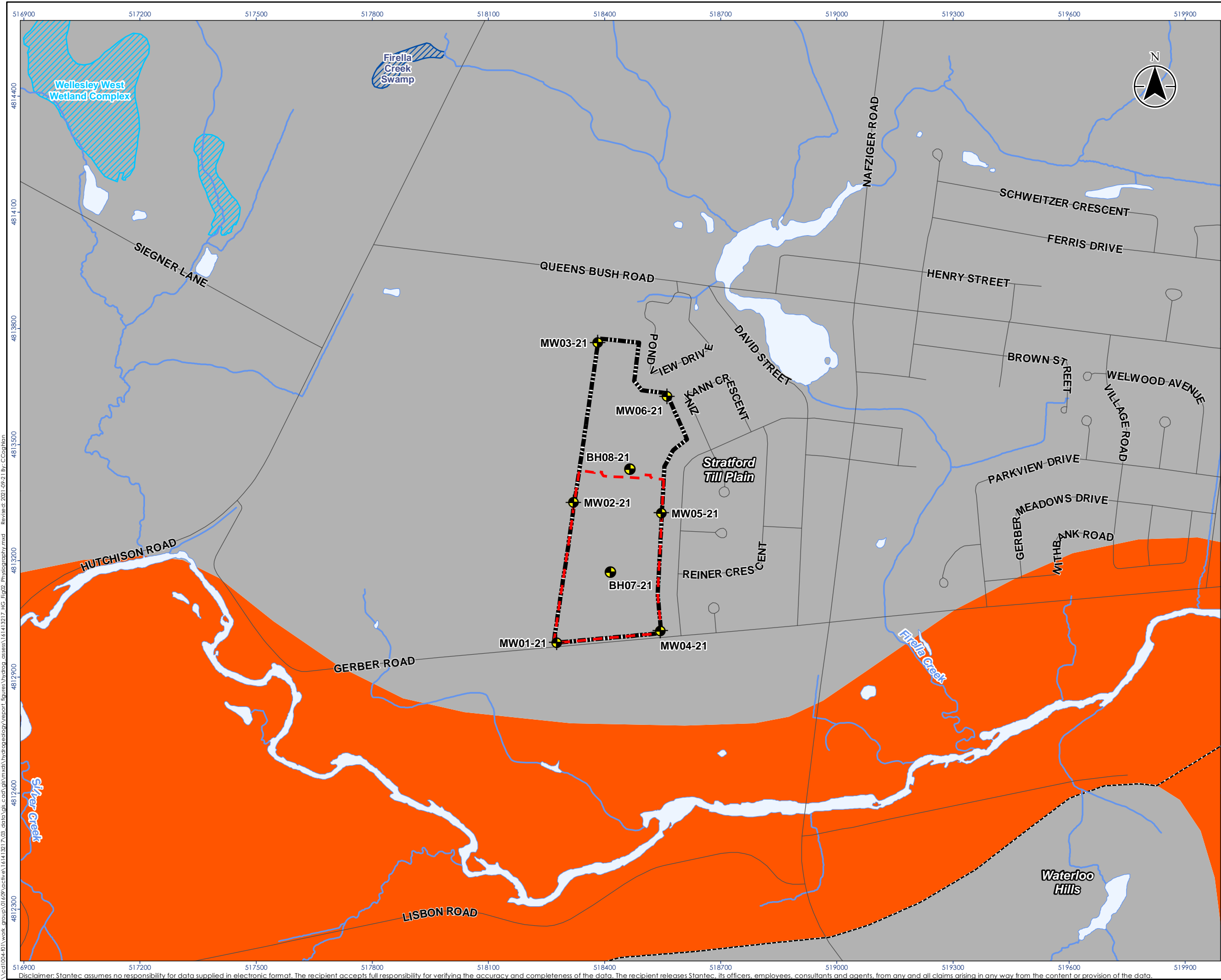
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Prepared by CMC on 2024-06-24  
Technical Review by GW on 2024-06-24

Client/Project  
STROHVST ONTARIO INC.  
STROH LANDS, WELLESLEY, ONTARIO  
HYDROGEOLOGICAL ASSESSMENT

Figure No.  
1

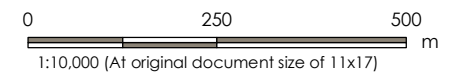
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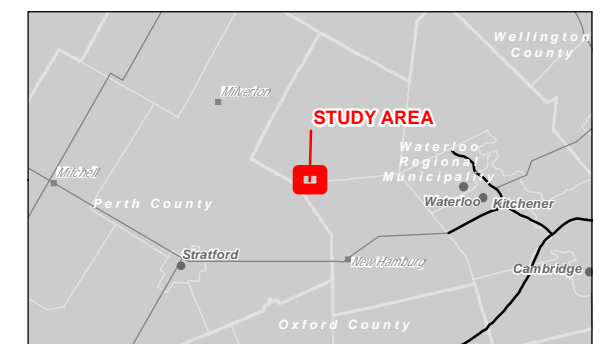
#### Legend

- Subject Lands
- Boundary of Lands Owned by the Applicant (Strohvest Ontario Inc.)
- Monitoring Well (Stantec, 2021)
- Borehole (Stantec, 2021)
- Road
- Watercourse - Permanent
- Waterbody
- Wetland - Evaluated (Provincial)
- Wetland - Evaluated (Other)
- Physiographic Region Boundary
- Physiography**
  - 5: Till Plains (Undrumlinized)
  - 3: Spillways



#### Notes

- Coordinate System: NAD 1983 UTM Zone 17N
- Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
- Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.



Project Location: 161413217 REVA  
Township of Wellesley  
Prepared by CMC on 2021-09-21  
Technical Review by BCC on 2021-02-03

Client/Project:  
STROHVST ONTARIO INC.  
STROH LANDS, WELLESLEY, ONTARIO  
HYDROGEOLOGICAL ASSESSMENT

Figure No.  
2

Title  
Physiography

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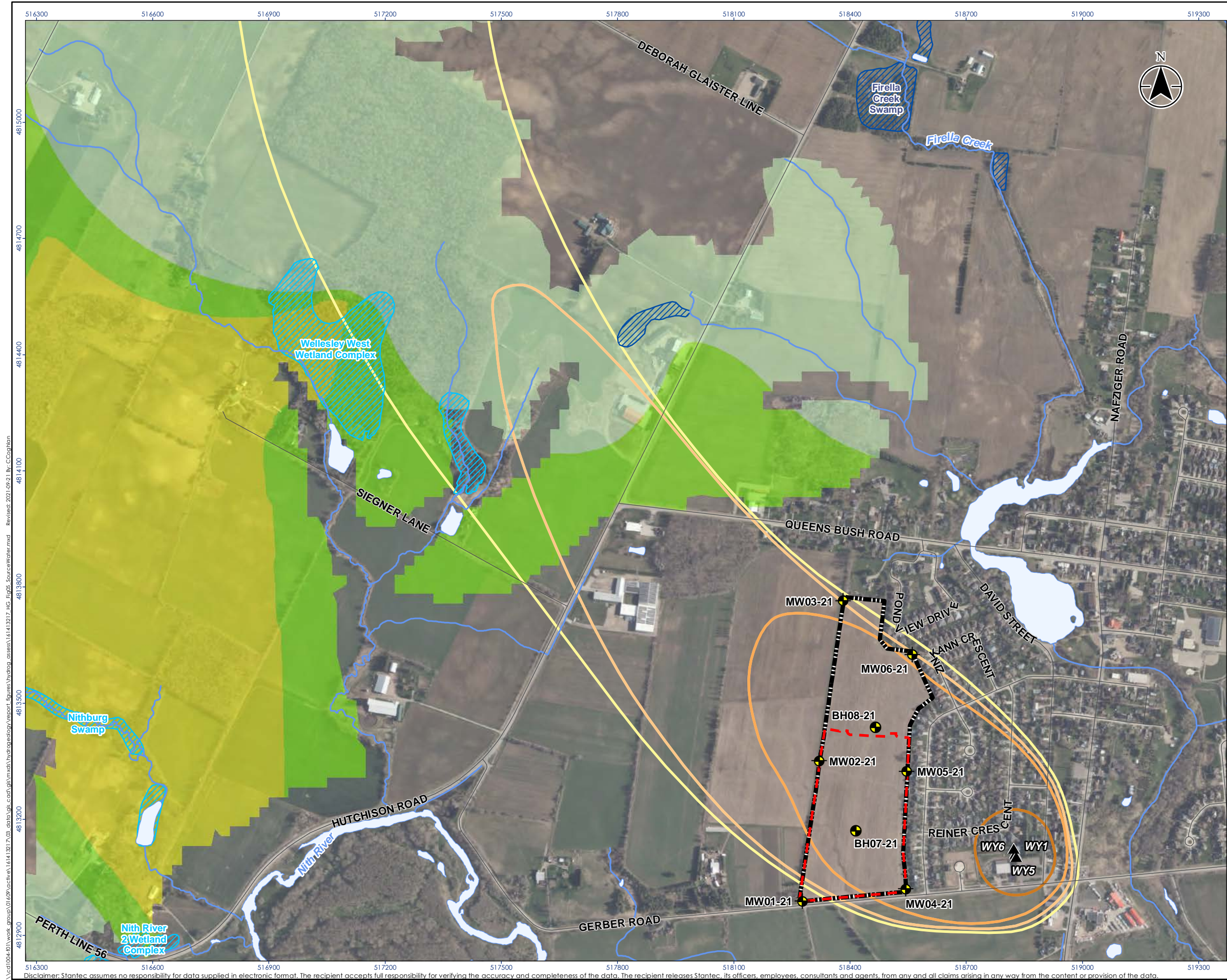












#### Legend

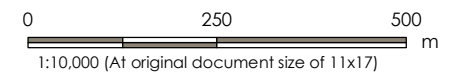
- Subject Lands
- Boundary of Lands Owned by the Applicant (Strohvest Ontario Inc.)
- Monitoring Well (Stantec, 2021)
- Borehole (Stantec, 2021)
- Municipal Production Well
- Road
- Watercourse - Permanent
- Waterbody
- Wetland - Evaluated (Provincial)
- Wetland - Evaluated (Other)

#### Wellhead Protection Areas

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

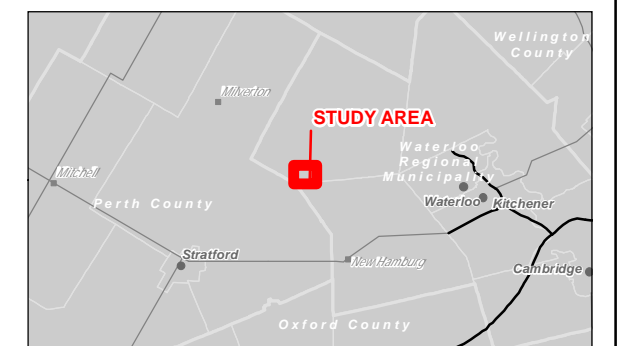
#### SGRA Vulnerability

- 2
- 4
- 6



#### Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Orthoimagery © First Base Solutions, 2021. Imagery Date, 2020.
4. Contains Information made available under Grand River Conservation Authority's Open Data Licence v2.0.



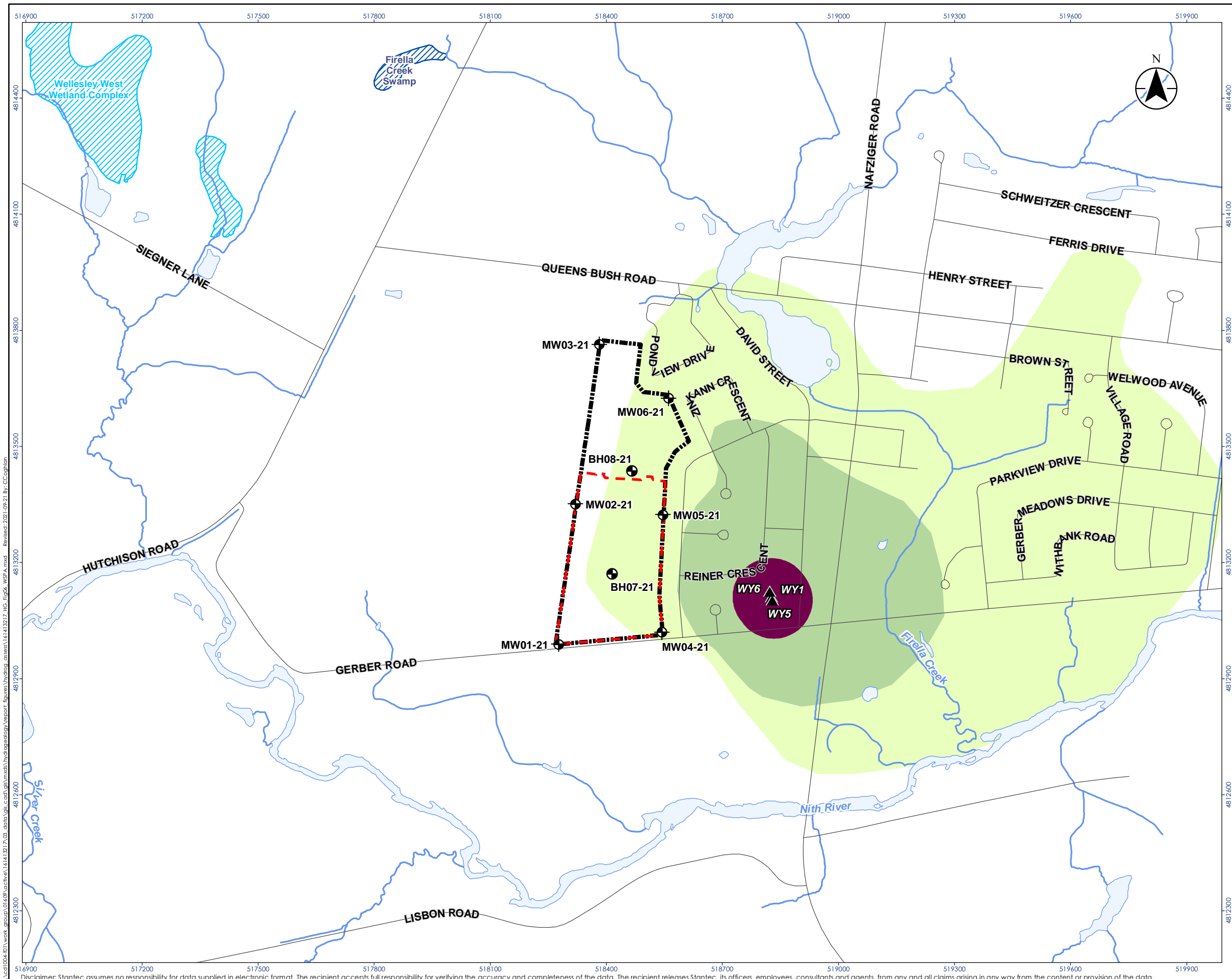
Project Location: 161413217 REVA  
Township of Wellesley  
Prepared by CMC on 2021-09-21  
Technical Review by BCC on 2021-02-03

Client/Project:  
STROHVST ONTARIO INC.  
STROH LANDS, WELLESLEY, ONTARIO  
HYDROGEOLOGICAL ASSESSMENT

Figure No.  
5

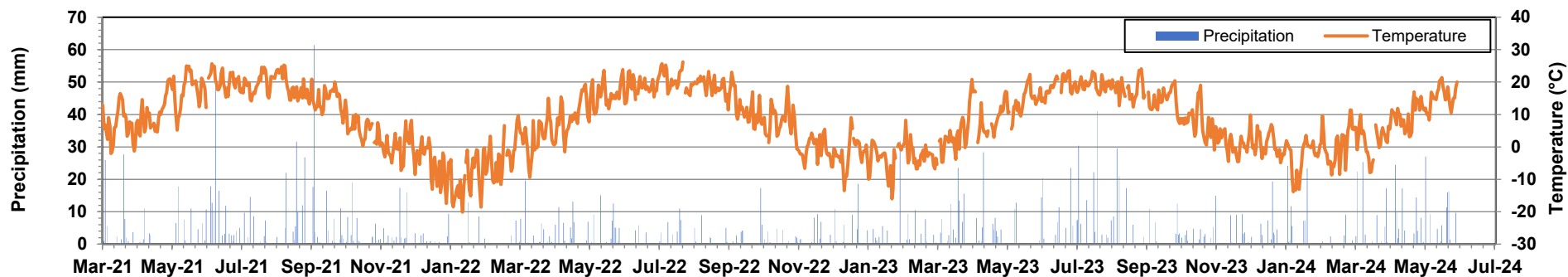
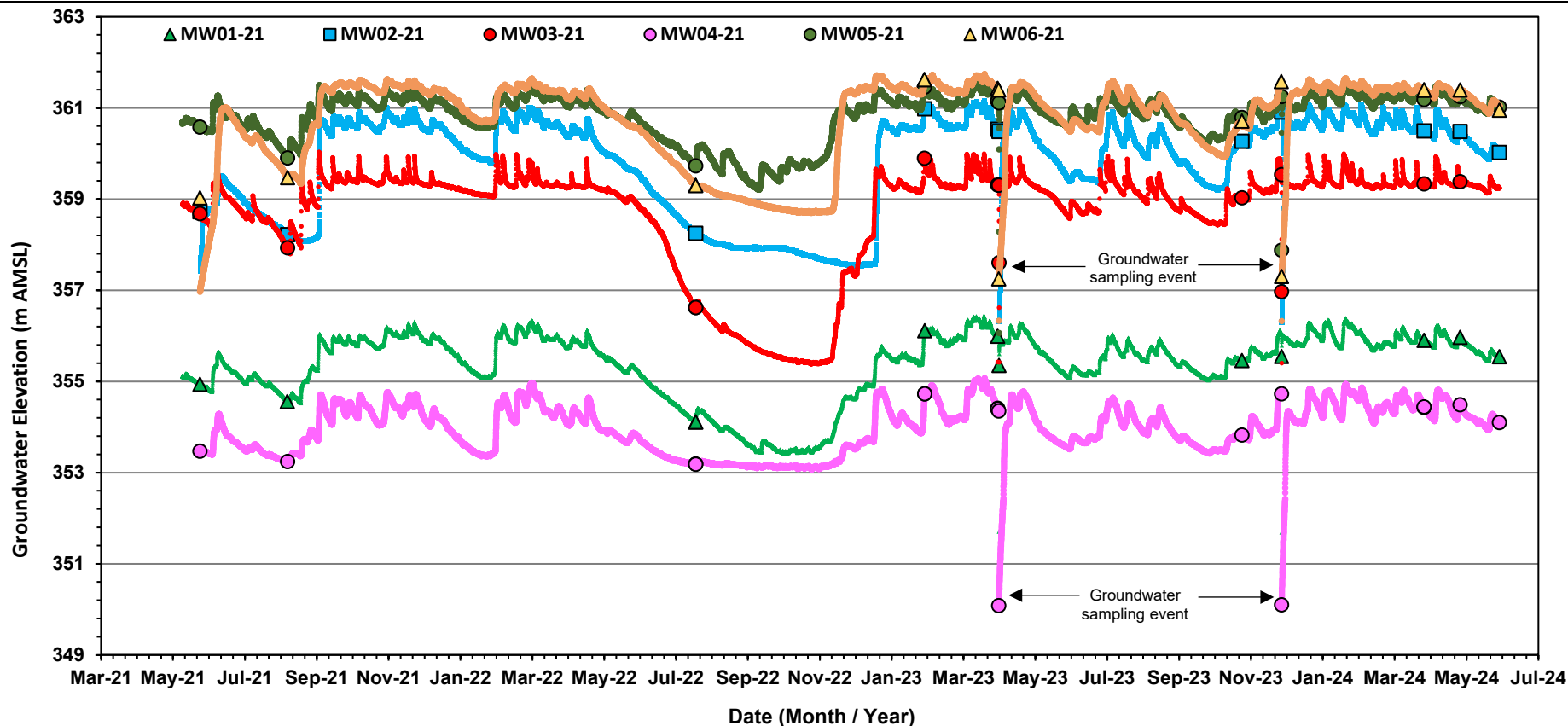
Title  
Source Water Protection





Title  
Regional Wellhead Protection Sensitivity  
Areas



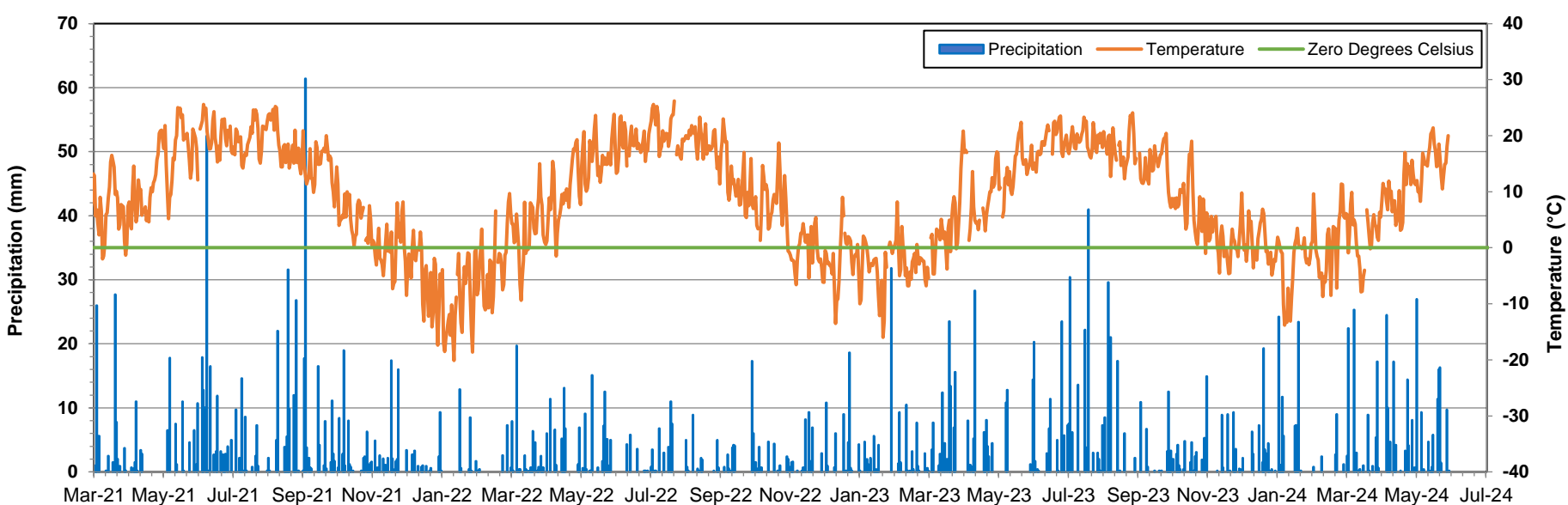
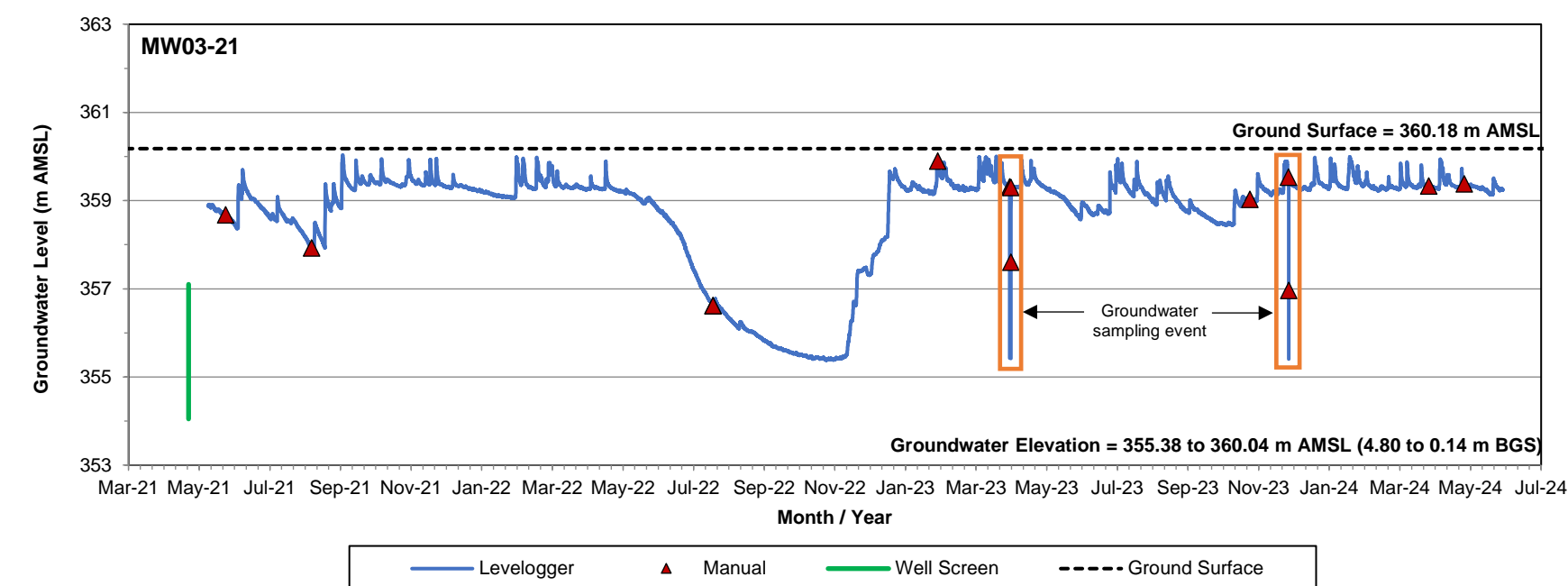
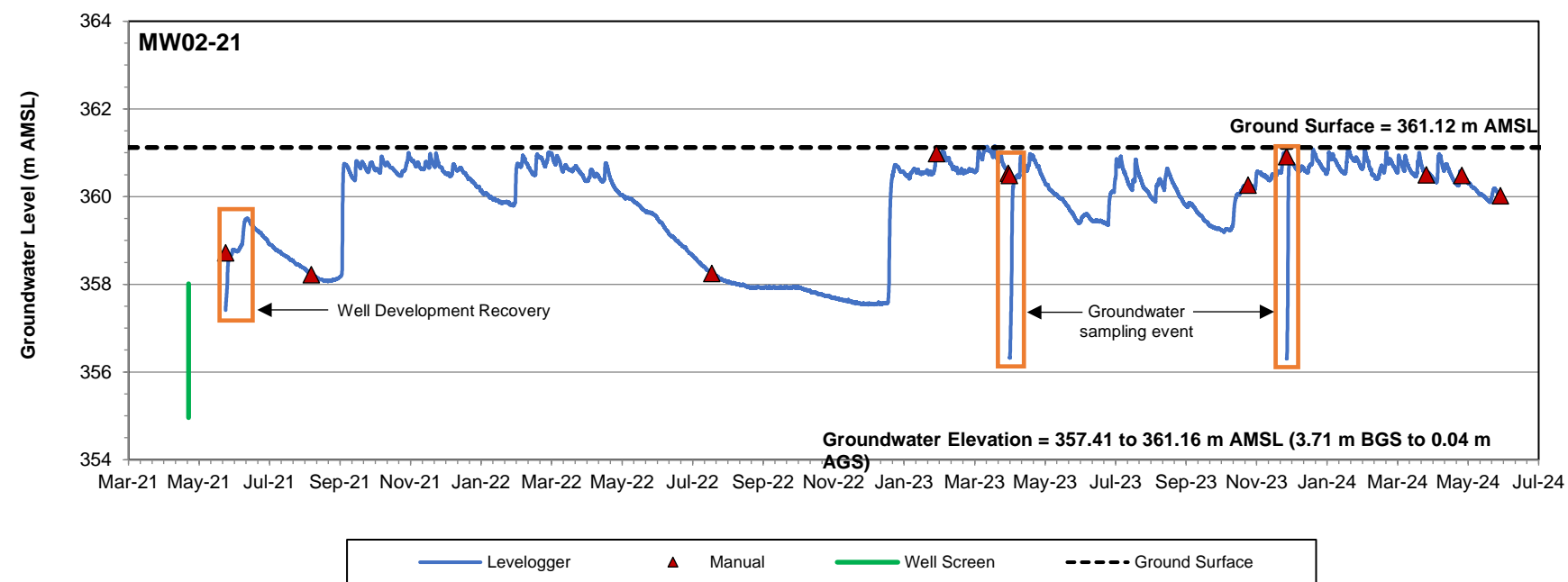
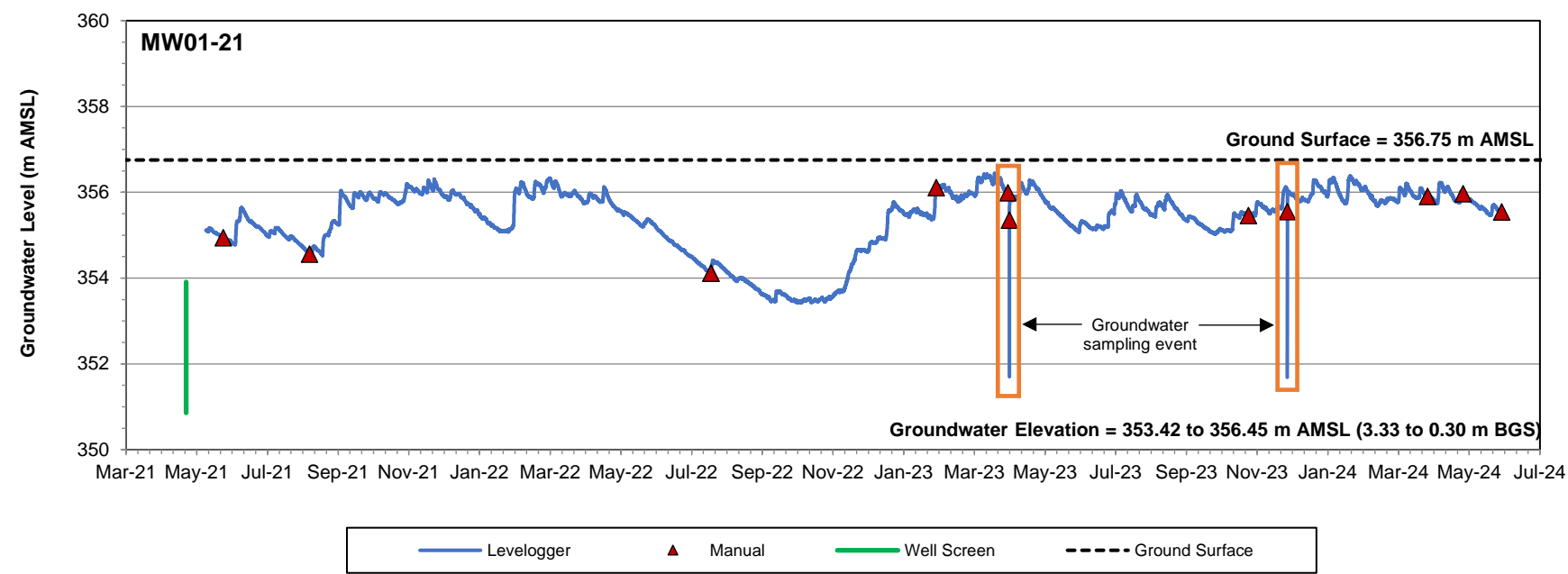


Precipitation and temperature data obtained from Environment Canada for the Kitchener/Waterloo Climate Station (Station ID 6144239), accessed June 2024.

Project: Strohvest Subdivision, Wellesley, Ontario  
Hydrogeological Assessment

Figure: 7

Title: HYDROGRAPHS - MONITORING WELLS



**Notes:**

- 1) Precipitation and temperature data obtained from Environment Canada for the Kitchener/Waterloo Climate Station (Station ID 6144239), accessed June 2024.
- 2) Data enclosed in orange boxes not included in groundwater elevation ranges.

Client/Project

Strohvest Ontario Inc.  
Hydrogeological Assessment  
Strohvest Subdivision, Wellesley, Ontario

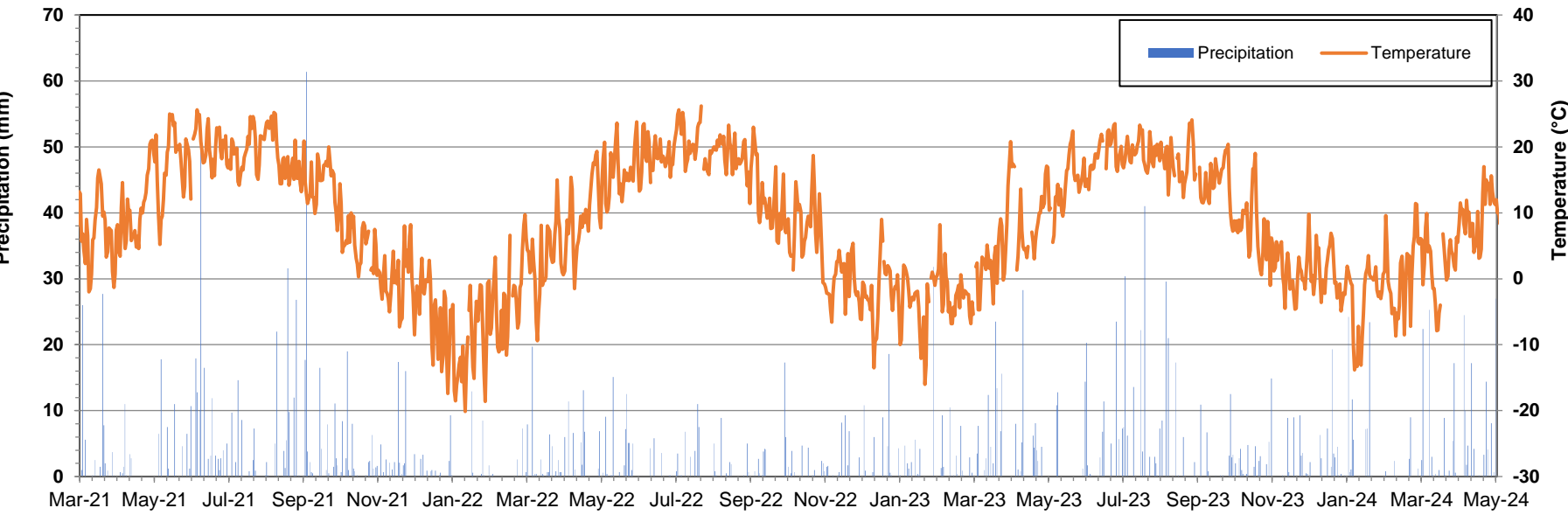
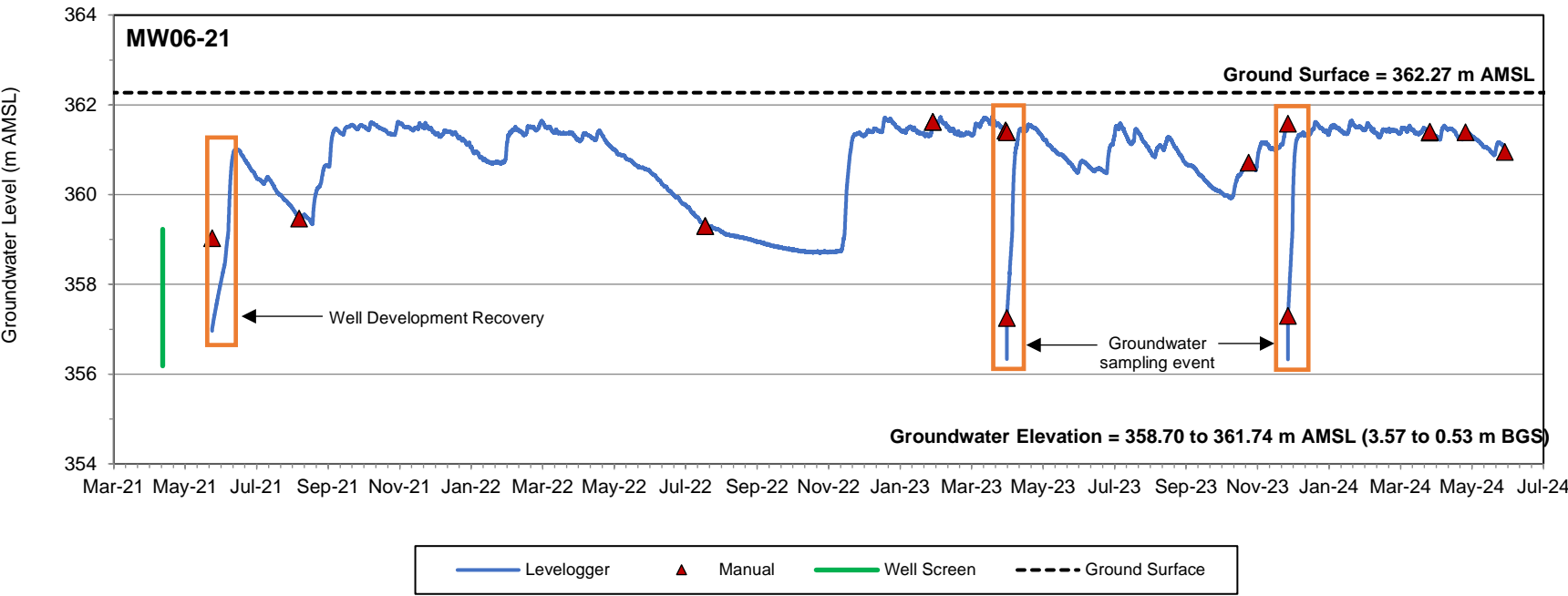
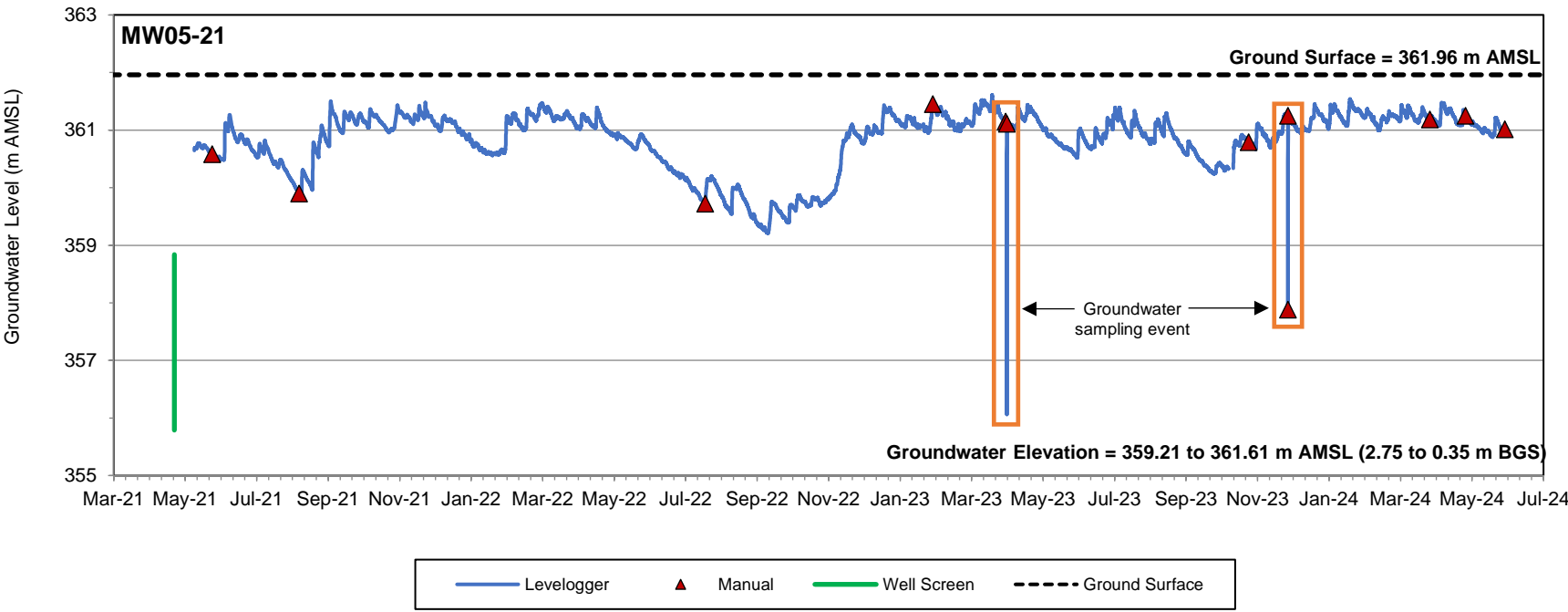
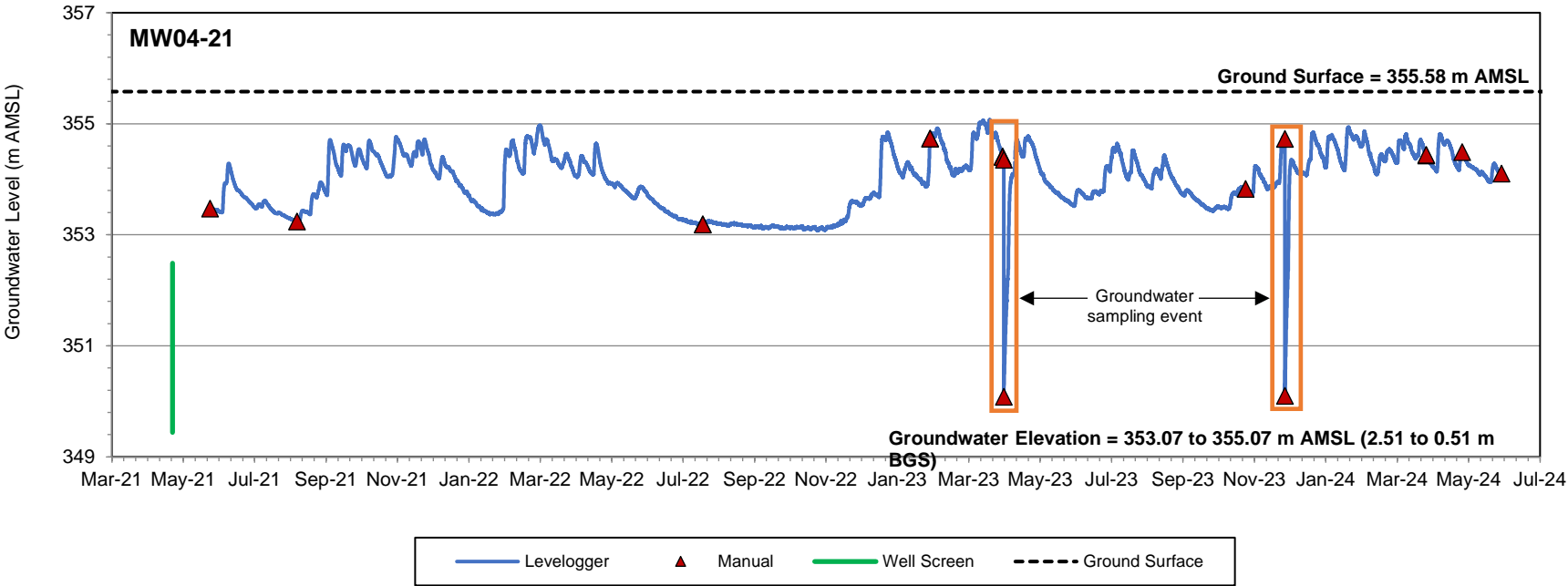
Figure No.

8

Title

HYDROGRAPHS  
MW01-21, MW02-21, and MW03-21





**Notes:**

1) Precipitation and temperature data obtained from Environment Canada for the Kitchener/Waterloo Climate Station (Station ID 6144239), accessed June 2024.

2) Data enclosed in orange boxes not included in groundwater elevation ranges.

Client/Project

Strohvest Ontario Inc.  
Hydrogeological Assessment  
Strohvest Subdivision, Wellesley, Ontario

Figure No.

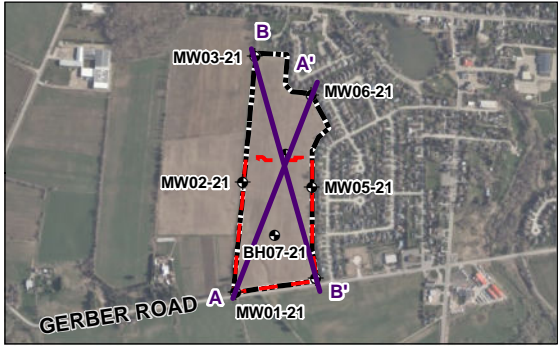
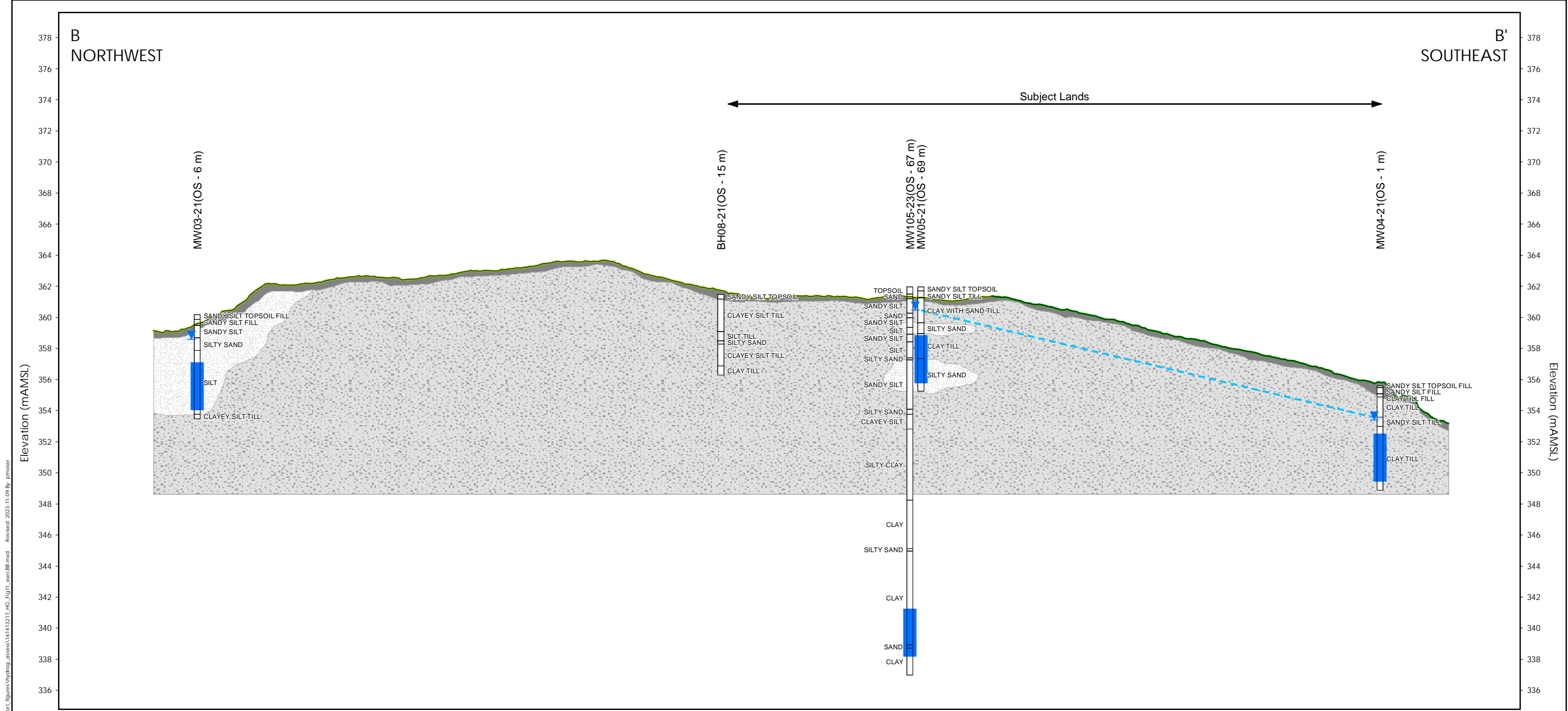
**9**

Title

**HYDROGRAPHS**  
**MW04-21, MW05-21, and MW06-21**

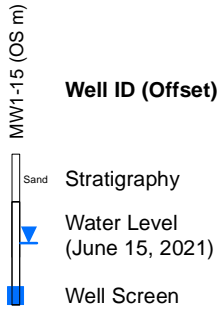






Notes

1. Groundwater elevations shown measured by Stantec personnel on June 15, 2021.



Project Location: Township of Wellesley

161413217 REVA

Prepared by pmoser on 2023-11-09

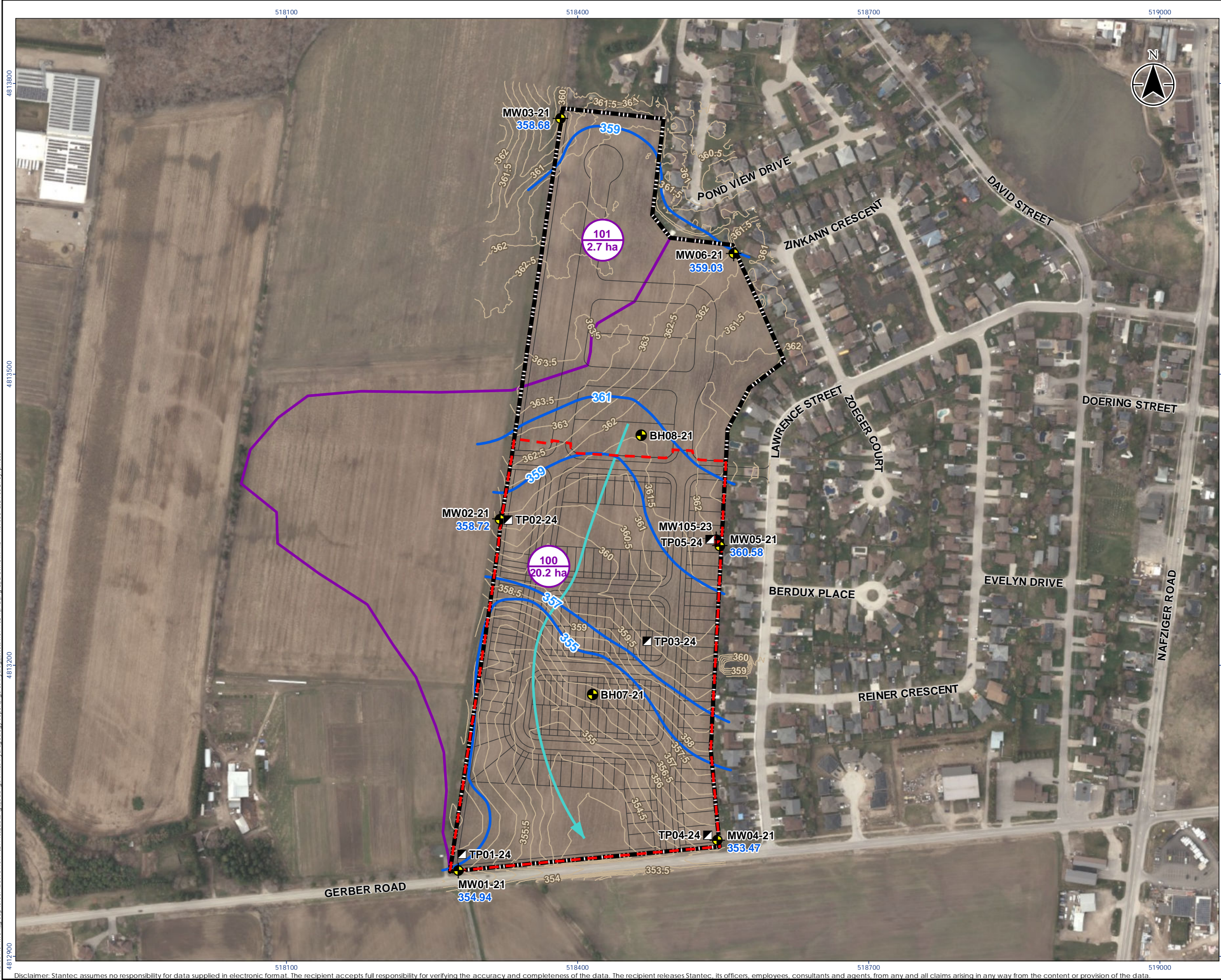
Technical Review by GW on 2021-09-22

Client/Project: STROHVEST ONTARIO INC. STROH LANDS, WELLESLEY, ONTARIO HYDROGEOLOGICAL ASSESSMENT

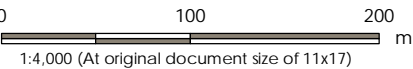
Figure No. 11

Title: Cross-Section B-B'

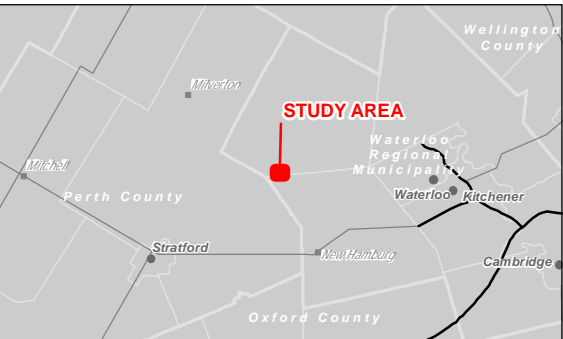




- Legend
- Subject Lands
  - Boundary of Lands Owned by the Applicant (Strohvest Ontario Inc.)
  - Monitoring Well (Stantec, 2023)
  - Monitoring Well (Stantec, 2021)
  - Borehole (Stantec, 2021)
  - Test Pit (Stantec, 2024)
  - Proposed Development Plan
  - 358.54 Groundwater Elevation - June 15, 2021
  - Groundwater Contour (m)
  - Interpreted Direction of Groundwater Flow
  - Topographic Contour (m)
  - Stormwater Catchment (Existing Conditions)



- Notes
- Coordinate System: NAD 1983 UTM Zone 17N
  - Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
  - Orthoimagery © First Base Solutions, 2024. Imagery Date, 2022.



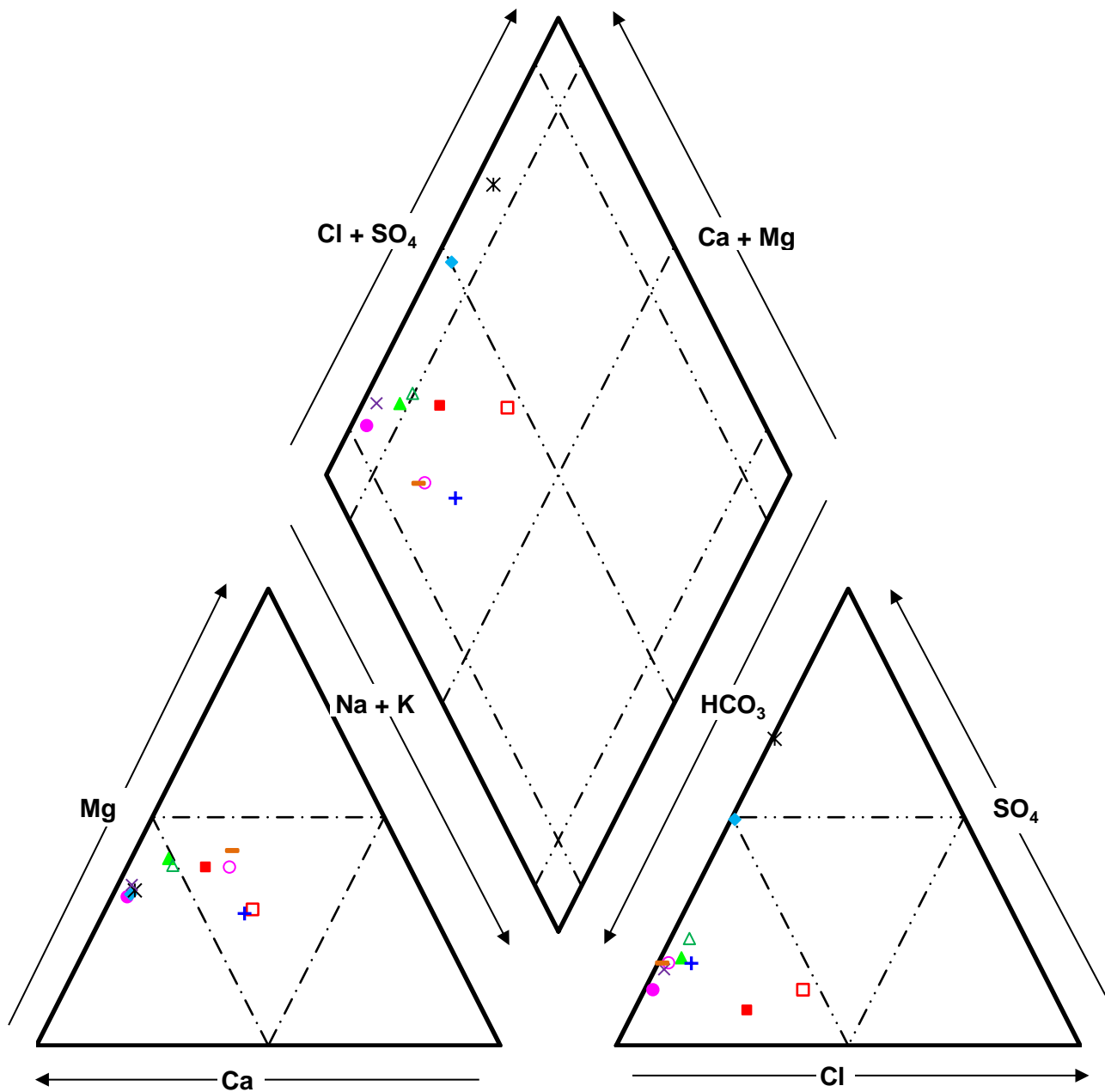
Project Location 161413217 REVA  
Township of Wellesley Prepared by CMC on 2024-06-24  
Technical Review by GW on 2024-06-24

Client/Project  
STROHVEST ONTARIO INC.  
STROH LANDS, WELLESLEY, ONTARIO  
HYDROGEOLOGICAL ASSESSMENT

Figure No.  
12

Title  
Groundwater Flow





- MW01-21 (May 2021)    ● MW03-21 (May 2021)    ▲ MW05-21 (May 2021)    ◆ RW01  
 ✕ RW02    □ MW01-21 (April 13, 2023)    ○ MW02-21 (April 13, 2023)    ✕ MW03-21 (April 13, 2023)  
 + MW04-21 (April 13, 2023)    ▲ MW05-21 (April 13, 2023)    — MW06-21 (April 13, 2023)



**STROHVEST SUBDIVISION, WELLESLEY, ONTARIO  
HYDROGEOLOGICAL ASSESSMENT**

**PIPER DIAGRAM**

DATE:	SCALE:	PROJECT No.	FIGURE No.
24-Jun-24		161413217	13

## **APPENDIX C:**

### **Tables**



TABLE 1  
MONITORING WELL CONSTRUCTION DETAILS

Well ID	UTM Coordinates		Elevations		Well Stick-up (m)	Well Depth (m BTOC)	Well Depth (m BGS)	Well Base Elevation (m AMSL)	Screened Interval				Screened Material Description <sup>(a)</sup> (% of screened interval)	Probable Hydrostratigraphic Unit	Hydraulic Conductivity <sup>(b)</sup>  (m/s)
	Northing	Easting	Top of Casing (m AMSL)	Ground Surface (m AMSL)					Top Elevation (m BGS)   (m AMSL)		Bottom Elevation (m BGS)   (m AMSL)				
MONITORING WELLS															
MW01-21	4812989	518277	357.59	356.75	0.84	6.73	5.89	350.86	2.84	353.91	5.89	350.86	Clay (100%)	ATB1	7.3E-06
MW02-21	4813350	518320	362.03	361.12	0.90	7.06	6.16	354.97	3.11	358.02	6.16	354.97	Clayey Silt (50%), Clay (50%)	ATB1	5.8E-09
MW03-21	4813763	518382	361.02	360.18	0.84	6.97	6.13	354.05	3.08	357.10	6.13	354.05	Silt (100%)	ATB1	1.6E-07
MW04-21	4813019	518544	356.37	355.58	0.79	6.93	6.14	349.44	3.09	352.49	6.14	349.44	Clay (100%)	ATB1	5.4E-09
MW05-21	4813323	518547	362.79	361.96	0.83	7.00	6.17	355.79	3.12	358.84	6.17	355.79	Clay (50%), Silty Sand (50%)	ATB1	9.1E-08
MW06-21	4813624	518561	363.09	362.27	0.82	6.91	6.09	356.18	3.04	359.23	6.09	356.18	Clay (100%)	ATB1	-
MW105-23	4813327	518546	363.02	361.97	1.05	25.38	24.33	337.64	21.28	340.69	24.33	337.64	Clay Till (94%) / Sand (6%)	ATB1	2.8E-09
													GEOMEAN (Applicant Lands) =	8.0E-08	
													GEOMEAN (Subject Lands) =	7.8E-08	

**Notes:**

(a) Refer to **Appendix G** for borehole and well construction logs.

(b) Refer to **Appendix H** for hydraulic conductivity analytical solutions. Note that calculated geometric mean horizontal hydraulic conductivities presented in this table do not include results from MW105-23.

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**  
**GROUNDWATER LEVEL DATA - MONITORING WELLS**

Well ID	Date	Time	Well Depth			Screen Length	Top of Casing Elevation	Ground Surface Elevation	Pipe Stick-up	Groundwater Level		
			(m BTOC)	(m BGS)	(m AMSL)					(m BGS) <sup>(1)</sup>	(m BTOC)	(m AMSL)
MW01-21	15-Jun-21	12:43 PM	6.73	5.89	350.86	3.05	357.59	356.75	0.84	1.81	2.65	354.94
	27-Aug-21	12:01 PM								2.19	3.03	354.56
	3-Aug-22	10:10 AM								2.64	3.48	354.11
	10-Feb-23	12:55 PM								1.19	2.03	355.56
	12-Apr-23	12:35 PM								1.31	2.15	355.44
	2-Nov-23	12:40 PM								1.84	2.68	354.91
	5-Dec-24	1:37 PM								1.25	2.09	355.50
	2-Apr-24	10:54 AM								1.40	2.24	355.35
	2-May-24	4:00 PM								1.33	2.17	355.42
	4-Jun-24	12:12 PM								1.76	2.60	354.99
MW02-21	15-Jun-21	12:25 PM	7.06	6.16	354.97	3.05	362.03	361.12	0.90	2.40	3.31	358.72
	27-Aug-21	12:20 PM								2.91	3.81	358.22
	3-Aug-22	10:33 AM								2.88	3.78	358.25
	10-Feb-23	12:30 PM								0.15	1.05	360.98
	12-Apr-23	12:10 PM								0.60	1.50	360.53
	2-Nov-23	1:38 PM								0.86	1.76	360.27
	5-Dec-24	11:38 AM								0.22	1.12	360.91
	2-Apr-24	11:09 AM								0.63	1.53	360.50
	2-May-24	2:56 PM								0.65	1.55	360.48
	4-Jun-24	12:00 PM								1.11	2.01	360.02
MW03-21	15-Jun-21	12:18 PM	6.97	6.13	354.05	3.05	361.02	360.18	0.84	1.50	2.34	358.68
	27-Aug-21	12:30 PM								2.25	3.09	357.93
	3-Aug-22	11:10 AM								3.56	4.40	356.62
	10-Feb-23	11:15 AM								0.29	1.13	359.89
	12-Apr-23	11:53 AM								0.87	1.71	359.31
	2-Nov-23	2:05 PM								1.15	1.99	359.03
	5-Dec-24	10:28 AM								0.64	1.48	359.54
	2-Apr-24	11:24 AM								0.85	1.69	359.33
	2-May-24	2:43 PM								0.80	1.64	359.38
	4-Jun-24	11:48 AM								-	-	-

**TABLE 2**  
**GROUNDWATER LEVEL DATA - MONITORING WELLS**

Well ID	Date	Time	Well Depth			Screen Length (m)	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level		
			(m BTOC)	(m BGS)	(m AMSL)					(m BGS) <sup>(1)</sup>	(m BTOC)	(m AMSL)
MW04-21	15-Jun-21	11:19 AM	6.93	6.14	349.44	3.05	356.37	355.58	0.79	2.11	2.90	353.47
	27-Aug-21	12:55 PM								2.34	3.13	353.24
	3-Aug-22	9:29 AM								2.39	3.18	353.19
	10-Feb-23	12:42 PM								0.85	1.64	354.73
	12-Apr-23	11:07 AM								1.18	1.97	354.40
	2-Nov-23	12:25 PM								1.75	2.54	353.83
	5-Dec-24	1:05 PM								0.85	1.64	354.73
	2-Apr-24	10:42 AM								1.14	1.93	354.44
	2-May-24	3:38 PM								1.09	1.88	354.49
	4-Jun-24	12:26 PM								1.48	2.27	354.10
MW05-21	15-Jun-21	11:38 AM	7.00	6.17	355.79	3.05	362.79	361.96	0.83	1.38	2.21	360.58
	27-Aug-21	12:47 PM								2.06	2.89	359.90
	3-Aug-22	11:45 AM								2.24	3.07	359.72
	10-Feb-23	12:10 PM								0.51	1.34	361.45
	12-Apr-23	11:29 AM								0.81	1.64	361.15
	2-Nov-23	1:05 PM								1.17	2.00	360.79
	5-Dec-24	12:15 PM								0.71	1.54	361.25
	2-Apr-24	12:35 PM								0.77	1.60	361.19
	2-May-24	3:18 PM								0.71	1.54	361.25
	4-Jun-24	12:38 PM								0.94	1.77	361.02
MW06-21	15-Jun-21	11:44 AM	6.91	6.09	356.18	3.05	363.09	362.27	0.82	3.24	4.06	359.03
	27-Aug-21	12:39 PM								2.80	3.62	359.47
	3-Aug-22	11:31 AM								2.97	3.79	359.30
	10-Feb-23	11:47 AM								0.65	1.47	361.62
	12-Apr-23	11:41 AM								0.84	1.66	361.43
	2-Nov-23	2:18 PM								1.56	2.38	360.71
	5-Dec-24	9:57 AM								0.69	1.51	361.58
	2-Apr-24	11:43 AM								0.87	1.69	361.40
	2-May-24	2:36 PM								0.88	1.70	361.39
	4-Jun-24	11:36 AM								1.32	2.14	360.95

**TABLE 2**  
**GROUNDWATER LEVEL DATA - MONITORING WELLS**

Well ID	Date	Time	Well Depth			Screen Length (m)	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level		
			(m BTOC)	(m BGS)	(m AMSL)					(m BGS) <sup>(1)</sup>	(m BTOC)	(m AMSL)
MW105-23	2-Nov-23	1:15 PM	25.38	24.33	337.64	3.05	363.02	361.97	1.05	6.70	7.75	355.27
	5-Dec-24	9:57 AM								5.67	6.72	356.30
	2-Apr-24	11:53 AM								5.08	6.13	356.89
	2-May-24	3:20 PM								5.03	6.08	356.94
	4-Jun-24	12:37 PM								5.04	6.09	356.93

Notes:

(1) A negative value indicates that the water level measured in the pipe is located above ground surface

m BGS = meters below ground surface

m BTOC = meters below top of casing

DRY = no groundwater or surface water was observed in the piezometer or watercourse, respectively

- = measurement not available

**TABLE 3**  
**INFILTRATION ESTIMATES**

Testing Location ID	Horizontal Hydraulic Conductivity (m/s)	Vertical Hydraulic Conductivity <sup>(2)</sup>		Infiltration Rate <sup>(1)</sup> (mm/hr)	Pit Depth (m BGS)	Screened Interval (m BGS)	Soil Substrate Tested (% of screened interval)
		(cm/s)	(m/s)				
In-situ Hydraulic Response Testing							
MW01-21	7.3E-06	7.3E-05	7.3E-07	42	-	2.8 - 5.8	Clay (100%)
MW02-21	5.8E-09	5.8E-08	5.8E-10	6	-	3.1 - 6.1	Clayey Silt (50%), Clay (50%)
MW03-21	1.6E-07	1.6E-06	1.6E-08	16	-	3.1 - 6.1	Silt (100%)
MW04-21	5.4E-09	5.4E-08	5.4E-10	6	-	3.1 - 6.1	Clay (100%)
MW05-21	9.1E-08	9.1E-07	9.1E-09	13	-	3.1 - 6.1	Clay (50%), Silty Sand (50%)
GEOMEAN =		8.0E-09	13				

**Notes:**

- (1) Infiltration rate calculated based on established relationship between vertical hydraulic conductivity and infiltration rate presented in *Credit Valley Conservation and Toronto and Region Conservation (2010) Low Impact Stormwater Management Planning and Design Guideline - Version 1.0*.
- (2) Vertical hydraulic conductivities assumed to be one order of magnitude lower than in-situ measured horizontal hydraulic conductivities.

TABLE 4 - GROUNDWATER QUALITY RESULTS, ONSITE MONITORING WELLS

Sample Location			MW01-21			MW02-21		MW03-21			MW04-21		MW05-21			
Sample Date			27-May-21	13-Apr-23	5-Dec-23	13-Apr-23	5-Dec-23	27-May-21	13-Apr-23	5-Dec-23	13-Apr-23	5-Dec-23	27-May-21	27-May-21	13-Apr-23	5-Dec-23
Sample ID			BH01-21	BH01-21	BH01-21	BH02-21	BH02-21	BH03-21	BH03-21	BH03-21	BH04-21	BH04-21	BH05-21	QC-01	BH05-21	BH05-21
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory			BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order			C1E5622	C3A5628	C3AV735	C3A5628	C3AV735	C1E5622	C3A5628	C3AV735	C3A5628	C3AV735	C1E5622	C1E5622	C3A5628	C3AV735
Laboratory Sample ID			PRQ479	VOD661	XUM771	VOD659	XUM768	PRQ480	VOD660	XUM767	VOD656	XUM770	PRQ481	PRQ482	VOD658	XUM769
Sample Type		Units	O. Reg. 169/03											Field Duplicate		
General Chemistry																
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	2.8	3.1	2.1	3.2	2.6	3.1	2.9	2.5	2.7	1.7	2.5	3.2	3.0	2.4
Alkalinity, Total (as CaCO3)	mg/L	30-500 <sup>D</sup>	300	310	300	270	290	380	350	360	190	200	290	280	300	310
Anion Sum	me/L	n/v	8.85	11.5	9.57	6.83	7.08	8.86	8.68	8.83	5.08	5.03	7.54	7.42	8.21	8.11
Bicarbonate(as CaCO3, Calculated)	mg/L	n/v	300	310	300	270	280	380	350	350	190	200	280	280	290	300
Cation Sum	me/L	n/v	8.86	13.0	9.90	6.95	7.19	9.26	8.98	9.07	5.42	6.10	7.66	7.65	8.57	8.19
Chloride	mg/L	250 <sup>B</sup>	76	140	92	5.3	3.9	5.7	6.0	5.6	13	11	12	11	12	12
Electrical Conductivity, Lab	µmhos/cm	n/v	820	1,200	970	650	660	780	780	800	500	500	680	670	740	750
Hardness (as CaCO3)	mg/L	80-100 <sup>D</sup>	370 <sup>D</sup>	440 <sup>D</sup>	370 <sup>D</sup>	270 <sup>D</sup>	280 <sup>D</sup>	450 <sup>D</sup>	440 <sup>D</sup>	440 <sup>D</sup>	190 <sup>D</sup>	220 <sup>D</sup>	350 <sup>D</sup>	350 <sup>D</sup>	390 <sup>D</sup>	380 <sup>D</sup>
Ion Balance	%	n/v	0.0500	6.10	1.71	0.860	0.730	2.22	1.68	1.36	3.22	9.59	0.840	1.56	2.13	0.500
Langelier Index (at 20 C)	none	n/v	0.919	1.02	0.784	0.833	0.769	1.13	1.08	1.04	0.695	0.580	0.868	0.972	0.987	0.886
Langelier Index (at 4 C)	none	n/v	0.671	0.774	0.536	0.585	0.521	0.878	0.834	0.794	0.446	0.331	0.619	0.724	0.739	0.637
Nitrate (as N)	mg/L	10.0 <sup>A</sup>	<0.10	<0.10	<0.10	0.60	0.39	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	<0.10
Nitrate + Nitrite (as N)	mg/L	10.0 <sup>A</sup>	<0.10	<0.10	<0.10	0.60	0.39	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	0.11	<0.10	<0.10
Nitrite (as N)	mg/L	1.0 <sup>A</sup>	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010	<0.010
pH, lab	S.U.	6.5-8.5 <sup>D</sup>	8.01	8.03	7.88	8.11	7.98	7.94	7.95	7.88	8.19	7.97	7.96	8.08	8.03	7.91
Saturation pH (at 20 C)	none	n/v	7.09	7.01	7.09	7.27	7.21	6.81	6.87	6.84	7.49	7.39	7.10	7.10	7.05	7.03
Saturation pH (at 4 C)	none	n/v	7.34	7.25	7.34	7.52	7.46	7.06	7.11	7.09	7.74	7.64	7.35	7.35	7.29	7.28
Sulfate	mg/L	500 <sup>B</sup>	33	68	43	59	59	52	69	73	44	38	70	68	93	80
Total Dissolved Solids (Calculated)	mg/L	500 <sup>B</sup>	460	660 <sup>B</sup>	520 <sup>B</sup>	370	380	470	460	470	290	300	400	400	450	440
Total Suspended Solids	mg/L	n/v	1,700	-	-	-	-	55,000	-	-	-	-	85,000	59,000	-	-
Turbidity, Lab	NTU	5 <sup>B</sup> <sup>D</sup>	1,800 <sup>B</sup>	-	-	-	-	4,700 <sup>B</sup>	-	-	-	-	2,100 <sup>B</sup>	3,500 <sup>B</sup>	-	-
Nutrients																
Ammonia (as N)	mg/L	n/v	0.062	0.10	0.11	<0.050	<0.050	0.071	0.070	0.068	0.082	0.15	0.097	0.093	0.090	0.10
Dissolved Organic Carbon (DOC)	mg/L	5 <sup>B</sup>	0.88	1.4	1.2	0.76	0.58	0.90	0.98	1.2	1.3	1.5	0.99	1.0	0.97	1.3
Orthophosphate (as P)	mg/L	n/v	<0.010	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Metals																
Aluminum	mg/L	0.1 <sup>D</sup>	<0.0049	0.32 <sup>D</sup>	<0.0049	0.015	<0.0049	0.010	<0.0049	<0.0049	<0.0049	0.44 <sup>D</sup>	0.021	0.0053	0.0049	<0.0049
Antimony	mg/L	0.006 <sup>A</sup>	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic	mg/L	0.01 <sup>A</sup>	0.0014	0.0017	0.0020	<0.0010	<0.0010	0.0012	0.0013	0.0015	<0.0010	0.0011	0.0029	0.0027	0.0027	0.0014
Barium	mg/L	1 <sup>A</sup>	0.13	0.16	0.13	0.11	0.11	0.14	0.12	0.098	0.061	0.064	0.13	0.13	0.14	0.11
Beryllium	mg/L	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Boron	mg/L	5 <sup>A</sup>	0.063	0.048	0.060	0.12	0.10	0.016	0.015	0.012	0.14	0.14	0.029	0.029	0.024	0.016
Cadmium	mg/L	0.005 <sup>A</sup>	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Calcium	mg/L	n/v	78	100	78	54	59	120	110	120	44	54	78	77	87	87
Chromium	mg/L	0.05 <sup>A</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cobalt	mg/L	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00074	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Copper	mg/L	1 <sup>B</sup>	<0.00090	0.0014	<0.00090	<0.00090	<0.00090	<0.00090	<0.00090	<0.00090	0.0022	0.0022	<0.00090	<0.00090	0.0010	<0.00090
Iron	mg/L	0.3 <sup>B</sup>	<0.10	0.29	<0.10	<0.10	<0.10	<0.10	0.21	0.45 <sup>B</sup>	<0.10	0.49 <sup>B</sup>	<0.10	<0.10	<0.10	<0.10
Lead	mg/L	0.01 <sup>A</sup>	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00065	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium	mg/L	n/v	42	47	41	33	33	37	38	35	19	21	38	38	41	39
Manganese	mg/L	0.05 <sup>B</sup>	0.052 <sup>B</sup>	0.054 <sup>B</sup>	0.044	0.0042	0.0053	0.065 <sup>B</sup>	0.044	0.040	0.053 <sup>B</sup>	0.085 <sup>B</sup>	0.046	0.043	0.076 <sup>B</sup>	0.050
Molybdenum	mg/L	n/v	0.0042	0.0040	0.0046	0.0084	0.0076	0.0012	0.00087	0.00092	0.0085	0.0074	0.0034	0.0036	0.0024	0.0021
Nickel	mg/L	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	0.0015	<0.0010
Phosphorus	mg/L	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	2.4	2.6	2.4	2.1	2.1	1.7	1.3	1.2	1.3	1.4	2.0	2.0	1.8	1.5
Selenium	mg/L	0.05 <sup>A</sup>	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Silicon	mg/L	n/v	7.3	9.2	8.0	6.2	6.4	8.0	7.9	8.3	6.3	6.8	8.7	8.5	8.6	8.4
Silver	mg/L	n/v	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Sodium	mg/L	200 <sup>B</sup> 20 <sup>g</sup> <sup>C</sup>	33 <sup>C</sup>	93 <sup>C</sup>	58 <sup>C</sup>	34 <sup>C</sup>	34 <sup>C</sup>	5.7	5.4	5.0	37 <sup>C</sup>	36 <sup>C</sup>	13	14	18	14
Strontium	mg/L	n/v	1.0	1.1	1.1	1.3	1.1	0.36	0.39	0.34	0.59	0.66	0.52	0.53	0.46	0.30
Thallium	mg/L	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Titanium	mg/L	n/v	<0.0050	0.014	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.018	<0.0050	<0.0050	<0.0050	<0.0050
Uranium	mg/L	0.02 <sup>A</sup>	0.0017	0.0037	0.0028	0.0028	0.0029	0.0011	0.00062	0.00053	0.0017	0.0016	0.0027	0.0028	0.0021	0.0021
Vanadium	mg/L	n/v	<0.00050	0.00079	<0.00050	0.00076	0.00083	0.00053	<0.00050	<0.00050	<0.00050	0.0016	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	5 <sup>B</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050



TABLE 4 - GROUNDWATER QUALITY RESULTS, ONSITE MONITORING WELLS

Sample Location		MW06-21	
Sample Date		13-Apr-23	5-Dec-23
Sample ID		BH06-21	BH06-21
Sampling Company		STANTEC	STANTEC
Laboratory		BV	BV
Laboratory Work Order		C3A5628	C3AV735
Laboratory Sample ID		VOD657	XUM766
Sample Type	Units	O. Reg. 169/03	

General Chemistry				
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	3.7	2.7
Alkalinity, Total (as CaCO3)	mg/L	30-500 <sup>D</sup>	280	290
Anion Sum	me/L	n/v	6.92	7.08
Bicarbonate(as CaCO3, Calculated)	mg/L	n/v	280	290
Cation Sum	me/L	n/v	7.08	7.19
Chloride	mg/L	250 <sup>B</sup>	2.2	2.4
Electrical Conductivity, Lab	µmhos/cm	n/v	640	660
Hardness (as CaCO3)	mg/L	80-100 <sup>D</sup>	280 <sup>D</sup>	290 <sup>D</sup>
Ion Balance	%	n/v	1.20	0.780
Langelier Index (at 20 C)	none	n/v	0.871	0.758
Langelier Index (at 4 C)	none	n/v	0.622	0.509
Nitrate (as N)	mg/L	10.0 <sub>d</sub> <sup>A</sup>	<0.10	<0.10
Nitrate + Nitrite (as N)	mg/L	10.0 <sub>d</sub> <sup>A</sup>	<0.10	<0.10
Nitrite (as N)	mg/L	1.0 <sub>d</sub> <sup>A</sup>	<0.010	<0.010
pH, lab	S.U.	6.5-8.5 <sup>D</sup>	8.15	7.99
Saturation pH (at 20 C)	none	n/v	7.28	7.23
Saturation pH (at 4 C)	none	n/v	7.53	7.48
Sulfate	mg/L	500 <sub>n</sub> <sup>B</sup>	60	55
Total Dissolved Solids (Calculated)	mg/L	500 <sup>B</sup>	370	370
Total Suspended Solids	mg/L	n/v	-	-
Turbidity, Lab	NTU	5 <sub>j</sub> <sup>B D</sup>	-	-

Nutrients				
Ammonia (as N)	mg/L	n/v	<0.050	<0.050
Dissolved Organic Carbon (DOC)	mg/L	5 <sup>B</sup>	0.83	0.95
Orthophosphate (as P)	mg/L	n/v	<0.010	<0.010

Metals				
Aluminum	mg/L	0.1 <sup>D</sup>	0.0072	0.0054
Antimony	mg/L	0.006 <sup>A</sup>	<0.00050	<0.00050
Arsenic	mg/L	0.01 <sup>A</sup>	<0.0010	<0.0010
Barium	mg/L	1 <sup>A</sup>	0.12	0.11
Beryllium	mg/L	n/v	<0.00040	<0.00040
Boron	mg/L	5 <sup>A</sup>	0.13	0.12
Cadmium	mg/L	0.005 <sup>A</sup>	<0.000090	<0.000090
Calcium	mg/L	n/v	52	55
Chromium	mg/L	0.05 <sup>A</sup>	<0.0050	<0.0050
Cobalt	mg/L	n/v	<0.00050	<0.00050
Copper	mg/L	1 <sup>B</sup>	0.0018	<0.00090
Iron	mg/L	0.3 <sup>B</sup>	<0.10	<0.10
Lead	mg/L	0.01 <sup>A</sup>	<0.00050	<0.00050
Magnesium	mg/L	n/v	37	37
Manganese	mg/L	0.05 <sup>B</sup>	0.0056	0.018
Molybdenum	mg/L	n/v	0.0063	0.0059
Nickel	mg/L	n/v	<0.0010	<0.0010
Phosphorus	mg/L	n/v	<0.10	<0.10
Potassium	mg/L	n/v	2.0	2.1
Selenium	mg/L	0.05 <sup>A</sup>	<0.0020	<0.0020
Silicon	mg/L	n/v	6.3	6.5
Silver	mg/L	n/v	<0.000090	<0.000090
Sodium	mg/L	200 <sub>g</sub> <sup>B</sup> 20 <sub>g</sub> <sup>C</sup>	33 <sup>C</sup>	31 <sup>C</sup>
Strontium	mg/L	n/v	1.8	1.5
Thallium	mg/L	n/v	<0.000050	<0.000050
Titanium	mg/L	n/v	<0.0050	<0.0050
Uranium	mg/L	0.02 <sup>A</sup>	0.0032	0.0031
Vanadium	mg/L	n/v	0.00084	0.00098
Zinc	mg/L	5 <sup>B</sup>	<0.0050	<0.0050

<b>Notes:</b>	
O. Reg. 169/03	Ontario Drinking Water Quality Standards (January 1, 2018)
<sup>A</sup>	Schedule 2 - Chemical Standards (expressed as a maximum acceptable concentration)
<sup>B</sup>	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Aesthetic Objectives
<sup>C</sup>	ODWS Table 4 - Medical Officer of Health Reporting Limit
<sup>D</sup>	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Operational Guidelines
6.5 <sup>A</sup>	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.
<sub>d</sub>	Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).
<sub>g</sub>	The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
<sub>h</sub>	When sulfate levels exceed 500 mg/L, water may have a laxative effect on some people.
<sub>i</sub>	Applicable for all waters at the point of consumption.
<sub>j</sub>	The operational guidelines for filtration processes are provided as performance criteria in the Procedure for Disinfection of Drinking Water in Ontario.



TABLE 5  
GROUNDWATER QUALITY RESULTS  
OFFSITE PRIVATE WELLS

Sample Location			RW01	RW02	
Sample Date			15-Jun-21	6-Aug-21	6-Aug-21
Sample ID			RW01	RW02	RW02 Lab-Dup
Sampling Company			STANTEC	STANTEC	STANTEC
Laboratory			BV	BV	BV
Laboratory Work Order			C1G5523	C1M2547	C1M2547
Laboratory Sample ID			PVV199	QHU792	QHU792
Sample Type	Units	ODWS			Lab Replicate
General Chemistry					
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	2.1	3.3	-
Alkalinity, Total (as CaCO3)	mg/L	30-500 <sup>E</sup>	230	210	-
Anion Sum	me/L	n/v	9.36	13.0	-
Bicarbonate(as CaCO3, Calculated)	mg/L	n/v	230	200	-
Cation Sum	me/L	n/v	8.68	12.3	-
Chloride	mg/L	250 <sup>C</sup>	2.7	2.9	-
Electrical Conductivity, Lab	µmhos/cm	n/v	840	1,200	-
Hardness (as CaCO3)	mg/L	80-100 <sup>E</sup>	420 <sup>E</sup>	580 <sup>E</sup>	-
Ion Balance	%	n/v	3.76	2.50	-
Langelier Index (at 20 C)	none	n/v	0.919	1.21	-
Langelier Index (at 4 C)	none	n/v	0.671	0.958	-
Nitrate (as N)	mg/L	10.0 <sub>d</sub> <sup>B</sup>	<0.10	<0.10	<0.10
Nitrate + Nitrite (as N)	mg/L	10.0 <sub>d</sub> <sup>B</sup>	-	-	-
Nitrite (as N)	mg/L	1.0 <sub>d</sub> <sup>B</sup>	<0.010	<0.010	<0.010
pH, lab	S.U.	6.5-8.5 <sup>E</sup>	7.99	8.23	-
Saturation pH (at 20 C)	none	n/v	7.07	7.03	-
Saturation pH (at 4 C)	none	n/v	7.32	7.28	-
Sulfate	mg/L	500 <sub>h</sub> <sup>C</sup>	220	420	-
Total Dissolved Solids (Calculated)	mg/L	500 <sup>C</sup>	530 <sup>C</sup>	780 <sup>C</sup>	-
Total Suspended Solids	mg/L	n/v	<10	15	-
Turbidity, Lab	NTU	5 <sub>j</sub> <sup>C</sup> <sup>E</sup>	1.5	49 <sup>C</sup>	48 <sup>C</sup>
Microbiological					
E. Coli/Fecal Coliform	cfu/100mL	0 <sup>A</sup>	0	0	-
Total Coliform Background	cfu/100mL	n/v	0	-	-
Total Coliforms	cfu/100mL	0 <sup>A</sup>	0	0	-
Nutrients					
Ammonia (as N)	mg/L	n/v	0.33	0.065	-
Dissolved Organic Carbon (DOC)	mg/L	5 <sup>C</sup>	0.60	0.64	-
Orthophosphate (as P)	mg/L	n/v	<0.010	<0.010	-
Metals					
Aluminum	mg/L	0.1 <sup>E</sup>	<0.0049	<0.0049	-
Antimony	mg/L	0.006 <sup>B</sup>	<0.00050	<0.00050	-
Arsenic	mg/L	0.01 <sup>B</sup>	<0.0010	0.0010	-
Barium	mg/L	1 <sup>B</sup>	0.064	0.024	-
Beryllium	mg/L	n/v	<0.00040	<0.00040	-
Boron	mg/L	5 <sup>B</sup>	0.024	0.047	-
Cadmium	mg/L	0.005 <sup>B</sup>	<0.000090	<0.000090	-
Calcium	mg/L	n/v	110	150	-
Chromium	mg/L	0.05 <sup>B</sup>	<0.0050	<0.0050	-
Cobalt	mg/L	n/v	<0.00050	<0.00050	-
Copper	mg/L	1 <sup>C</sup>	0.0029	<0.00090	-
Iron	mg/L	0.3 <sup>C</sup>	0.43 <sup>C</sup>	5.9 <sup>C</sup>	-
Lead	mg/L	0.01 <sup>B</sup>	<0.00050	<0.00050	-
Lithium	mg/L	n/v	0.0053	0.0087	-
Magnesium	mg/L	n/v	35	50	-
Manganese	mg/L	0.05 <sup>C</sup>	0.013	0.080 <sup>C</sup>	-
Molybdenum	mg/L	n/v	0.0013	0.0016	-
Nickel	mg/L	n/v	<0.0010	<0.0010	-
Phosphorus	mg/L	n/v	<0.10	<0.10	-
Potassium	mg/L	n/v	1.1	1.4	-
Selenium	mg/L	0.05 <sup>B</sup>	<0.0020	<0.0020	-
Silicon	mg/L	n/v	6.8	4.7	-
Silver	mg/L	n/v	<0.000090	<0.000090	-
Sodium	mg/L	200 <sub>g</sub> <sup>C</sup> 20 <sub>g</sub> <sup>D</sup>	6.9	11	-
Strontium	mg/L	n/v	35	38	-
Thallium	mg/L	n/v	<0.000050	<0.000050	-
Titanium	mg/L	n/v	<0.0050	<0.0050	-
Uranium	mg/L	0.02 <sup>B</sup>	0.00090	0.00016	-
Vanadium	mg/L	n/v	<0.00050	<0.00050	-
Zinc	mg/L	5 <sup>C</sup>	0.021	<0.0050	-

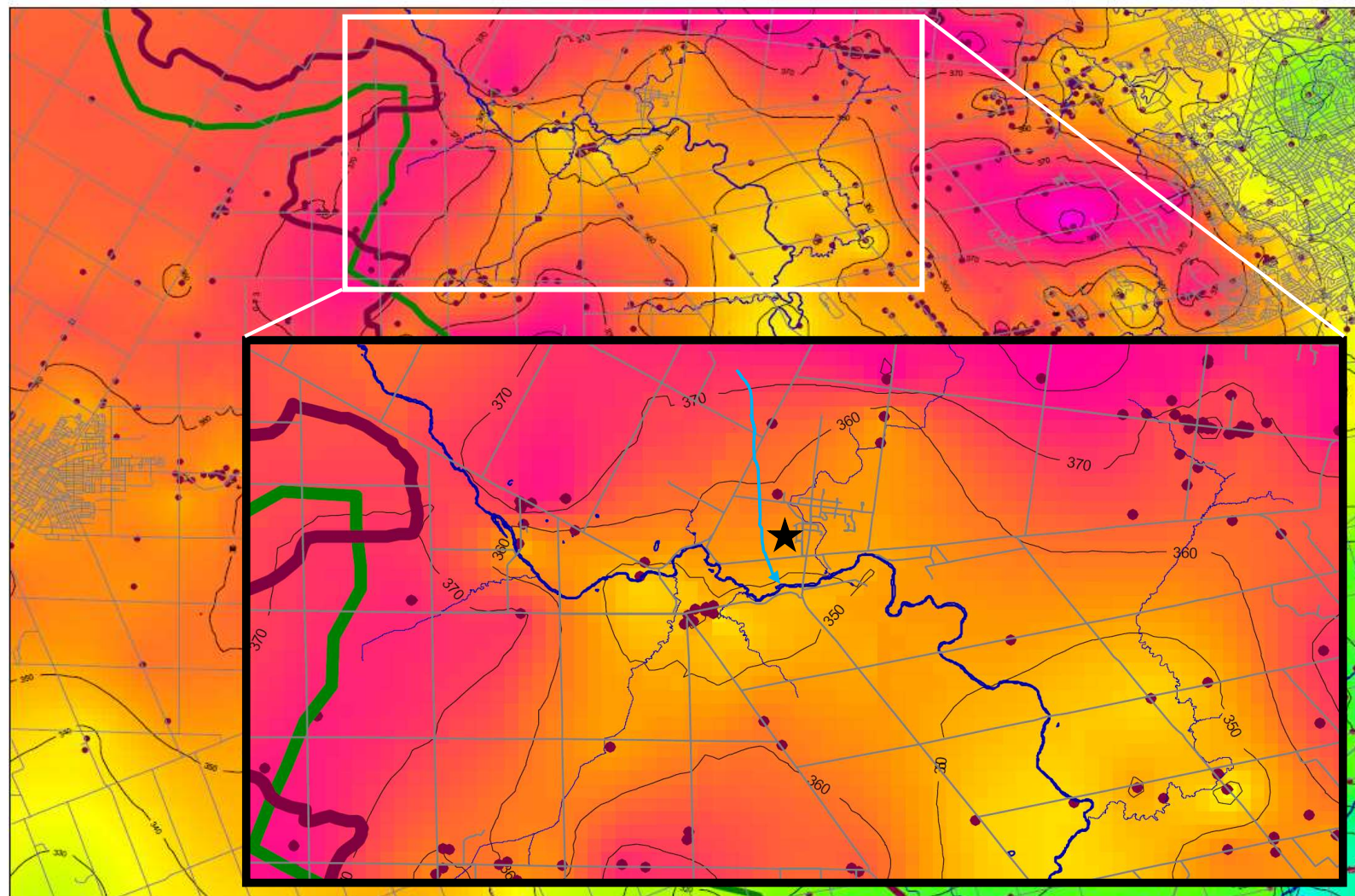
Notes:

ODWS	Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, 2006), in support of O.Reg 169/03 (January 1, 2018)
A	Schedule 1 - Microbiological Standards (expressed as a maximum)
B	Schedule 2 - Chemical Standards (expressed as a maximum acceptable concentration)
C	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Aesthetic Objectives
D	ODWS Table 4 - Medical Officer of Health Reporting Limit
E	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Operational Guidelines
6.5 <sup>A</sup>	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.
d	Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).
CD	The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration
g	exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
h	When sulfate levels exceed 500 mg/L, water may have a laxative effect on some people.
i	Applicable for all waters at the point of consumption.
j	The operational guidelines for filtration processes are provided as performance criteria in the Procedure for Disinfection of Drinking Water in Ontario.



## **APPENDIX D:**

### **Regional Groundwater Mapping**



To Report



Contour Interval = 10 metres

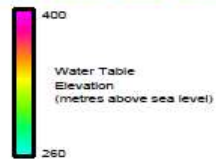
Scale (m):  
0 2000 4000 6000

→ Groundwater Flow Direction

— Grand River Watershed Boundary

— Interpreted Water Table Divide

★ Subject Lands



Grand River  
Conservation Authority

**Grand River Regional  
Groundwater Study**

Figure ST-7:  
Stratford Map Sheet  
Water Table Surface

Source: Grand River Conservation Authority. 2001. Grand River Regional Groundwater Study, Technical Report. June 2001.



Grand River  
Conservation Authority  
Date: Sep 21, 2021

### Average Annual Recharge

FIGURE D-1

#### Legend

Municipal Boundary (GRCA)

Watercourse - Local (GRCA)

CA Boundary - Local (GRCA)

Waterbody - Local (GRCA)

#### Average Annual Recharge (GRCA)

less than 50 mm/yr

50 - 100

100 - 200

200 - 300

300 - 400

> 400

Great Lakes - Local (GRCA)

Boundary of Lands Owned by the Applicant (Strohvest Ontario Inc.)

Copyright Grand River Conservation Authority, 2021.  
Disclaimer: This map is for illustrative purposes only. Information contained herein is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.  
The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to: <https://maps.grandriver.ca/Sources-and-Citations.pdf>

0 50 100 150 200 250 Meters  
NAD 1983 UTM Zone 17N  
Scale: 1:6,250



Map Centre (UTM NAD83 z17): 518,493.39 4,813,352.77

This map is not to be used for navigation | 2015 Ortho (ON)

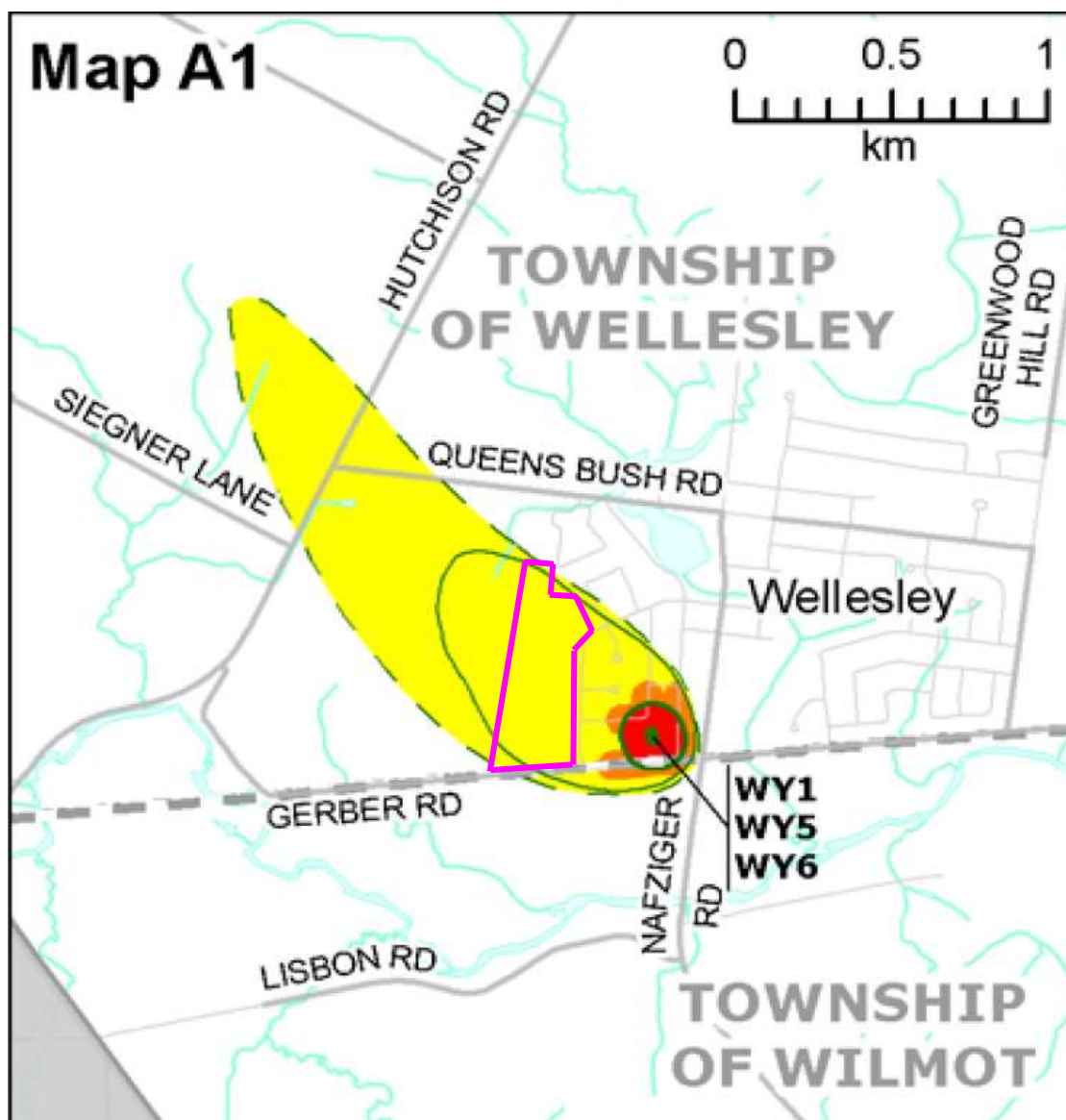
Source: Grand River Information Network (GRIN). 2021. <https://data.grandriver.ca/applications.html>.



## **APPENDIX E:**

### **Source Water Protection Plan Mapping**

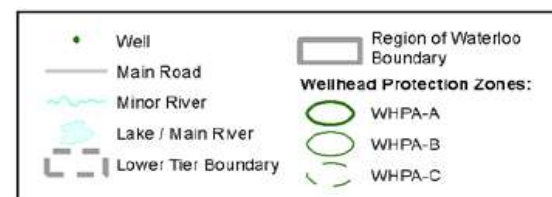
## 10.6 Schedule B: Region of Waterloo Groundwater Systems: Map A



### Significant Drinking Water Threat Policy Applicability

Significant Drinking Water Threat Policy Categories		Vulnerability Scores on Map		
		10	8	2,4,6
1.	Waste Disposal			
2.	Sewage Systems			
3, 4.	Agricultural Source Material			
6, 7.	Non-Agricultural Source Material*			
8, 9.	Commercial Fertilizer*			
10, 11.	Pesticide			
12, 13.	Road Salt*			
14.	Storage of Snow			
15.	Fuel			
16.	DNAPLs			
17.	Organic Solvents			
18.	Aircraft De-icing			
21.	Livestock Area			
22.	Oil Pipelines			

Note: This table provides a summary of the activities listed in the Clean Water Act (2006) that apply as Prescribed Drinking Water Threats (PDWT) within Non-GUDI Wellhead Protection Zones on this map. For details refer to the Drinking Water Threats Tables from the Ministry of the Environment and Climate Change, and the text of this Source Protection Plan.  
\*Application of Commercial Fertilizer, Non-Agricultural Source Material, and Road Salt may not be a significant drinking water threat in some areas due to the % managed land, livestock density, and/or % impervious surface calculations for these areas. See the text of this plan for further details.

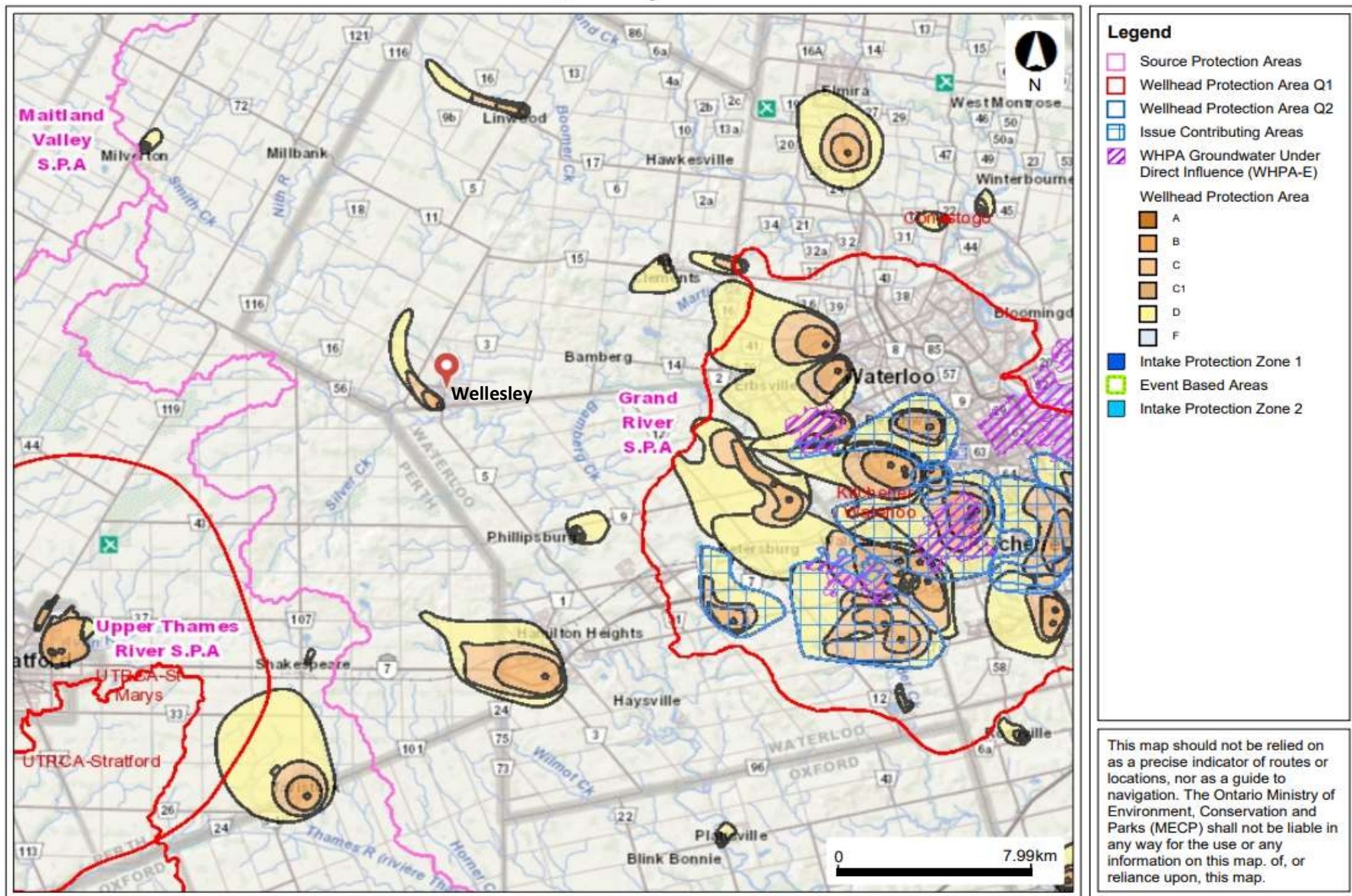


Grand River  
Conservation Authority

1. Updated July 24, 2019
2. Larger scale mapping of some map layers, including roads and vulnerability scores, is available at [www.sourcewater.ca](http://www.sourcewater.ca).
3. This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.



**FIGURE E-1: Water Quantity Vulnerable Areas**



© Queen's Printer for Ontario, 2021

Map Created: 9/21/2021

Map Center: 43.45219 N, -80.71499 W

Source: Ministry of the Environment, Conservation and Parks. 2021b. Source Water Protection Information Atlas. Accessed September 2021.

<https://www.gisapplication.lrc.gov.on.ca/SourceWaterProtection/Index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-US>

**APPENDIX F:**  
**Region of Waterloo Source Water Protection**  
**Land Use Categories**

## Schedule B: Source Water Protection Land Use Categories

### Category 'A'

- Waste treatment and disposal facilities, including lagoons, landfills, communal/municipal sewage treatment facilities and including large sewage vaults at sewage pumping stations, but not including facilities regulated under the Nutrient Management Act.
- Salvage yards, including automobile wrecking yards or premises
- Bulk storage of hazardous chemicals and hazardous substances (as listed in O.Reg. 347 under the Environmental Protection Act), including bulk storage of oil, gasoline or petroleum products, and including transportation terminals for these substances/chemicals (including truck/trailer/container parking, washing or cleaning depots)

### Category 'B'

- Bulk storage of road salt and snow disposal sites
- Primary metal manufacturing, including iron and steel mills and ferro-alloy manufacturing; steel product manufacturing from purchased steel; alumina and aluminum production and processing; non-ferrous metal production and processing; and foundries
- Manufacturing of fabricated metal products, including manufacturing of unfinished metal products and metal finishing operations
- Manufacturing and assembly of transportation equipment, including motor vehicles and parts, aerospace products and parts, rail cars, ships and boats
- Manufacturing of machinery, including agricultural, commercial, industrial, and other machinery
- Chemical manufacturing including chemicals; resins; fertilizers, pesticides and other agricultural chemicals; pharmaceutical and medicines; paint, coating and adhesives; inks and other chemicals but excluding soap and cleaning compound manufacturing. Including manufacturing, packaging, repackaging, and bottling. Excludes uses involving bulk storage of hazardous materials which are included under Category 'A'
- Manufacturing of petroleum and coal products, including manufacturing of asphalt materials. Excludes uses involving bulk storage of hazardous materials which are included under Category 'A'
- Manufacturing of electronic components such as semiconductors, printed circuit boards, and cathode ray tubes
- Manufacturing of electrical equipment, appliances and components
- Commercial or industrial dry cleaning of textiles and textile products, excluding depots not performing on-site dry cleaning
- Manufacturing of leather and allied products including footwear
- Wood and wood product preservation and treatment
- Gasoline stations and other retail establishments with gasoline sales
- Wholesale/distributing of cleaning products, pesticides, herbicides, fungicides and chemicals



**Category 'C'**

- Manufacturing of rubber products
- Manufacturing of soap, cleaning compounds and toilet preparations
- Textile and fabric finishing and fabric coating
- Manufacturing of plastic products
- Manufacturing of wood products including wood furniture, and excluding wood preservation
- Manufacturing of glass and glass products
- Manufacturing of paper and paper products including newsprint and boxes
- Printing and related support activities, excluding business support services such as photocopy services
- Repair and Maintenance of automobiles and automotive machinery, electronic equipment, industrial and commercial machinery, and personal and household goods repair
- Golf courses
- Airports, train and public transit terminals, except terminals with no fuel storage or transfer of shipped goods or materials
- Medical, health and other laboratories (other than clinics generally associated with commercial plazas)
- Miscellaneous manufacturing not included elsewhere, including jewellery, silverware, medical equipment and signs
- Recycling, recovery, or remanufacturing of materials including the collection, processing, manufacturing, or reuse of post-consumer or post-industrial materials, not including recycling or disposal of hazardous materials, and not including salvage yards or facilities with outdoor operations which are Category 'A' uses

**Category 'D'**

- Underground parking garages
- *Geothermal wells*
- *Mineral aggregate operations including wayside pits and quarries*

**Schedule C: Other information and materials that may be required to process an application****Digital Plans**

- Subdivision/Condominium Plan(s)

**Cultural**

- *Archaeological Assessment*
- *Cultural Heritage Impact Assessment*

**Environmental**

- Aggregate/Mineral Resource Analysis
- Local Air Quality Study

- Salt Impact Assessment
- Salt Management Plans
- Cut & Fill Analysis
- *Environmental Impact Statement*
- Comprehensive *Environmental Impact Statement*
- Natural Habitat Inventory
- Environmental Management Plan
- Tree Conservation and Planting Plans
- *Provincial and Federal Requirements for Fish Habitat*
- Slope Stability Study and Report
- Floodline Delineation Study/Hydraulics Study
- Hydrologic and Hydrogeologic Studies
- Source Water Protection Studies
- Best Management Practices for development within the Regional Recharge Area
- Best Management Practices (for golf courses)
- Environmental Site Assessment and/or Record of Site Condition
- *Cumulative Impact Assessment*
- Site Plan, Spill Protection Measures and other Best Management Practices for *Mineral Aggregate Operations*
- Final Rehabilitation Plan (for *mineral aggregate operations*)

### **Construction, Servicing and Infrastructure**

- Preliminary Grading Plan
- Preliminary Stormwater Management Report/Plan and/or update to an existing Stormwater Management Plan
- Soils/Geotechnical Study
- Construction Methods and Spills Protection Measures
- Servicing Options Report
- Development Phasing Plan
- Water and Wastewater Servicing Plans and associated studies
- Hydrogeologic Studies for Privately Serviced Developments
- Impact on Existing Infrastructure Study

### **Land Use Compatibility**

- Air Quality Assessment
- Dust Impact Analysis
- Land Use Compatibility Study
- Landfill Impact Study
- Agricultural Impact Assessment
- *Minimum Distance Separation*
- Noise Study
- Odour Impact Assessment
- Vibration Study
- Written Provincial approval (pursuant to the Environmental Protection Act for development within former waste management facilities)

- *Provincial and Federal Requirements for Alternative and/or Renewable Energy Systems and Fish Habitat*
- Approval from the Grand River Conservation Authority

**Planning**

- Affordable Housing Report/Rental Conversion Assessment
- Detailed Property Assessment of Affordable Rental Housing
- Farm Viability Study
- Planning Report
- Land Use Study for Retail/Commercial Land Uses in Support of the Planned Community Structure or Retail/Commercial Impact Analysis
- Retail Commercial Market Impact Study
- Urban Design Report/Brief

**Transportation**

- Transportation Impact Study
- Transportation System Impact Study
- Parking Analysis
- *Pedestrian* Route and Sidewalk Analysis
- Roundabout Feasibility Analysis
- Traffic Calming Options Report
- Transit Assessment
- Transportation Demand Management Options Report
- Provincial Requirements and Permits under the Public Transportation Act and Highway Improvements Act
- Environmental Assessment and Other Appropriate Studies for development adjacent to Proposed Regional and Provincial Corridors

## **APPENDIX G:**

### **Borehole Logs**

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 6, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
						TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	50100150200											
						WATER CONTENT & ATTERBERG LIMITS										W <sub>p</sub> W		W <sub>L</sub>			
						DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m										▼					
						STANDARD PENETRATION TEST, BLOWS/0.3m										●					
						102030405060708090100															
0	356.7	Edge of Plowed Field			0																
	356.6	Dark brown to black, sandy silt			1	SS	1	610 610	7												
	356.4	topsoil FILL			2																
		- moist																			
		Brown, silty sand FILL			3																
1		Dark brown to black, sandy silt			4	SS	2	100 610	10												
	355.2	TOPSOIL			5																
	355.1	- moist																			
		Compact, brown, silty SAND (SM)			6	SS	3	610 610	15												
2		- wet			7																
		- slightly dilatant			8																
		Hard to very stiff, brown, silty			9	SS	4	610 610	19												
		CLAY (CL) TILL			10																
		- trace sand and gravel			11	SS	5	610 610	11												
		- DTPL to APL			12																
3		- grey below 3.1 m BGS			13																
					14																
					15																
					16	SS	6	460 610	19												
5		- coarse grained sand and gravel			17																
		seam/layer, saturated			18																
					19																
					20																
					21	SS	7	510 610	12												
	350.0				22																
7		Borehole terminated at 6.7 m BGS.			23																
		50 mm diameter PVC well installed			24																
		with 3.1 m screen across 3.1 - 6.1 m			25																
		BGS. Sand from 6.1 m up to 2.7 m,			26																
		and bentonite from 2.7 m to 0.3 m			27																
		BGS. Concrete and above ground																			
8		casing. MECP Well Tag # A313918																			
										□ Field Vane Test, kPa											
										■ Remoulded Vane Test, kPa											
										△ Pocket Penetrometer Test, kPa											

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

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 5, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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☐ Field Vane Test, kPa  
☒ Remoulded Vane Test, kPa  
 Pocket Penetrometer Test, kPa

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 5, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
						TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	50 100 150 200										
										WATER CONTENT & ATTERBERG LIMITS DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m										
										W <sub>p</sub> W W <sub>L</sub>										
0	360.2	Grassed			0					10	20	30	40	50	60	70	80	90	100	
	359.9	Dark brown, sandy silt topsoil FILL - some clay, trace gravel - wet			1	SS	1	610 610	7	●		○								
	359.4	Brown, sandy silt FILL - some clay, trace gravel - wet			2															
1					3	SS	2	610 610	9	●		○			△					
	358.7	Loose, mottled brown, sandy SILT (ML) - trace to some clay - wet			4															
					5															
2					6	SS	3	610 610	16		●	○					△			
	357.9	Compact, brown, silty SAND (SM) - wet - very stiff, brown, sandy silt, some clay layers, APL			7															
					8	SS	4	510 610	18		●									
					9															
3		Compact, brown to grey, SILT (ML) - trace sand and clay - wet - slightly dilatant			10															
		- grey below 3.4 m BGS - very stiff, grey, clayey silt layer, APL			11	SS	5	610 610	16		●						△			
					12															
4					13															
					14															
					15															
5		- slightly dilatant seam			16	SS	6	560 610	24		○	●								
					17															
					18															
					19															
6					20															
	353.8				21	SS	7	610 610	21		○	●								
	353.5	Very stiff, grey, clayey SILT (CL-ML) TILL - DTPL			22															
7					23															
		Borehole terminated at 6.7 m BGS. 50 mm diameter PVC well installed with 3.1 m screen across 3.1 - 6.1 m BGS. Sand from 6.1 m up to 2.7 m, and bentonite from 2.7 m to 0.3 m BGS. Concrete and above ground casing. MECP Well Tag # A069634			24															
					25															
8					26															
					27															

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

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

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 6, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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☐ Field Vane Test, kPa  
☒ Remoulded Vane Test, kPa  
☐ Pocket Penetrometer Test, kPa



CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 6, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%)
						TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	50 100 150 200										
										WATER CONTENT & ATTERBERG LIMITS										
										DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m										▼
										STANDARD PENETRATION TEST, BLOWS/0.3m										●
										10 20 30 40 50 60 70 80 90 100										GR SA SI CL
0	362.0	Grassed			0															
	361.7	Loose, dark brown, sandy silt TOPSOIL - moist			1	SS	1	510 / 610	8											
	361.2	Loose, brown, sandy SILT (ML) TILL - some gravel - trace clay - moist			2															
1					3	SS	2	510 / 610	15											5 20 51 24
					4															
					5															
2		Very stiff to hard, mottled brown, CLAY with Sand (CL) TILL - silty			6	SS	3	610 / 610	23											
	359.7	- trace gravel - DTPL to APL - frequent silt seams - occasional silty sand layers			7															
					8	SS	4	610 / 610	44											
					9															
3	358.9	Dense, light brown, silty SAND (SM) - moist - occasional clayey pockets			10															
					11	SS	5	560 / 610	44											
					12															
4		Hard, grey-brown, CLAY (CL) TILL - DTPL - silt seams - silty sand layers			13															
	357.4				14															
					15															
5		Very dense, grey, silty SAND (SM) - moist to wet - slightly dilatant - occasional clayey pockets			16	SS	6	610 / 610	73											
					17															
					18															
					19															
6					20															
					21	SS	7	610 / 610	53											
	355.3				22															
7		Borehole terminated at 6.7 m BGS. 50 mm diameter PVC well installed with 3.1 m screen across 3.1 - 6.1 m BGS. Sand from 6.1 m up to 2.7 m, and bentonite from 2.7 m to 0.3 m BGS. Concrete and above ground casing. MECP Well Tag # A245818			23															
					24															
					25															
8					26															
					27															

Field Vane Test, kPa

Remoulded Vane Test, kPa

Pocket Penetrometer Test, kPa

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

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 5, 2021 WATER LEVEL June 15, 2021 TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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□ Field Vane Test, kPa  
 ■ Remoulded Vane Test, kPa  
 △ Pocket Penetrometer Test, kPa

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 5, 2021 WATER LEVEL \_\_\_\_\_ TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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☐ Field Vane Test, kPa  
☒ Remoulded Vane Test, kPa  
 Pocket Penetrometer Test, kPa

CLIENT Strohvest Ontario Inc. PROJECT No. 161413217  
 LOCATION Stroh Properties, Wellesley DATUM \_\_\_\_\_  
 DATES: BORING May 5, 2021 WATER LEVEL \_\_\_\_\_ TPC ELEVATION \_\_\_\_\_

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES				UNDRAINED SHEAR STRENGTH (kPa)										REMARKS & GRAIN SIZE DISTRIBUTION (%)
						TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	50100150200										
										WATER CONTENT & ATTERBERG LIMITS										
										DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m										▼
										STANDARD PENETRATION TEST, BLOWS/0.3m										●
										102030405060708090100										GR SA SI CL
0	361.5	Plowed Field			0															
	361.2	Loose, dark brown, sandy silt TOPSOIL - trace clay - wet			1	SS	1	610 610	8		●	○								
					2															
1		Very stiff, mottled brown, clayey SILT (CL-ML) TILL - some sand - trace gravel - rootlets to 1.4 m BGS - APL			3	SS	2	460 610	9		●	○			△					
					4															
					5															
2					6	SS	3	610 610	12		●	○			△					
	359.1				7															
		Compact, brown, SILT (ML) TILL - trace to some clay - trace sand and gravel - moist			8	SS	4	610 610	23		○	●								
	358.4				9															
3	358.3	- frequently laminated with silt seams			10															
		Compact, grey, silty SAND (SM) - moist			11	SS	5	610 610	29		○	●								
					12															
4		Hard, grey, clayey SILT (CL-ML) TILL - DTPL			13															
	356.9	- silty fine sand layers, moist			14															
5		Very stiff, grey, CLAY (CL) TILL - trace gravel - occasional silt seams - APL			15															
	356.3				16	SS	6	610 610	12		●	○			△					
					17															
6		Borehole terminated at 5.2 m BGS. Borehole open and dry. Backfilled with bentonite and cuttings to surface.			18															
					19															
					20															
					21															
7					22															
					23															
					24															
					25															
8					26															
					27															

Field Vane Test, kPa

Remoulded Vane Test, kPa

Pocket Penetrometer Test, kPa

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

**Method:** CME 850, Hollow-stem  
**Date started/completed:** 16-Oct-2023 / 17-Oct-2023  
**Ground surface elevation:** 361.97 m AMSL  
**Top of casing elevation:** 363.02 m AMSL  
**Easting:** 518546  
**Northing:** 4813327

STANTEC BOREHOLE AND WELL V2 161413217\_SH\_DS.GPJ STANTEC - DATA TEMPLATE.GDT 6/5/24 DRSMITH

AGS - Above Ground Surface



# Monitoring Well: MW105-23

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Scott Hutchinson  
**Contractor:** Aardvark Drilling Inc.

**Method:** CME 850, Hollow-stem  
**Date started/completed:** 16-Oct-2023 / 17-Oct-2023  
**Ground surface elevation:** 361.97 m AMSL  
**Top of casing elevation:** 363.02 m AMSL  
**Easting:** 518546  
**Northing:** 4813327

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value	Diagram	Description
(ft) (m)									
50		CLAY (TILL) Dark grayish brown (10YR 4/2), moist, very stiff				100%	(20)		
16				13	SS	22" 92%	2-6-8-4 (14)		
55			345.13						
		SILTY SAND Dark gray (10YR 4/1), wet, compact	16.84	14	SS	24" 100%	5-3-7-10 (10)		
		CLAY (TILL) Dark grayish brown (10YR 4/2), moist, stiff to very stiff Some silt from 19.81 m to 22.86 m	344.98 16.99						
18				15	SS	20" 83%	2-6-8-6 (14)		
60									
65				16	SS	25" 104%	1-6-7-5 (13)		
20									
70				17	SS	24" 100%	3-5-11-7 (16)		
22									
75			338.93						
		SAND Fine to coarse, trace silt, subangular to subround, dark gray (10YR 4/1), wet, compact	23.04	18	SS	18" 75%	1-4-7-6 (11)		
		CLAY (TILL) Dark gray (10YR 4/1), moist, very stiff	338.73 23.24						
24									
80			336.98	19	SS	24" 100%	3-7-11-11 (18)		
		End of Borehole	24.99						
26									
90									
28									
95									

Holeplug  
20.06 to 20.67 m BGS

No. 2 Silica Sand  
20.67 to 24.33 m BGS

No. 10 Slot  
Schedule 40  
PVC Screen  
21.28 to 24.33 m BGS

Holeplug  
24.33 to 24.99 m BGS

Screen Interval: 21.28 - 24.33 m BGS  
Sand Pack Interval: 20.67 - 24.33 m BGS  
Well Seal Interval: 0.00 - 20.67 m BGS

Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
SS - split-spoon sample  
n/a - not available

AGS - Above Ground Surface



Drawn By/Checked By: SH/ GW

Sheet 2 of 2

STANTEC BOREHOLE AND WELL V2 161413217\_SH\_DS.GPJ STANTEC - DATA TEMPLATE.GDT 6/5/24 DRS/SMITH

# Test Pit: TP01-24

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Drew Smith  
**Contractor:** Strohvest Ontario Inc.

**Method:** Rubber Tire Backhoe  
**Date started/completed:** 01-May-2024 / 02-May-2024  
**Ground surface elevation:** 356.70 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 518328  
**Northing:** 4813349

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description	
(ft)	(m)					
		Ground Surface	356.70			
		TOPSOIL Clay, dark brown	0.00			
2		SILTY TO LEAN CLAY Pale brown	356.10			
		Grain-size analysis results at 0.7 m BGS: 0% Gravel, 4% Sand, 76% Silt, 20% Clay	0.60			
1		Grain-size analysis results at 1.1 m BGS: 1% Gravel, 7% Sand, 53% Silt, 39% Clay				
4						
		Moisture noted on test pit wall at 1.8 m BGS about one day after completion				
6		Transition to silt, some clay, trace fine-grained sand				
2						
8		Minor seepage noted at 2.5 m BGS within one hour of excavation completion; moisture on wall remains present about one day after completion	354.00			
		CLAYEY SILT Trace fine-grained sand, grey, blocky	2.70			
10	3					
		Water level in test pit at 3.4 m BGS. Soil sloughing from side walls noted in bottom of test pit about one day after completion	353.10			
12		End of Test Pit	3.60			
4						

Backfilled with Natural  
Cave/ Cuttings  
0 to 3.6 m BGS

Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
n/a - not available

Depths and elevations are approximate.



Drawn By/Checked By: DS/ GW

Sheet 1 of 1

STANTEC BOREHOLE AND WELL V2 161413217\_SH\_DS.GPJ STANTEC - DATA TEMPLATE.GDT 6/21/24 DRSMITH

# Test Pit: TP02-24

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Drew Smith  
**Contractor:** Strohvest Ontario Inc.

**Method:** Rubber Tire Backhoe  
**Date started/completed:** 01-May-2024 / 02-May-2024  
**Ground surface elevation:** 361.10 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 518532  
**Northing:** 4813329

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL)	Depth (m BGS)	Diagram	Description
(ft)	(m)					
		Ground Surface	361.10			
		TOPSOIL Clay, dark brown	0.00			
2		SILT Trace fine-grained sand, pale brown, moist	360.60	0.50		
1		Moisture noted on test pit walls from 1.0 m BGS to base of pit about one day after completion				
4						
6						
2						
8						
10		CLAYEY SILT Grey, blocky	358.20	2.90		
12						
4		Soil sloughing from all test pit walls noted in bottom of test pit. No water pooled in bottom of pit about one day after completion.	357.10			
		End of Test Pit	4.00			

Backfilled with Natural  
Cave/ Cuttings  
0 to 4.0 m BGS

Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
n/a - not available

Depths and elevations are approximate.



Drawn By/Checked By: DS/ GW

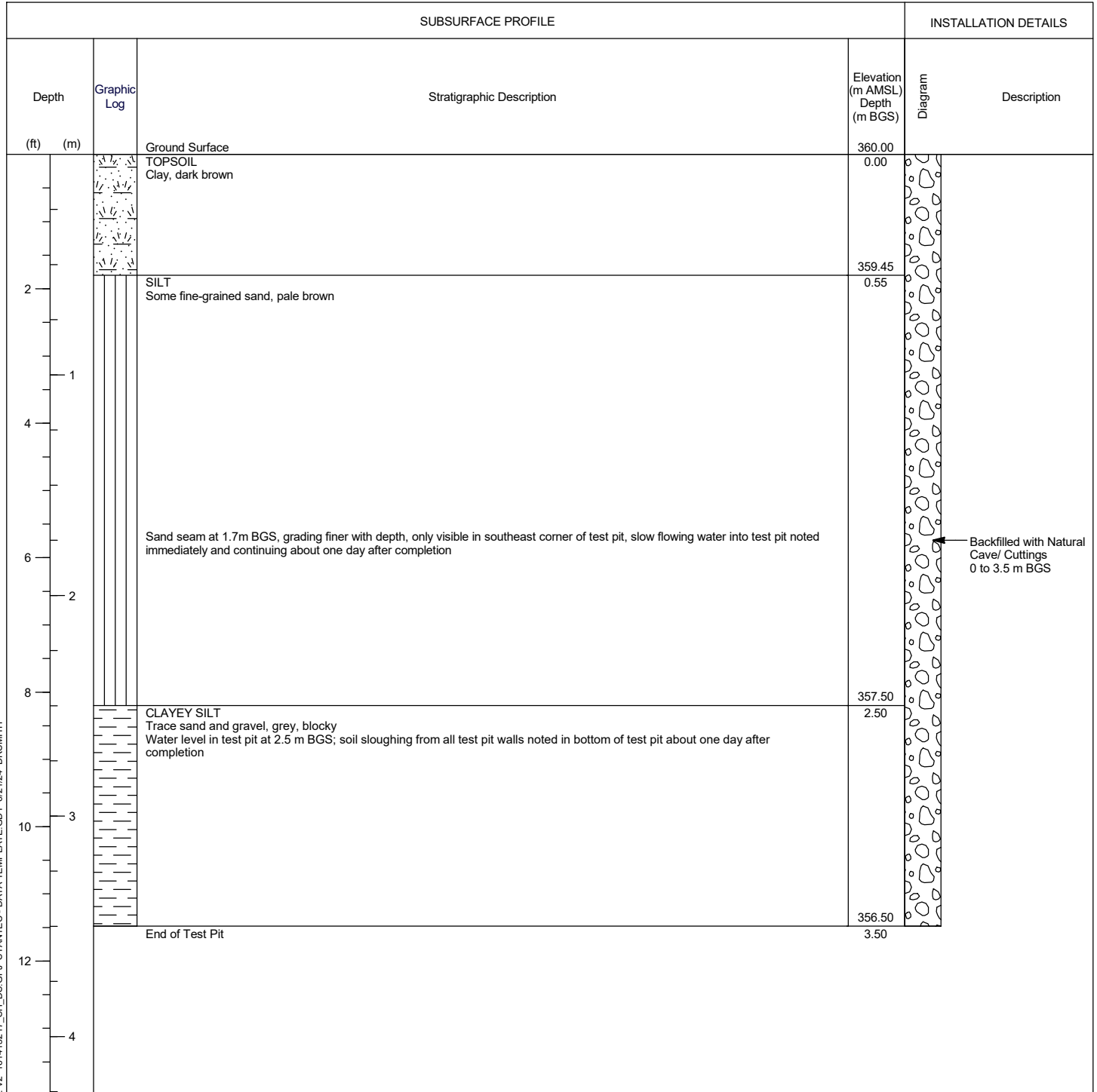
Sheet 1 of 1



# Test Pit: TP03-24

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Drew Smith  
**Contractor:** Strohvest Ontario Inc.

**Method:** Rubber Tire Backhoe  
**Date started/completed:** 01-May-2024 / 02-May-2024  
**Ground surface elevation:** 360.00 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 518471  
**Northing:** 4813225



Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
n/a - not available

Depths and elevations are approximate.



Drawn By/Checked By: DS/ GW

Sheet 1 of 1

STANTEC BOREHOLE AND WELL V2 161413217\_SH\_DS.GPJ STANTEC - DATA TEMPLATE.GDT 6/21/24 DRSMITH

# Test Pit: TP04-24

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Drew Smith  
**Contractor:** Strohvest Ontario Inc.

**Method:** Rubber Tire Backhoe  
**Date started/completed:** 01-May-2024 / 02-May-2024  
**Ground surface elevation:** 355.60 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 518280  
**Northing:** 4813005

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description	
(ft)	(m)					
		Ground Surface	355.60			
		TOPSOIL Clay, dark brown	0.00			
2		SANDY CLAY Trace fine-grained sand, pale brown Grain-size analysis results at 0.6 m BGS: 9% Gravel, 32% Sand, 30% Silt, 29% Clay	0.60			
1		LEAN CLAY Brown with reddish brown and greyish brown discolourations, blocky Grain-size analysis results at 1.1 m BGS: 1% Gravel, 5% Sand, 38% Silt, 56% Clay	1.00			
4						
6		Gravelly sand seam at 1.8 m BGS on eastern test pit wall; slow flowing water noted into test pit immediately after completion				
2						
8						
		GRAVELLY SAND Trace to some fine sand. Layer observed on all test pit walls; slow flowing water into test pit noted immediately after completion Water level in test pit at 2.5 m BGS one day after completion	2.50			
		SILTY CLAY Grey	2.75			
10	3					
		End of Test Pit	3.50			
12						
4						

Backfilled with Natural  
Cave/ Cuttings  
0 to 3.5 m BGS

Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
n/a - not available

Depths and elevations are approximate.



Drawn By/Checked By: DS/ GW

Sheet 1 of 1

# Test Pit: TP05-24

**Project:** Strohvest Subdivision, Hydrogeological Assessment  
**Client:** Strohvest Ontario Inc.  
**Location:** Wellesley ON  
**Number:** 161413217  
**Field investigator:** Drew Smith  
**Contractor:** Strohvest Ontario Inc.

**Method:** Rubber Tire Backhoe  
**Date started/completed:** 01-May-2024 / 02-May-2024  
**Ground surface elevation:** 362.00 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 518532  
**Northing:** 4813026

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Diagram	Description	
(ft) (m)						
		Ground Surface	362.00			
		TOPSOIL Clay, dark brown	0.00			
2		CLAYEY SILT Trace fine to coarse-grained sand, trace gravel, yellowish brown, moist	361.45 0.55			
1		SILT Trace fine-grained sand Minor flow originating from seep located in northwest corner of test pit following initial excavation. Groundwater seep no longer flowing about one day after completion.	361.00 1.00			
4						
6						
2						
8						
10		CLAYEY SILT Trace coarse-grained sand, trace gravel, grey	359.40 2.60			
3						
12		Water pooled in northwest corner of test pit about one day after completion. Pooled water a byproduct of sand seam (seep) drainage.	358.40			
4		End of Test Pit	3.60			

Backfilled with Natural  
Cave/ Cuttings  
0 to 3.6 m BGS

Notes:  
m AMSL - metres above mean sea level  
m BGS - metres below ground surface  
n/a - not available

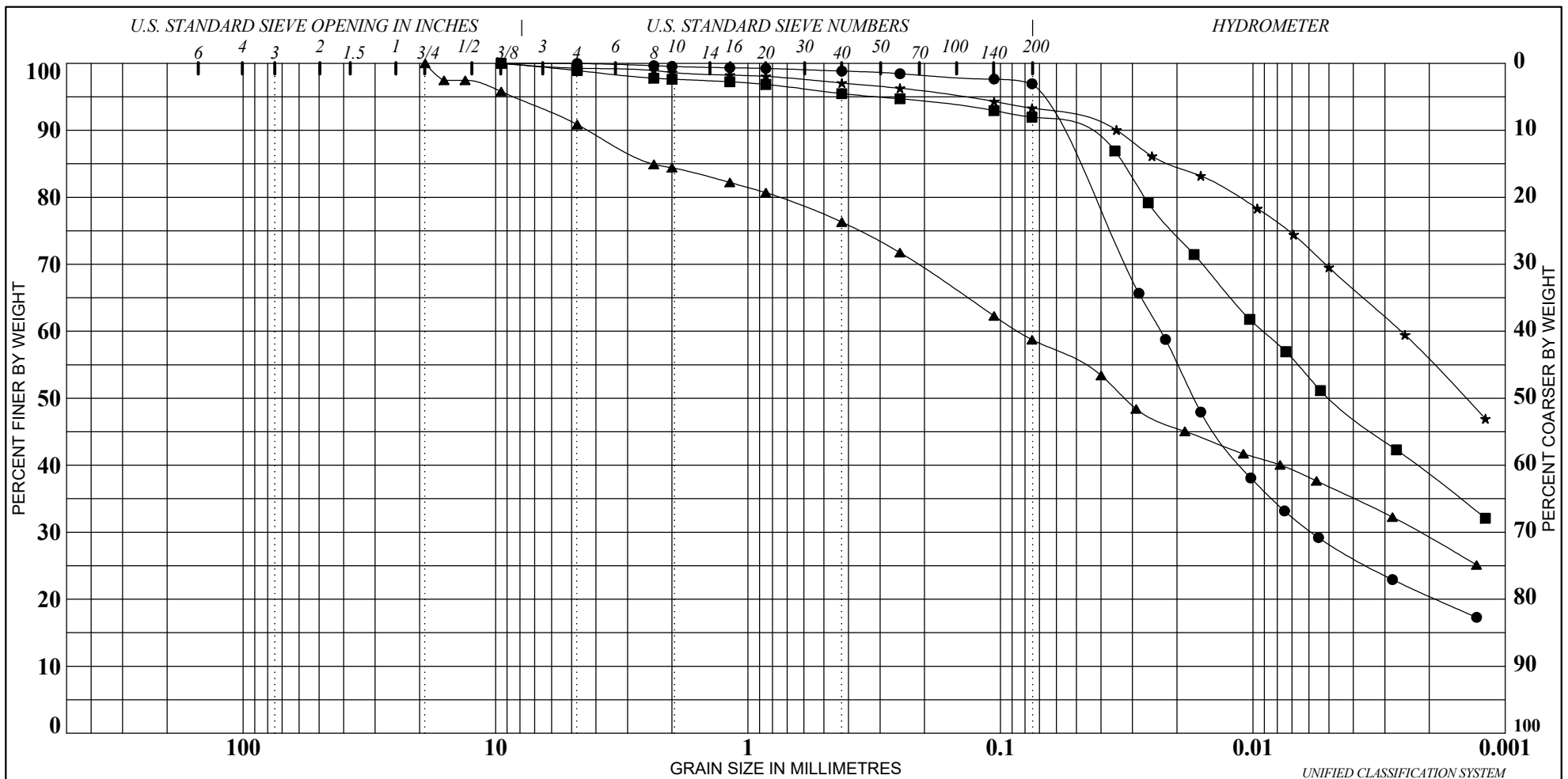
Depths and elevations are approximate.



Drawn By/Checked By: DS/ GW

Sheet 1 of 1

STANTEC BOREHOLE AND WELL V2 161413217\_SH\_DS.GPJ STANTEC - DATA TEMPLATE.GDT 6/21/24 DRSMITH

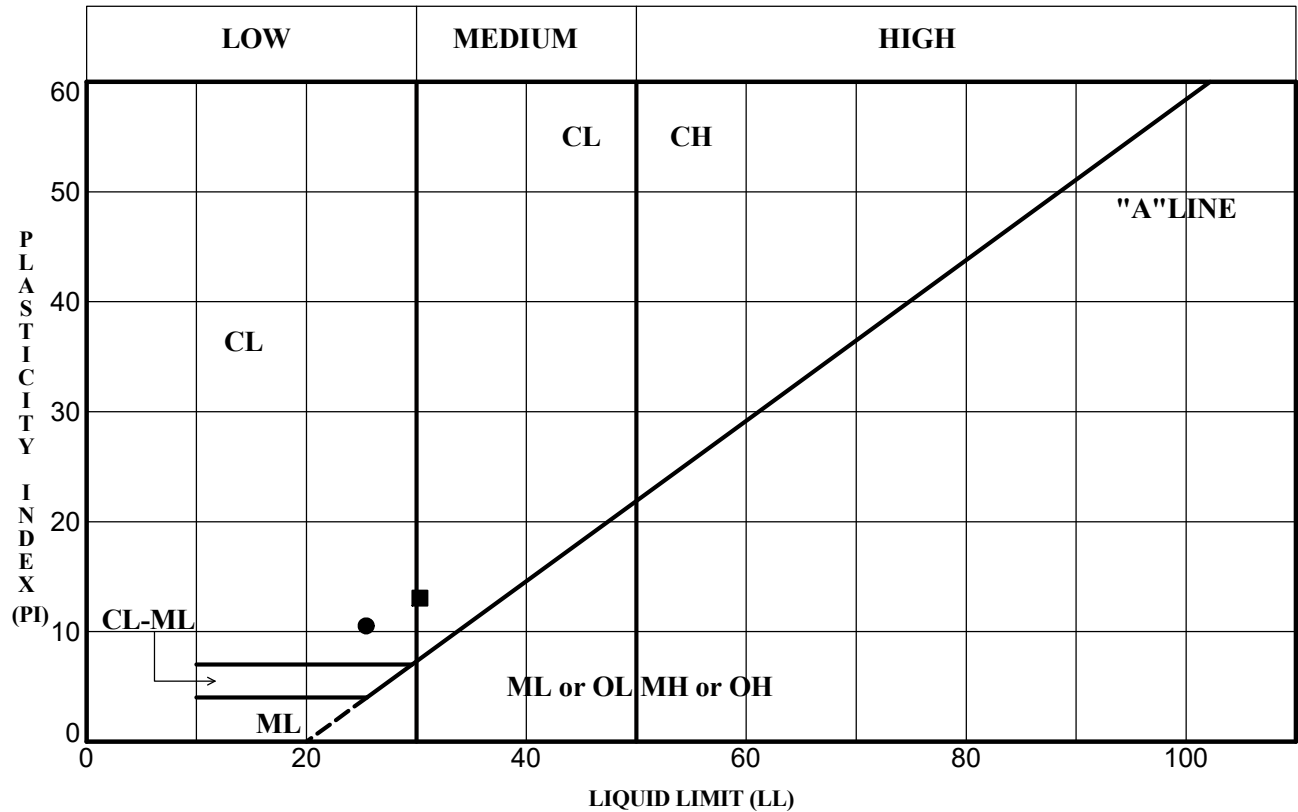


BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W <sub>L</sub>	W <sub>p</sub>	I <sub>p</sub>	%Gravel	%Sand	%Silt	%Clay
● TP01-24	0.7	SILTY CLAY(CL-ML)	15				0	4	76	20
■ TP01-24	1.1	LEAN CLAY(CL)	16	25	15	10	1	7	53	39
▲ TP04-24	0.6	SANDY LEAN CLAY(CL)	23	30	17	13	9	32	30	29
★ TP04-24	1.1	LEAN CLAY(CL)	20				1	5	38	56

	<b>Project:</b> Strohvest Subdivision	<b>GRADATION CURVE</b> (ASTM D422)
	<b>Location:</b>	<b>Figure:</b> 1
	<b>Project No.:</b> 161413217	<b>Remarks:</b>

# PLASTICITY CHART



Specimen	Depth (m)	LL	PL	PI	Fines	W%	Classification
● TP01-24	1.1	25	15	10	92	16	LEAN CLAY(CL)
■ TP04-24	0.6	30	17	13	59	23	SANDY LEAN CLAY(CL)



**Project:** Strohvest Subdivision

**Location:**

**Project No.:** 161413217

**ATTERBERG LIMITS**  
(ASTM D4318)

**Figure:** 2

**Remarks:**

**PROJECT: Strohvest Subdivision****MOISTURE CONTENT**

<b>BH</b>	<b>DEPTH (ft)</b>	<b>SAMPLE</b>	<b>Moisture Content %</b>
TP01-24	2.2	1	14.7
TP01-24	3.5	2	16.3
TP04-24	2	1a	23.2
TP04-24	3.5	2	20.4

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6501877	518834	4813363	362.95	0.00	7.62	362.95	355.33	DUG		
6501877	518834	4813363	362.95	7.62	38.40	355.33	324.55	CLAY		
6501877	518834	4813363	362.95	38.40	65.53	324.55	297.42	MEDIUM SAND		
6501877	518834	4813363	362.95	65.53	70.71	297.42	292.24	SHALE		
6501878	518954	4813503	356.64	0.00	8.23	356.64	348.41	CLAY	MEDIUM SAND	
6501878	518954	4813503	356.64	8.23	60.05	348.41	296.59	MEDIUM SAND		
6501878	518954	4813503	356.64	60.05	78.03	296.59	278.61	ROCK		
6501879	519054	4813363	359.13	0.00	0.91	359.13	358.22	CLAY		
6501879	519054	4813363	359.13	0.91	1.52	358.22	357.61	MEDIUM SAND		
6501879	519054	4813363	359.13	1.52	30.48	357.61	328.65	CLAY		
6501879	519054	4813363	359.13	30.48	49.07	328.65	310.06	MEDIUM SAND		
6501879	519054	4813363	359.13	49.07	60.35	310.06	298.78	MEDIUM SAND	GRAVEL	
6501879	519054	4813363	359.13	60.35	63.40	298.78	295.73	MEDIUM SAND		
6501879	519054	4813363	359.13	63.40	70.10	295.73	289.03	LIMESTONE		
6501880	518974	4813163	359.36	0.00	17.68	359.36	341.68	CLAY		
6501880	518974	4813163	359.36	17.68	27.74	341.68	331.63	HARDPAN		
6501880	518974	4813163	359.36	27.74	29.57	331.63	329.80	GRAVEL	HARDPAN	
6501880	518974	4813163	359.36	29.57	30.48	329.80	328.88	GRAVEL	COARSE SAND	
6501881	518764	4813753	357.57	0.00	7.01	357.57	350.56	DUG		
6501881	518764	4813753	357.57	7.01	18.29	350.56	339.28	CLAY		
6501881	518764	4813753	357.57	18.29	21.34	339.28	336.23	MEDIUM SAND	CLAY	
6501881	518764	4813753	357.57	21.34	42.67	336.23	314.89	HARDPAN		
6501881	518764	4813753	357.57	42.67	60.35	314.89	297.22	GRAVEL		
6501881	518764	4813753	357.57	60.35	68.88	297.22	288.68	LIMESTONE		
6501881	518764	4813753	357.57	68.88	69.49	288.68	288.07	LIMESTONE		
6501882	518974	4813083	357.34	0.00	9.14	357.34	348.20	CLAY		
6501882	518974	4813083	357.34	9.14	38.40	348.20	318.94	HARDPAN	BOULDERS	
6501882	518974	4813083	357.34	38.40	39.01	318.94	318.33	QUICKSAND		
6501882	518974	4813083	357.34	39.01	49.99	318.33	307.35	HARDPAN		
6501882	518974	4813083	357.34	49.99	54.25	307.35	303.09	LIMESTONE		
6501883	519044	4813343	359.17	0.00	0.61	359.17	358.56	FILL		
6501883	519044	4813343	359.17	0.61	3.96	358.56	355.21	CLAY		

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6501883	519044	4813343	359.17	3.96	26.52	355.21	332.65	CLAY		
6501883	519044	4813343	359.17	26.52	27.13	332.65	332.04	FINE SAND		
6501883	519044	4813343	359.17	27.13	32.92	332.04	326.25	CLAY	MEDIUM SAND	
6501883	519044	4813343	359.17	32.92	37.80	326.25	321.37	HARDPAN	GRAVEL	
6501883	519044	4813343	359.17	37.80	46.63	321.37	312.53	CLAY	MEDIUM SAND	
6501883	519044	4813343	359.17	46.63	48.46	312.53	310.70	HARDPAN	GRAVEL	
6501883	519044	4813343	359.17	48.46	54.25	310.70	304.91	SHALE		
6501883	519044	4813343	359.17	54.25	56.39	304.91	302.78	ROCK		
6501884	519014	4813623	349.84	0.00	0.91	349.84	348.93	FILL		
6501884	519014	4813623	349.84	0.91	36.58	348.93	313.27	CLAY		
6501884	519014	4813623	349.84	36.58	42.67	313.27	307.17	CLAY	STONES	
6501884	519014	4813623	349.84	42.67	43.59	307.17	306.26	MEDIUM SAND		
6501884	519014	4813623	349.84	43.59	43.89	306.26	305.95	GRAVEL		
6501886	518894	4813188	361.05	0.00	0.61	361.05	360.44	TOPSOIL		
6501886	518894	4813188	361.05	0.61	36.58	360.44	324.47	CLAY	MEDIUM SAND	
6501886	518894	4813188	361.05	36.58	44.20	324.47	316.85	FINE SAND		
6501886	518894	4813188	361.05	44.20	46.63	316.85	314.41	MEDIUM SAND		
6501887	518304	4813923	361.15	0.00	0.91	361.15	360.23	FILL		
6501887	518304	4813923	361.15	0.91	14.33	360.23	346.82	MEDIUM SAND	CLAY	
6501887	518304	4813923	361.15	14.33	30.78	346.82	330.36	HARDPAN		
6501887	518304	4813923	361.15	30.78	34.75	330.36	326.40	GRAVEL		
6501887	518304	4813923	361.15	34.75	49.99	326.40	311.16	HARDPAN		
6501887	518304	4813923	361.15	49.99	54.25	311.16	306.89	QUICKSAND		
6501887	518304	4813923	361.15	54.25	60.35	306.89	300.80	GRAVEL	MEDIUM SAND	
6501887	518304	4813923	361.15	60.35	61.57	300.80	299.58	SHALE		
6501887	518304	4813923	361.15	61.57	70.41	299.58	290.74	LIMESTONE		
6501896	518694	4813968	351.69	0.00	0.61	351.69	351.08	TOPSOIL		
6501896	518694	4813968	351.69	0.61	8.53	351.08	343.15	CLAY		
6501896	518694	4813968	351.69	8.53	27.43	343.15	324.26	HARDPAN		
6501896	518694	4813968	351.69	27.43	28.04	324.26	323.65	GRAVEL		
6501897	518844	4813963	354.63	0.00	6.10	354.63	348.53	CLAY		
6501897	518844	4813963	354.63	6.10	15.24	348.53	339.39	MEDIUM SAND	CLAY	



## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6501897	518844	4813963	354.63	15.24	27.43	339.39	327.20	HARDPAN		
6501897	518844	4813963	354.63	27.43	30.48	327.20	324.15	GRAVEL		
6501898	518234	4814013	363.50	0.00	0.61	363.50	362.89	TOPSOIL		
6501898	518234	4814013	363.50	0.61	15.54	362.89	347.96	CLAY		
6501898	518234	4814013	363.50	15.54	26.21	347.96	337.29	HARDPAN		
6501898	518234	4814013	363.50	26.21	28.35	337.29	335.16	MEDIUM SAND		
6501898	518234	4814013	363.50	28.35	51.82	335.16	311.69	CLAY		
6501898	518234	4814013	363.50	51.82	54.56	311.69	308.94	HARDPAN		
6501898	518234	4814013	363.50	54.56	57.30	308.94	306.20	MEDIUM SAND		
6502334	518714	4812803	351.23	0.00	2.13	351.23	349.10	GRAVEL		
6502334	518714	4812803	351.23	2.13	4.27	349.10	346.96	MEDIUM SAND		
6502334	518714	4812803	351.23	4.27	11.58	346.96	339.65	CLAY		
6502334	518714	4812803	351.23	11.58	32.00	339.65	319.23	CLAY	MEDIUM SAND	
6502334	518714	4812803	351.23	32.00	39.62	319.23	311.61	MEDIUM SAND		
6502334	518714	4812803	351.23	39.62	43.89	311.61	307.34	CLAY	MEDIUM SAND	
6502334	518714	4812803	351.23	43.89	52.43	307.34	298.80	SHALE		
6502334	518714	4812803	351.23	52.43	59.13	298.80	292.10	LIMESTONE		
6503598	519104	4813473	355.41	0.00	1.52	355.41	353.89	DUG		
6503598	519104	4813473	355.41	1.52	3.66	353.89	351.75	CLAY		
6503598	519104	4813473	355.41	3.66	19.81	351.75	335.60	CLAY		
6503598	519104	4813473	355.41	19.81	21.03	335.60	334.38	BOULDERS		
6503598	519104	4813473	355.41	21.03	33.22	334.38	322.19	CLAY	SILT	
6503598	519104	4813473	355.41	33.22	39.32	322.19	316.09	CLAY	SAND	STONES
6503598	519104	4813473	355.41	39.32	41.15	316.09	314.26	CLAY		
6503598	519104	4813473	355.41	41.15	43.28	314.26	312.13	SAND		
6503993	518888	4813145	359.80	0.00	3.66	359.80	356.15	CLAY		
6503993	518888	4813145	359.80	3.66	17.37	356.15	342.43	CLAY		
6503993	518888	4813145	359.80	17.37	26.52	342.43	333.29	CLAY		
6503993	518888	4813145	359.80	26.52	40.23	333.29	319.57	CLAY		
6503993	518888	4813145	359.80	40.23	43.28	319.57	316.52	CLAY		
6503993	518888	4813145	359.80	43.28	45.11	316.52	314.69	GRAVEL	SAND	
6504338	518914	4813583	354.00	0.00	0.91	354.00	353.08	CLAY		

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6504338	518914	4813583	354.00	0.91	3.66	353.08	350.34	CLAY		
6504338	518914	4813583	354.00	3.66	10.06	350.34	343.94	CLAY	FRAGMENTS	
6504338	518914	4813583	354.00	10.06	23.47	343.94	330.53	CLAY		
6504338	518914	4813583	354.00	23.47	29.26	330.53	324.73	SAND	SILT	
6504338	518914	4813583	354.00	29.26	33.53	324.73	320.47	CLAY		
6504338	518914	4813583	354.00	33.53	34.75	320.47	319.25	CLAY		
6504338	518914	4813583	354.00	34.75	55.78	319.25	298.22	CLAY	SAND	
6504338	518914	4813583	354.00	55.78	58.83	298.22	295.17	CLAY	STONES	SHALE
6504338	518914	4813583	354.00	58.83	59.13	295.17	294.86	SAND	GRAVEL	
6504339	518894	4813183	360.92	0.00	3.66	360.92	357.26	CLAY		
6504339	518894	4813183	360.92	3.66	35.36	357.26	325.56	CLAY	STICKY	
6504339	518894	4813183	360.92	35.36	48.16	325.56	312.76	CLAY	SILT	
6504339	518894	4813183	360.92	48.16	53.64	312.76	307.27	CLAY		
6504339	518894	4813183	360.92	53.64	57.91	307.27	303.01	CLAY		
6504339	518894	4813183	360.92	57.91	58.83	303.01	302.09	CLAY		
6504339	518894	4813183	360.92	58.83	59.44	302.09	301.48	CLAY		
6504339	518894	4813183	360.92	59.44	59.74	301.48	301.18	LIMESTONE		
6504340	518894	4813163	360.39	0.00	3.35	360.39	357.04	CLAY		
6504340	518894	4813163	360.39	3.35	33.83	357.04	326.56	CLAY	STICKY	
6504340	518894	4813163	360.39	33.83	37.49	326.56	322.90	CLAY	SILTY	
6504340	518894	4813163	360.39	37.49	42.98	322.90	317.41	CLAY	SAND	SILTY
6504340	518894	4813163	360.39	42.98	47.24	317.41	313.14	SAND	SILT	
6504340	518894	4813163	360.39	47.24	57.91	313.14	302.48	CLAY	SANDY	
6504340	518894	4813163	360.39	57.91	58.52	302.48	301.87	SAND		
6504340	518894	4813163	360.39	58.52	59.13	301.87	301.26	CLAY		
6504340	518894	4813163	360.39	59.13	59.74	301.26	300.65	SHALE		
6504340	518894	4813163	360.39	59.74	59.74	300.65	300.65	LIMESTONE		
6504341	518894	4813123	359.16	0.00	3.35	359.16	355.80	CLAY		
6504341	518894	4813123	359.16	3.35	32.61	355.80	326.54	CLAY		
6504341	518894	4813123	359.16	32.61	36.88	326.54	322.28	CLAY	SILT	
6504341	518894	4813123	359.16	36.88	43.89	322.28	315.27	CLAY		
6504341	518894	4813123	359.16	43.89	48.77	315.27	310.39	GRAVEL		

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6504341	518894	4813123	359.16	48.77	49.07	310.39	310.08	LIMESTONE	FRACTURED	
6504342	518894	4813083	357.62	0.00	3.35	357.62	354.27	CLAY		
6504342	518894	4813083	357.62	3.35	32.61	354.27	325.01	CLAY		
6504342	518894	4813083	357.62	32.61	36.88	325.01	320.74	CLAY	SILT	
6504342	518894	4813083	357.62	36.88	43.89	320.74	313.73	CLAY		
6504342	518894	4813083	357.62	43.89	48.46	313.73	309.16	GRAVEL		
6504711	519074	4813443	357.44	0.00	1.83	357.44	355.61	GRAVEL	FILL	LOOSE
6504711	519074	4813443	357.44	1.83	9.75	355.61	347.68	CLAY	STONES	HARD
6504711	519074	4813443	357.44	9.75	39.01	347.68	318.42	CLAY	HARD	
6504711	519074	4813443	357.44	39.01	44.50	318.42	312.93	SAND	CLAY	LOOSE
6504711	519074	4813443	357.44	44.50	45.72	312.93	311.72	FINE GRAVEL	LOOSE	
6504797	518874	4813603	355.67	0.00	0.30	355.67	355.36	TOPSOIL		
6504797	518874	4813603	355.67	0.30	2.74	355.36	352.92	CLAY		
6504797	518874	4813603	355.67	2.74	25.91	352.92	329.76	CLAY		
6504797	518874	4813603	355.67	25.91	26.21	329.76	329.45	GRAVEL		
6504797	518874	4813603	355.67	26.21	39.32	329.45	316.35	CLAY		
6504797	518874	4813603	355.67	39.32	44.50	316.35	311.17	SAND	CLAY	
6505158	519047	4813387	359.78	0.00	8.53	359.78	351.24	CLAY	GRAVEL	LOOSE
6505158	519047	4813387	359.78	8.53	30.48	351.24	329.30	CLAY	HARD	
6505158	519047	4813387	359.78	30.48	45.11	329.30	314.67	CLAY	SAND	LOOSE
6505158	519047	4813387	359.78	45.11	47.85	314.67	311.93	SAND	SILT	LOOSE
6505158	519047	4813387	359.78	47.85	62.48	311.93	297.30	CLAY	STONES	SAND
6505158	519047	4813387	359.78	62.48	64.31	297.30	295.47	SHALE	HARD	
6505158	519047	4813387	359.78	64.31	65.84	295.47	293.94	LIMESTONE	HARD	
6505684	518877	4813894	354.68	0.00	5.79	354.68	348.88	CLAY		SANDY
6505684	518877	4813894	354.68	5.79	10.36	348.88	344.31	CLAY	STONES	HARD
6505684	518877	4813894	354.68	10.36	13.11	344.31	341.57	SAND	GRAVEL	SOFT
6505684	518877	4813894	354.68	13.11	33.22	341.57	321.45	CLAY	SAND	SOFT
6505684	518877	4813894	354.68	33.22	41.15	321.45	313.53	SAND	CLAY	
6505684	518877	4813894	354.68	41.15	51.21	313.53	303.47	HARDPAN	STONES	HARD
6505684	518877	4813894	354.68	51.21	62.79	303.47	291.89	SAND	CLAY	
6505684	518877	4813894	354.68	62.79	64.31	291.89	290.36	SAND	GRAVEL	SOFT

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6505684	518877	4813894	354.68	64.31	67.67	290.36	287.01	GRAVEL	BOULDERS	SOFT
6505710	518519	4814053	363.44	0.00	2.44	363.44	361.00	CLAY		
6505710	518519	4814053	363.44	2.44	3.66	361.00	359.78	SAND		
6505710	518519	4814053	363.44	3.66	6.10	359.78	357.34	CLAY		
6505710	518519	4814053	363.44	6.10	6.40	357.34	357.04	CLAY	SAND	LAYERED
6505710	518519	4814053	363.44	6.40	10.97	357.04	352.47	CLAY		
6505710	518519	4814053	363.44	10.97	11.58	352.47	351.86	CLAY		HARD
6506203	518993	4812967	352.61	0.00	6.40	352.61	346.21	CLAY		SOFT
6506203	518993	4812967	352.61	6.40	35.36	346.21	317.25	STONES	BOULDERS	HARD
6506203	518993	4812967	352.61	35.36	43.59	317.25	309.02	STONES	BOULDERS	SAND
6506203	518993	4812967	352.61	43.59	44.50	309.02	308.11	GRAVEL		LOOSE
6506729	518240	4812662	346.31	0.00	0.61	346.31	345.70	TOPSOIL	SOFT	
6506729	518240	4812662	346.31	0.61	7.01	345.70	339.30	CLAY	HARD	STICKY
6506729	518240	4812662	346.31	7.01	26.21	339.30	320.10	CLAY	STONES	SOFT
6506729	518240	4812662	346.31	26.21	29.57	320.10	316.74	SILT	SAND	LOOSE
6506729	518240	4812662	346.31	29.57	29.57	316.74	316.74	CLAY	SOFT	
6506729	518240	4812662	346.31	29.57	33.22	316.74	313.09	CLAY	SOFT	
6506729	518240	4812662	346.31	33.22	36.27	313.09	310.04	SILT	CLAY	LOOSE
6506729	518240	4812662	346.31	36.27	41.15	310.04	305.16	SAND	SILT	LOOSE
6506729	518240	4812662	346.31	41.15	46.02	305.16	300.28	SAND	LOOSE	
6506729	518240	4812662	346.31	46.02	47.85	300.28	298.46	SAND	LOOSE	
6506729	518240	4812662	346.31	47.85	49.38	298.46	296.93	SAND	CLAY	STONES
6506767	517936	4812932	357.43	0.00	5.49	357.43	351.94	CLAY		
6506767	517936	4812932	357.43	5.49	12.19	351.94	345.23	CLAY	STONES	
6506767	517936	4812932	357.43	12.19	35.05	345.23	322.37	CLAY		SANDY
6506767	517936	4812932	357.43	35.05	37.19	322.37	320.24	FINE SAND		
6506767	517936	4812932	357.43	37.19	44.20	320.24	313.23	HARDPAN		
6506767	517936	4812932	357.43	44.20	48.16	313.23	309.27	LIMESTONE		
6507285	518829	4813110	358.19	0.00	0.61	358.19	357.58	FILL	CLAY	
6507285	518829	4813110	358.19	0.61	2.74	357.58	355.44	CLAY		
6507285	518829	4813110	358.19	2.74	17.98	355.44	340.20	CLAY		
6507285	518829	4813110	358.19	17.98	32.00	340.20	326.18	CLAY	FINE SAND	GRAVEL

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
6507285	518829	4813110	358.19	32.00	40.54	326.18	317.65	CLAY	GRAVEL	STONES
6507285	518829	4813110	358.19	40.54	43.28	317.65	314.90	CLAY	STONES	
6507285	518829	4813110	358.19	43.28	49.38	314.90	308.81	GRAVEL	SILT	LAYERED
6507285	518829	4813110	358.19	49.38	50.90	308.81	307.28	LIMESTONE		
6507285	518829	4813110	358.19	50.90	51.51	307.28	306.67	LIMESTONE	SHALE	LAYERED
6507285	518829	4813110	358.19	51.51	52.43	306.67	305.76	LIMESTONE		
6507870	518479	4814084	363.94	0.00	0.61	363.94	363.33	CLAY		
6507870	518479	4814084	363.94	0.61	4.57	363.33	359.37	SAND		
6507870	518479	4814084	363.94	4.57	21.34	359.37	342.60	CLAY		SANDY
6507870	518479	4814084	363.94	21.34	32.00	342.60	331.93	CLAY		
6507870	518479	4814084	363.94	32.00	35.05	331.93	328.89	GRAVEL		DIRTY
6507870	518479	4814084	363.94	35.05	59.44	328.89	304.50	TILL	GRAVEL	SANDY
6507870	518479	4814084	363.94	59.44	60.35	304.50	303.59	CLAY	GRAVEL	
6507870	518479	4814084	363.94	60.35	62.18	303.59	301.76	SHALE		
6708237	518480	4814083	363.95	0.00	0.61	363.95	363.34	TOPSOIL	CLAY	
6708237	518480	4814083	363.95	0.61	4.57	363.34	359.37	SAND		
6708237	518480	4814083	363.95	4.57	21.34	359.37	342.61	SAND	CLAY	
6708237	518480	4814083	363.95	21.34	32.00	342.61	331.94	CLAY		
6708237	518480	4814083	363.95	32.00	35.05	331.94	328.89	GRAVEL		
6708237	518480	4814083	363.95	35.05	59.44	328.89	304.51	SAND	TILL	GRAVEL
6708237	518480	4814083	363.95	59.44	62.18	304.51	301.77	CLAY	GRAVEL	LAYERED
6508521	519025	4813269	359.01	0.00	5.49	359.01	353.52	CLAY	STONES	
6508521	519025	4813269	359.01	5.49	23.77	353.52	335.23	CLAY		
6508521	519025	4813269	359.01	23.77	26.21	335.23	332.79	GRAVEL		
6508521	519025	4813269	359.01	26.21	60.05	332.79	298.96	HARDPAN		
6508521	519025	4813269	359.01	60.05	61.87	298.96	297.13	SAND	STONES	
6508521	519025	4813269	359.01	61.87	64.01	297.13	295.00	GRAVEL	SAND	
6508521	519025	4813269	359.01	64.01	65.84	295.00	293.17	HARDPAN		
7046752	518804	4813120	358.46	0.00	3.66	358.46	354.80	GRAVEL	FILL	
7046752	518804	4813120	358.46	3.66	25.91	354.80	332.55	CLAY		
7046752	518804	4813120	358.46	25.91	45.42	332.55	313.04	CLAY	STONES	SILTY
7046752	518804	4813120	358.46	45.42	47.85	313.04	310.60	GRAVEL	SAND	

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
7046752	518804	4813120	358.46	47.85	50.90	310.60	307.55	MEDIUM SAND		
7046752	518804	4813120	358.46	50.90	52.43	307.55	306.03	LIMESTONE		
7136166	518730	4812736	350.67	0.00	58.83	350.67	291.84			
7177219	518837	4813894	353.87	0.00	2.13	353.87	351.74	GRAVEL	SAND	FILL
7177219	518837	4813894	353.87	2.13	6.10	351.74	347.77	CLAY	TILL	
7185327	518991	4812953	351.97	0.00	7.92	351.97	344.05	CLAY		
7185327	518991	4812953	351.97	7.92	9.75	344.05	342.22	CLAY	STONES	
7185327	518991	4812953	351.97	9.75	11.58	342.22	340.39	SILT	SAND	
7185327	518991	4812953	351.97	11.58	44.81	340.39	307.17	CLAY	STONES	
7185327	518991	4812953	351.97	44.81	47.85	307.17	304.12	LIMESTONE		
7185953	518941	4813100	358.30	0.00	0.30	358.30	358.00	TOPSOIL		
7185953	518941	4813100	358.30	0.30	1.20	358.00	357.10	SAND	FINE GRAVEL	BEARING
7185953	518941	4813100	358.30	1.20	2.40	357.10	355.90	CLAY	SILT	
7185953	518941	4813100	358.30	2.40	4.00	355.90	354.30	CLAY		DENSE
7185954	518951	4813092	357.94	0.00	0.30	357.94	357.64	TOPSOIL		
7185954	518951	4813092	357.94	0.30	2.40	357.64	355.54	CLAY	SILT	
7185954	518951	4813092	357.94	2.40	3.30	355.54	354.64	SILT	CLAY	BEARING
7185954	518951	4813092	357.94	3.30	4.60	354.64	353.34	SILT	CLAY	DENSE
7185955	518929	4813085	357.86	0.00	0.30	357.86	357.56	TOPSOIL		
7185955	518929	4813085	357.86	0.30	1.80	357.56	356.06	CLAY	SILT	
7185955	518929	4813085	357.86	1.80	3.30	356.06	354.56	SILT	CLAY	BEARING
7185955	518929	4813085	357.86	3.30	4.60	354.56	353.26	SILT	CLAY	DENSE
7288580	519034	4813143	354.30	0.00	1.52	354.30	352.78	CLAY	SILT	FILL
7288580	519034	4813143	354.30	1.52	3.05	352.78	351.26	CLAY		HARD
7288580	519034	4813143	354.30	3.05	6.10	351.26	348.21	CLAY		SOFT
7288580	519034	4813143	354.30	6.10	6.71	348.21	347.60	SAND	GRAVEL	LOOSE
7288580	519034	4813143	354.30	6.71	7.62	347.60	346.68	CLAY		SOFT
7288581	519019	4813076	353.69	0.00	0.30	353.69	353.38	TOPSOIL		SOFT
7288581	519019	4813076	353.69	0.30	6.10	353.38	347.59	CLAY		HARD
7288581	519019	4813076	353.69	6.10	9.14	347.59	344.54	CLAY		SOFT
7288581	519019	4813076	353.69	9.14	10.67	344.54	343.02	SILT	CLAY	HARD
7288582	519017	4813207	358.29	0.00	0.61	358.29	357.68	TOPSOIL		SOFT

## MECP Water Well Records - Lithology

Well ID	Easting	Northing	Ground Surface Elevation (m AMSL)	Geologic Unit Depth		Geologic Unit Elevation		Geologic Description		
				Top (m BGS)	Bottom (m BGS)	Top (m AMSL)	Bottom (m AMSL)	Primary	Secondary	Tertiary
7288582	519017	4813207	358.29	0.61	1.52	357.68	356.76	CLAY	SILT	FILL
7288582	519017	4813207	358.29	1.52	2.44	356.76	355.85	CLAY	SILT	FILL
7288582	519017	4813207	358.29	2.44	4.57	355.85	353.71	CLAY	SILT	HARD
7288582	519017	4813207	358.29	4.57	9.14	353.71	349.14	CLAY		SOFT
7318145	518251	4813001		0.00	5.49			SAND	SILT	CLAY
7318145	518251	4813001		5.49	12.19			CLAY		HARD
7318145	518251	4813001		12.19	44.20			CLAY	STONES	SOFT
7318145	518251	4813001		44.20	51.21			CLAY		HARD
7318145	518251	4813001		51.21	55.78			LIMESTONE		
7318145	518251	4813001		55.78	57.91			LIMESTONE		
7318145	518251	4813001		57.91	67.67			LIMESTONE	SHALE	LAYERED
7327048	518804	4813120		0.00	3.66			GRAVEL	FILL	
7327048	518804	4813120		3.66	25.91			CLAY		
7327048	518804	4813120		25.91	45.42			CLAY	STONES	SILTY
7327048	518804	4813120		45.42	47.85			GRAVEL	STONES	SAND
7327048	518804	4813120		47.85	50.90			MEDIUM SAND		
7327048	518804	4813120		50.90	52.43			LIMESTONE		

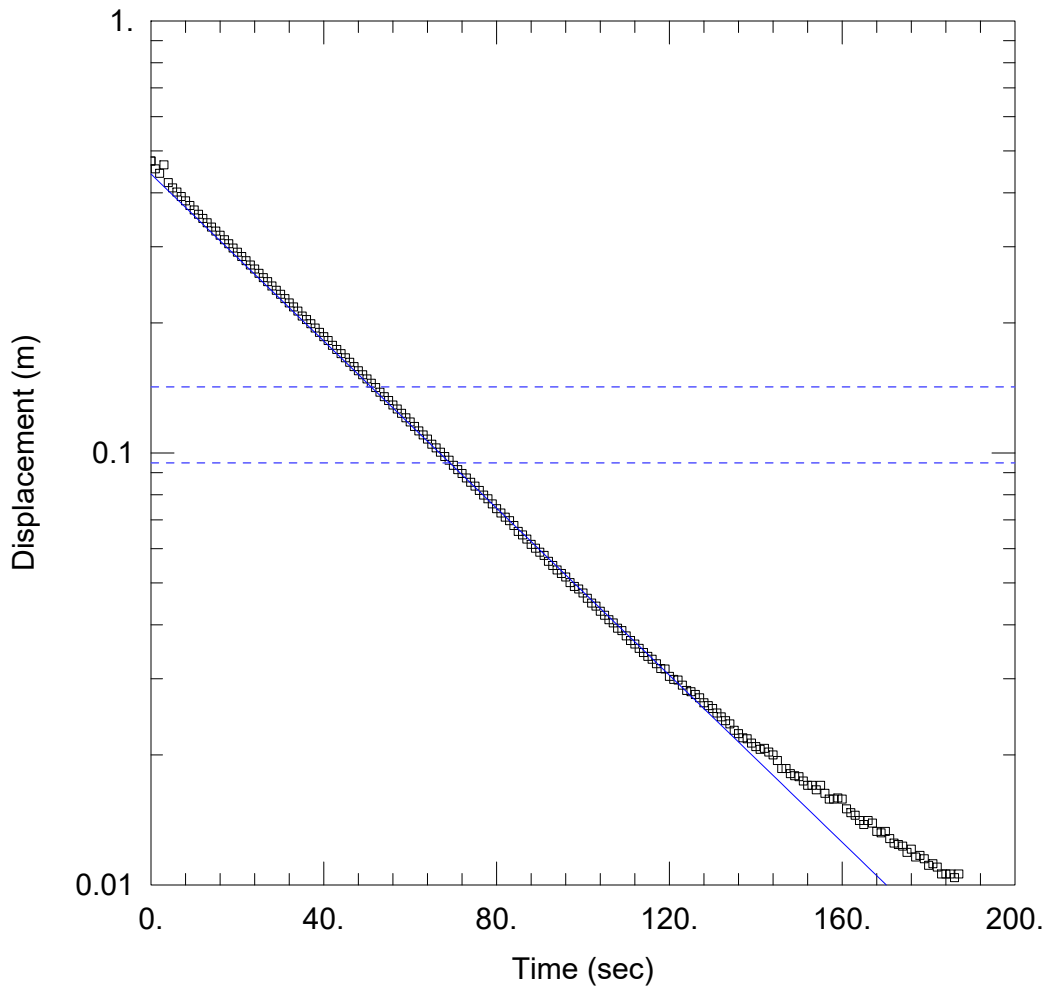
## MECP Water Well Records - Construction Details

Well ID	Distance from Site (m)	Easting	Northing	Depth to Bedrock (m BGS)	Well Depth (m BGS)	Ground Surface (m AMSL)	Well Base Elevation (m AMSL)	Well Use		Date Constructed
								Type	Use	
7185953	401	518941	4813100		4.00	358.30	354.30		Test Hole	05-Jun-12
7185955	388	518929	4813085		4.60	357.86	353.26		Test Hole	05-Jun-12
7257398	394	518934	4813097			358.26		Alteration		19-Jan-16
7177219	372	518837	4813894		6.10	353.87	347.77	Observation	Monitoring	08-Jul-11
7288580	495	519034	4813143		7.62	354.30	346.68	Observation	Monitoring	05-May-17
7288581	477	519019	4813076		10.67	353.69	343.02	Observation	Monitoring	05-May-17
7288582	474	519017	4813207		9.14	358.29	349.14	Observation	Monitoring	05-May-17
6504339	353	518894	4813183	59.44	59.74	360.92	301.18	Test Hole	Not Used	07-Aug-75
6504340	354	518894	4813163	59.13	59.74	360.39	300.65	Test Hole	Not Used	12-Aug-75
6504341	356	518894	4813123	48.77	49.07	359.16	310.08	Test Hole	Not Used	14-Aug-75
7185954	410	518951	4813092		4.60	357.94	353.34	Test Hole	Test Hole	05-Jun-12
6501877	267	518834	4813363	65.53	70.71	362.95	292.24	Water Supply	Domestic	10-Oct-49
6501878	341	518954	4813503	60.05	78.03	356.64	278.61	Water Supply	Domestic	14-Jun-54
6501879	466	519054	4813363	63.40	70.10	359.13	289.03	Water Supply	Domestic	01-Nov-54
6501880	434	518974	4813163		30.48	359.36	328.88	Water Supply	Domestic	09-Feb-55
6501881	237	518764	4813753	60.35	69.49	357.57	288.07	Water Supply	Domestic	18-Aug-55
6501882	432	518974	4813083	49.99	54.25	357.34	303.09	Water Supply	Domestic	18-Jan-57
6501883	463	519044	4813343	48.46	56.39	359.17	302.78	Water Supply	Domestic	29-May-59
6501884	416	519014	4813623		43.89	349.84	305.95	Water Supply	Domestic	30-Jan-67
6501886	352	518894	4813188		46.63	361.05	314.41	Water Supply	Domestic	24-Feb-67
6501887	169	518304	4813923	60.35	70.41	361.15	290.74	Water Supply	Domestic	21-May-57
6501896	290	518694	4813968		28.04	351.69	323.65	Water Supply	Domestic	12-Aug-57
6501897	407	518844	4813963		30.48	354.63	324.15	Water Supply	Industrial	18-May-52
6501898	283	518234	4814013		57.30	363.50	306.20	Water Supply	Domestic	06-Oct-67
6502334	269	518714	4812803	43.89	59.13	351.23	292.10	Water Supply	Livestock	05-May-54
6503598	493	519104	4813473		43.28	355.41	312.13	Water Supply	Domestic	08-May-72
6503993	349	518888	4813145		45.11	359.80	314.69	Water Supply	Domestic	20-Aug-73
6504338	309	518914	4813583	55.78	59.13	354.00	294.86	Water Supply	Livestock	12-Sep-75
6504342	353	518894	4813083		48.46	357.62	309.16	Water Supply	Municipal	05-Sep-74
6504711	466	519074	4813443		45.72	357.44	311.72	Water Supply	Domestic	23-Aug-77
6504797	276	518874	4813603		44.50	355.67	311.17	Water Supply	Domestic	01-Jun-78
6505158	452	519047	4813387	62.48	65.84	359.78	293.94	Water Supply	Domestic	10-Oct-80
6505684	409	518877	4813894		67.67	354.68	287.01	Water Supply	Public	31-May-85
6505710	291	518519	4814053		11.58	363.44	351.86	Water Supply	Domestic	31-Oct-85
6506203	449	518993	4812967		44.50	352.61	308.11	Water Supply	Domestic	03-Nov-87
6506729	327	518240	4812662		49.38	346.31	296.93	Water Supply	Domestic	02-Aug-89
6506767	337	517936	4812932	44.20	48.16	357.43	309.27	Water Supply	Domestic	12-Jan-89
6507285	290	518829	4813110	49.38	52.43	358.19	305.76	Water Supply	Municipal	10-Apr-92
6507870	318	518479	4814084	60.35	62.18	363.94	301.76	Water Supply	Domestic	30-Aug-84
6508521	479	519025	4813269		65.84	359.01	293.17	Water Supply	Domestic	27-Aug-99
6708237	317	518480	4814083		62.18	363.95	301.77	Water Supply	Domestic	30-Aug-84
7046752	266	518804	4813120		52.43	358.46	306.03	Water Supply	Domestic	29-Jun-07
7136166	333	518730	4812736		58.83	350.67	291.84	Water Supply	Domestic	04-Jun-09
7185327	449	518991	4812953		47.85	351.97	304.12	Water Supply	Commerical	20-Jun-12
7211359	294	518833	4813104			358.00		Water Supply	Municipal	16-Oct-13
7217068	294	518833	4813104			358.00		Water Supply	Municipal	16-Oct-13
7318145	19	518251	4813001		67.67			Water Supply		27-Aug-18
7327048	266	518804	4813120		52.43			Water Supply	Municipal	29-Jun-07



## **APPENDIX H:**

### **Hydraulic Conductivity Testing Solutions**



#### MW01-21 - TEST 2

Data Set: \...\mw01-21\_2\_ah\_JK.aqt  
Date: 07/05/21

Time: 09:41:05

#### PROJECT INFORMATION

Company: Stantec Consulting, Ltd  
Project: 161413217  
Location: Wellesley, ON  
Test Well: MW01-21  
Test Date: 31-May-21

#### AQUIFER DATA

Saturated Thickness: 5.095 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.2

#### WELL DATA (MW01-21)

Initial Displacement: 0.4739 m  
Total Well Penetration Depth: 4.285 m  
Casing Radius: 0.0254 m

Static Water Column Height: 4.285 m  
Screen Length: 3.05 m  
Well Radius: 0.105 m

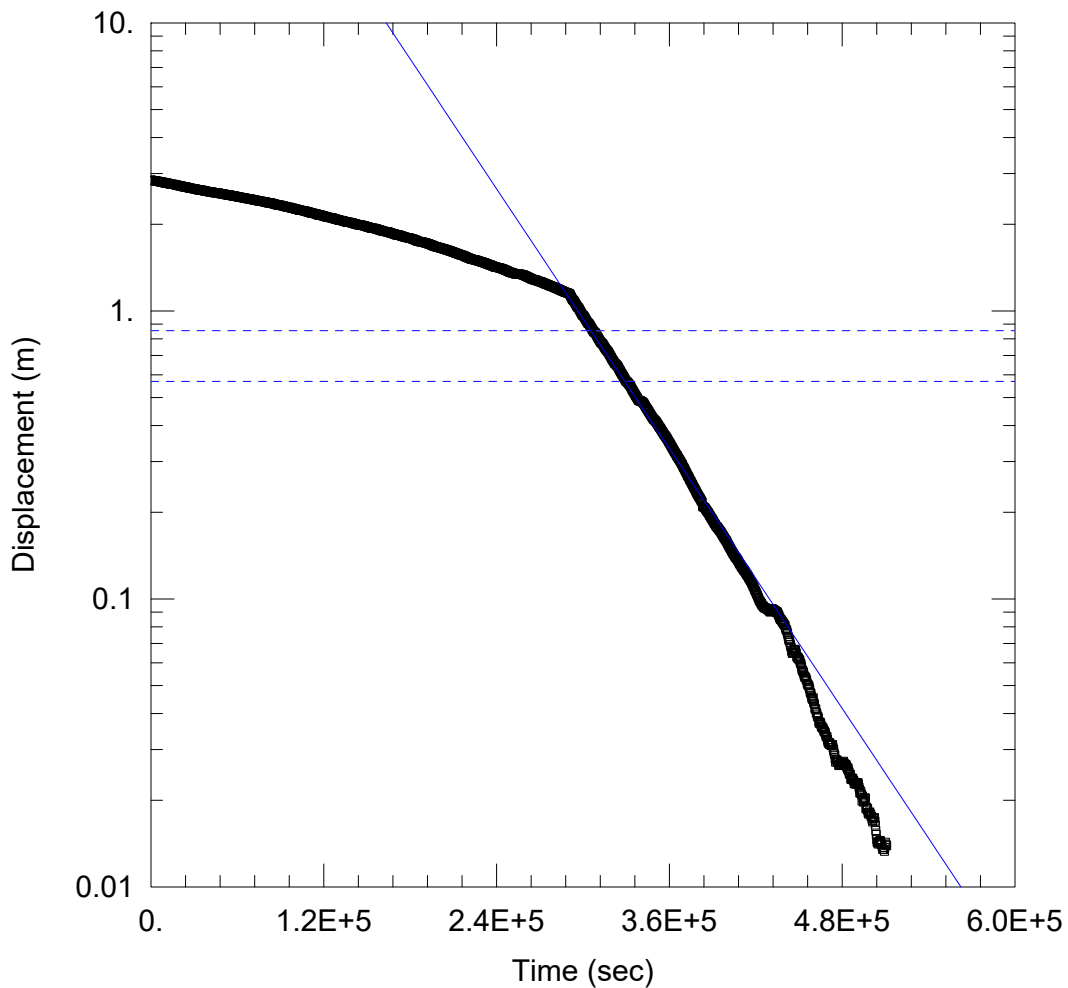
#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 7.3E-6$  m/sec

$y_0 = 0.4422$  m



#### MW02-21

Data Set: \...\mw02-21\_1\_ah\_JK.aqt

Date: 07/05/21

Time: 11:12:41

#### PROJECT INFORMATION

Company: Stantec Consulting, Ltd

Project: 161413217

Location: Wellesley, ON

Test Well: MW02-21

Test Date: 31-May-21

#### AQUIFER DATA

Saturated Thickness: 5.11 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.2

#### WELL DATA (MW02-21)

Initial Displacement: 2.847 m

Static Water Column Height: 4.57 m

Total Well Penetration Depth: 4.57 m

Screen Length: 3.05 m

Casing Radius: 0.0254 m

Well Radius: 0.105 m

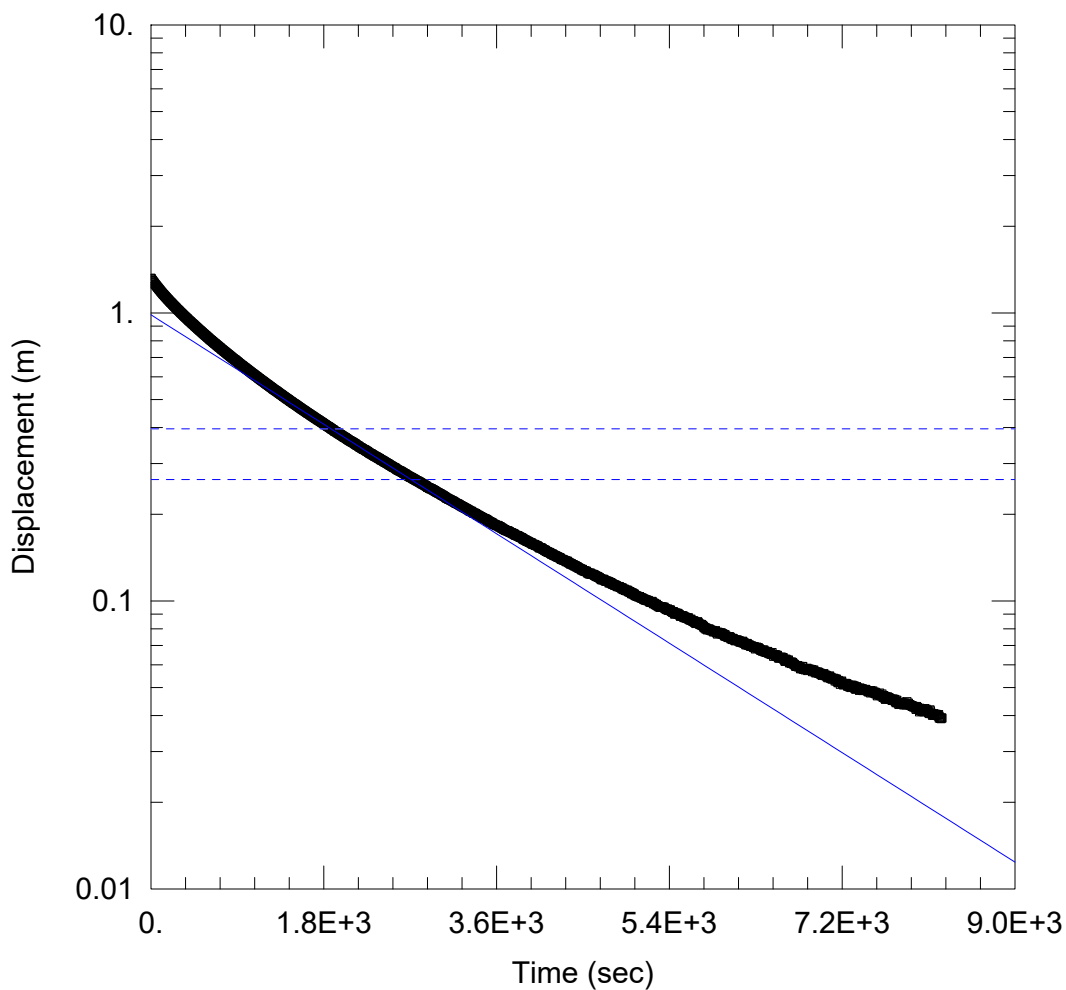
#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 5.8E-9$  m/sec

$y_0 = 169.$  m



#### MW03-21 - TEST 1

Data Set: \...\mw03-21\_1\_ah\_JK.aqt

Date: 07/05/21

Time: 11:24:09

#### PROJECT INFORMATION

Company: Stantec Consulting, Ltd

Project: 161413217

Location: Wellesley, ON

Test Well: MW03-21

Test Date: 31-May-21

#### AQUIFER DATA

Saturated Thickness: 4.87 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.2

#### WELL DATA (MW03-21)

Initial Displacement: 1.319 m

Static Water Column Height: 4.87 m

Total Well Penetration Depth: 4.87 m

Screen Length: 3.05 m

Casing Radius: 0.0254 m

Well Radius: 0.105 m

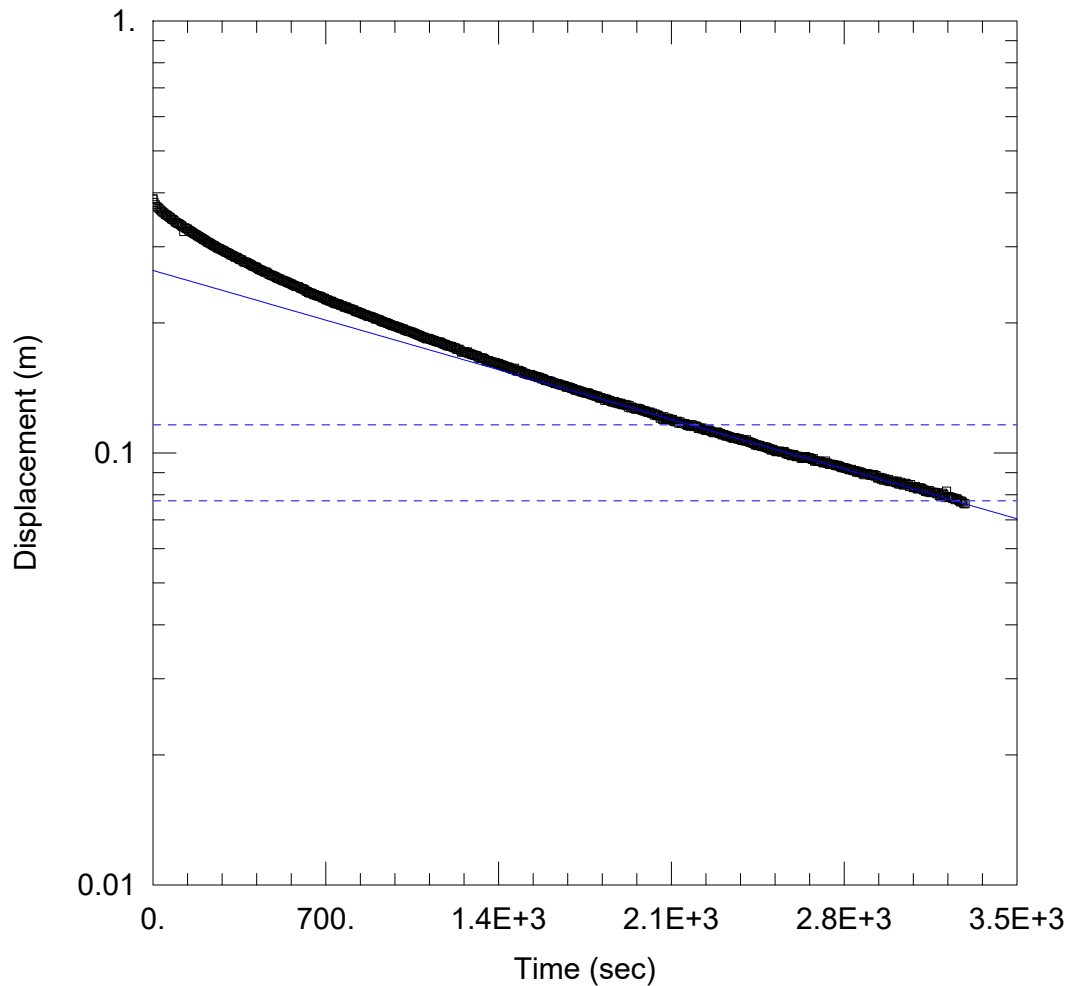
#### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.8E-7$  m/sec

$y_0 = 0.9849$  m



### MW03-21 - TEST 2

Data Set: \...\mw03-21\_2\_ah\_JK.aqt  
Date: 07/05/21

Time: 11:25:43

### PROJECT INFORMATION

Company: Stantec Consulting, Ltd  
Project: 161413217  
Location: Wellesley, ON  
Test Well: MW03-21  
Test Date: 31-May-21

### AQUIFER DATA

Saturated Thickness: 4.87 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.2

### WELL DATA (MW03-21)

Initial Displacement: 0.3872 m  
Total Well Penetration Depth: 4.87 m  
Casing Radius: 0.0254 m

Static Water Column Height: 4.87 m  
Screen Length: 3.05 m  
Well Radius: 0.105 m

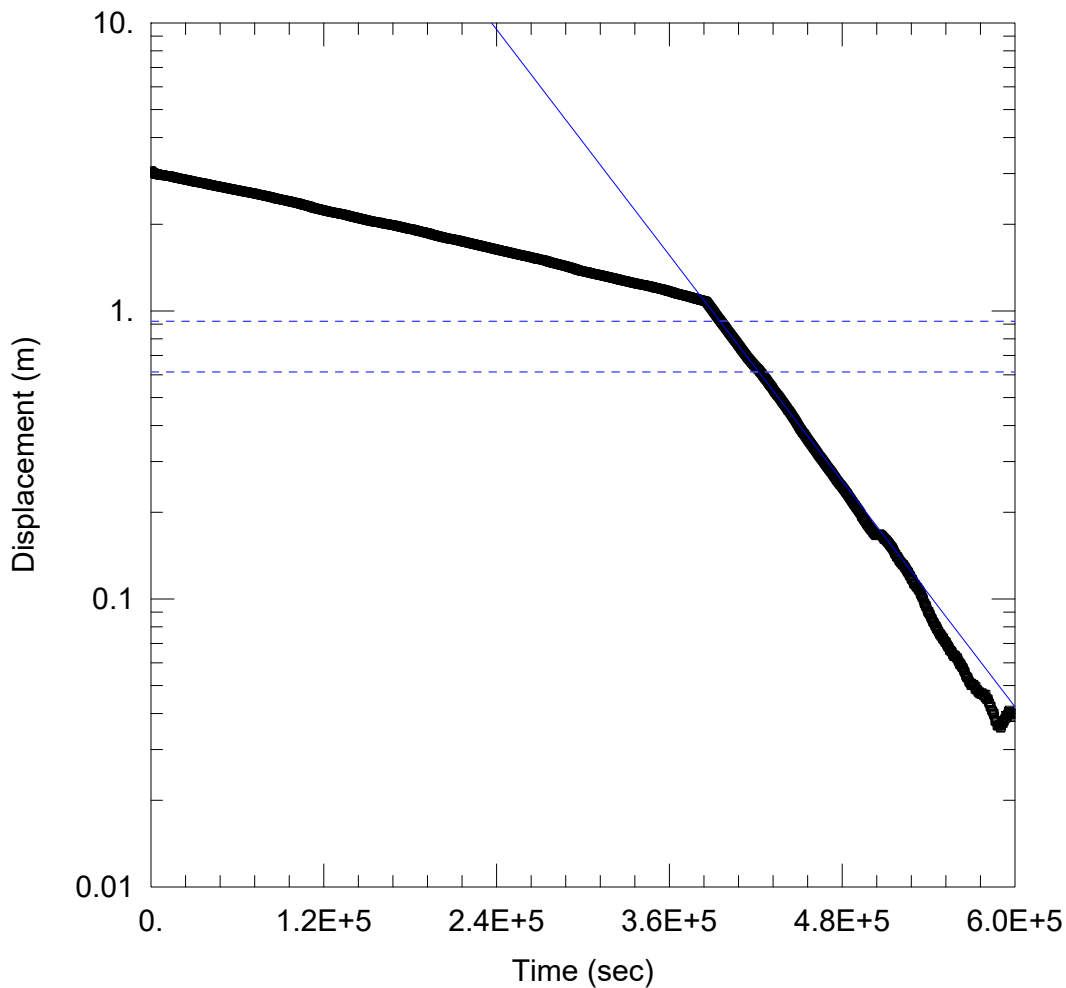
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.4E-7$  m/sec

$y_0 = 0.2644$  m



#### MW04-21

Data Set: \\Cd1004-f01\01609\active\161413217\03\_data\field\logger\_data\k-tests\mw04-21\_ah\_JK.aqt  
 Date: 07/05/21 Time: 11:32:19

#### PROJECT INFORMATION

Company: Stantec Consulting, Ltd  
 Project: 161413217  
 Location: Wellesley, ON  
 Test Well: MW04-21  
 Test Date: 31-May-21

#### AQUIFER DATA

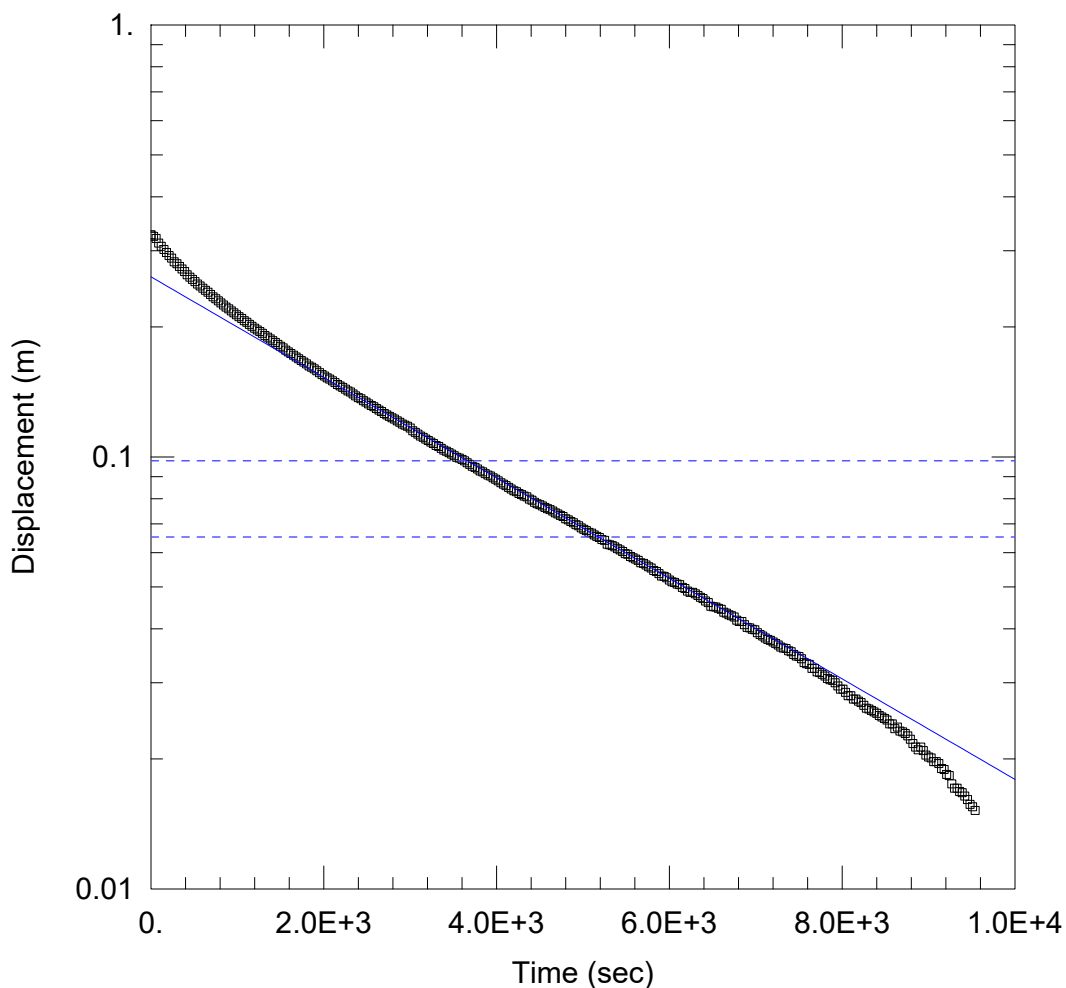
Saturated Thickness: 4.11 m Anisotropy Ratio ( $K_z/K_r$ ): 0.2

#### WELL DATA (MW04-21)

Initial Displacement: 3.067 m Static Water Column Height: 4.11 m  
 Total Well Penetration Depth: 4.11 m Screen Length: 3.05 m  
 Casing Radius: 0.0254 m Well Radius: 0.105 m

#### SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 $K = 5.4E-9$  m/sec  $y_0 = 351.1$  m



### MW05-21 - TEST 2

Data Set: \...\mw05-21\_2\_ah\_JK.aqt

Date: 07/05/21

Time: 11:37:03

### PROJECT INFORMATION

Company: Stantec Consulting, Ltd

Project: 161413217

Location: Wellesley, ON

Test Well: MW05-21

Test Date: 31-May-21

### AQUIFER DATA

Saturated Thickness: 5.4 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.2

### WELL DATA (MW05-21)

Initial Displacement: 0.3264 m

Static Water Column Height: 4.9 m

Total Well Penetration Depth: 4.9 m

Screen Length: 3.05 m

Casing Radius: 0.0254 m

Well Radius: 0.105 m

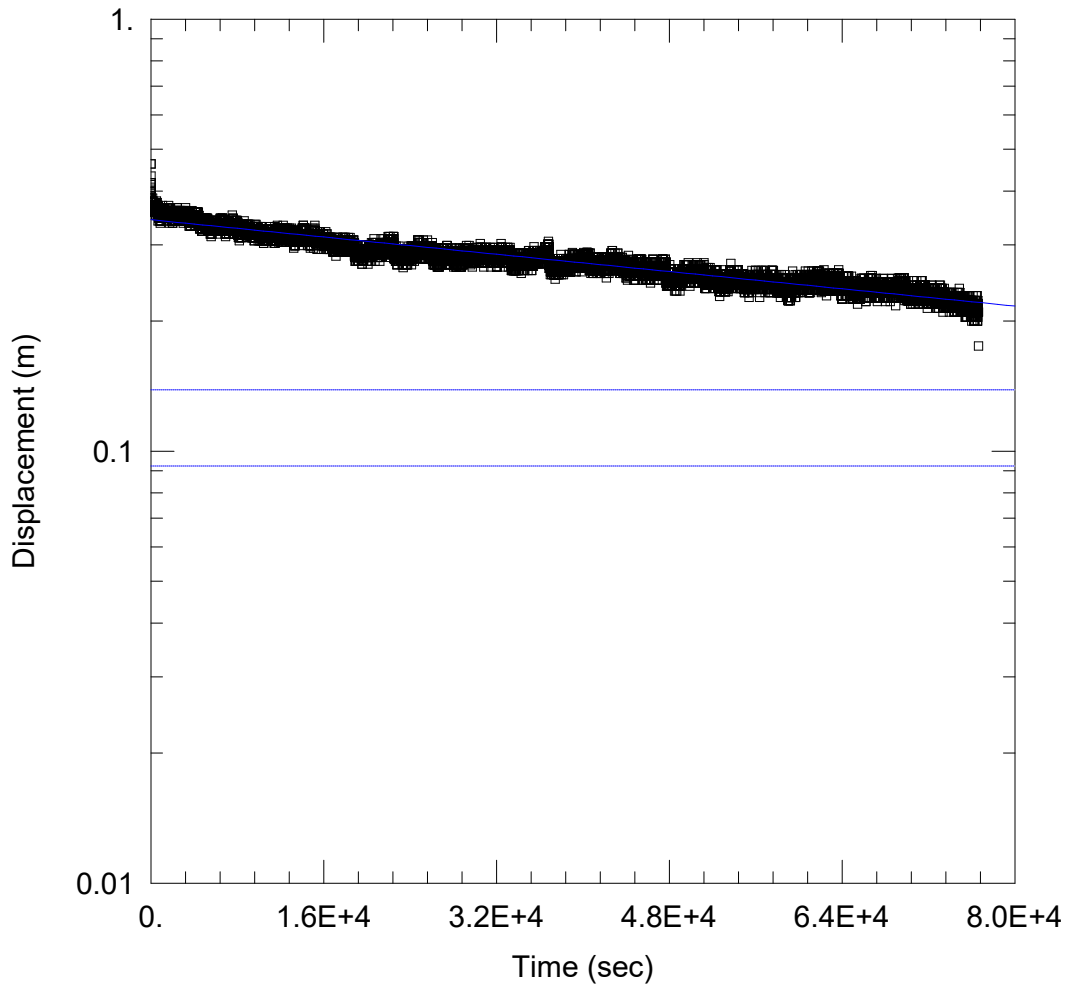
### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 9.1E-8$  m/sec

$y_0 = 0.2612$  m



### MW105-23 - RISING HEAD TEST

Data Set: \...\MW105-23\_ST\_JK.aqt

Date: 04/04/24

Time: 11:13:08

### PROJECT INFORMATION

Company: Stantec

Client: Strohvest Ontario Inc.

Project: 161413217

Location: Stroh Lands, Wellesley, ON

Test Well: MW105-23

Test Date: April 2, 2024

### AQUIFER DATA

Saturated Thickness: 19.21 m

Anisotropy Ratio ( $K_z/K_r$ ): 0.1

### WELL DATA (MW105-23)

Initial Displacement: 0.462 m

Static Water Column Height: 19.21 m

Total Well Penetration Depth: 19.21 m

Screen Length: 3.05 m

Casing Radius: 0.0254 m

Well Radius: 0.105 m

### SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 2.8E-9$  m/sec

$y_0 = 0.3432$  m



# **APPENDIX I:**

## **Laboratory Certificates of Analysis**



Your Project #: 161413217.777  
 Site Location: WELLESLEY  
 Your C.O.C. #: 158433

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
 300 Hagey Blvd  
 Suite 100  
 Waterloo, ON  
 CANADA N2L 0A4

**Report Date: 2021/06/04**  
 Report #: R6661365  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1E5622**

**Received: 2021/05/28, 10:25**

Sample Matrix: Water  
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	4	N/A	2021/06/01	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	4	N/A	2021/06/02	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2021/06/02	CAM SOP-00463	SM 23 4500-Cl E m
Chloride by Automated Colourimetry	2	N/A	2021/06/03	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	4	N/A	2021/06/01	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2021/05/31	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/06/01	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	4	N/A	2021/06/03	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	4	N/A	2021/06/02	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	4	N/A	2021/06/03		
Anion and Cation Sum	4	N/A	2021/06/03		
Total Ammonia-N	4	N/A	2021/06/03	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	4	N/A	2021/06/01	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	4	2021/05/31	2021/06/01	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2021/06/02	CAM SOP-00461	EPA 365.1 m
Orthophosphate	2	N/A	2021/06/03	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	4	N/A	2021/06/03		Auto Calc
Sat. pH and Langelier Index (@ 4C)	4	N/A	2021/06/03		Auto Calc
Sulphate by Automated Colourimetry	2	N/A	2021/06/02	CAM SOP-00464	EPA 375.4 m
Sulphate by Automated Colourimetry	2	N/A	2021/06/03	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	4	N/A	2021/06/03		Auto Calc
Total Suspended Solids	4	2021/06/01	2021/06/02	CAM SOP-00428	SM 23 2540D m
Turbidity	4	N/A	2021/05/31	CAM SOP-00417	SM 23 2130 B m

**Remarks:**

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in



Your Project #: 161413217.777  
Site Location: WELLESLEY  
Your C.O.C. #: 158433

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2021/06/04**  
Report #: R6661365  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1E5622**

**Received: 2021/05/28, 10:25**

writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless 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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Ronklin Gracian  
Project Manager  
04 Jun 2021 15:18:43

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

=====

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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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

### RCAP - COMPREHENSIVE (WATER)

BV Labs ID		PRQ479	PRQ480		PRQ481		
Sampling Date		2021/05/27 14:30	2021/05/27 16:15		2021/05/27 15:00		
COC Number		158433	158433		158433		
	UNITS	BH01-21	BH03-21	QC Batch	BH05-21	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	me/L	8.85	8.86	7378596	7.54	N/A	7378596
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	300	380	7378589	280	1.0	7378589
Calculated TDS	mg/L	460	470	7378601	400	1.0	7378601
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	2.8	3.1	7378589	2.5	1.0	7378589
Cation Sum	me/L	8.86	9.26	7378596	7.66	N/A	7378596
Hardness (CaCO <sub>3</sub> )	mg/L	370	450	7378593	350	1.0	7378593
Ion Balance (% Difference)	%	0.0500	2.22	7378595	0.840	N/A	7378595
Langelier Index (@ 20C)	N/A	0.919	1.13	7378599	0.868		7378599
Langelier Index (@ 4C)	N/A	0.671	0.878	7378600	0.619		7378600
Saturation pH (@ 20C)	N/A	7.09	6.81	7378599	7.10		7378599
Saturation pH (@ 4C)	N/A	7.34	7.06	7378600	7.35		7378600
<b>Inorganics</b>							
Total Ammonia-N	mg/L	0.062	0.071	7382520	0.097	0.050	7382520
Conductivity	umho/cm	820	780	7380237	680	1.0	7380953
Dissolved Organic Carbon	mg/L	0.88	0.90	7380569	0.99	0.40	7379930
Orthophosphate (P)	mg/L	<0.010	<0.010	7380186	<0.010	0.010	7380176
pH	pH	8.01	7.94	7380241	7.96		7380962
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	33	52	7380196	70	1.0	7380185
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	300	380	7380240	290	1.0	7380946
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	76	5.7	7380194	12	1.0	7380181
Nitrite (N)	mg/L	<0.010	<0.010	7380282	<0.010	0.010	7380287
Nitrate (N)	mg/L	<0.10	<0.10	7380282	0.12	0.10	7380287
Nitrate + Nitrite (N)	mg/L	<0.10	<0.10	7380282	0.12	0.10	7380287
<b>Metals</b>							
Dissolved Aluminum (Al)	mg/L	<0.0049	0.010	7379961	0.021	0.0049	7379961
Dissolved Antimony (Sb)	mg/L	<0.00050	<0.00050	7379961	<0.00050	0.00050	7379961
Dissolved Arsenic (As)	mg/L	0.0014	0.0012	7379961	0.0029	0.0010	7379961
Dissolved Barium (Ba)	mg/L	0.13	0.14	7379961	0.13	0.0020	7379961
Dissolved Beryllium (Be)	mg/L	<0.00040	<0.00040	7379961	<0.00040	0.00040	7379961
Dissolved Boron (B)	mg/L	0.063	0.016	7379961	0.029	0.010	7379961
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable							



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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

### RCAP - COMPREHENSIVE (WATER)

BV Labs ID		PRQ479	PRQ480		PRQ481		
Sampling Date		2021/05/27 14:30	2021/05/27 16:15		2021/05/27 15:00		
COC Number		158433	158433		158433		
	UNITS	BH01-21	BH03-21	QC Batch	BH05-21	RDL	QC Batch
Dissolved Cadmium (Cd)	mg/L	<0.000090	<0.000090	7379961	<0.000090	0.000090	7379961
Dissolved Calcium (Ca)	mg/L	78	120	7379961	78	0.20	7379961
Dissolved Chromium (Cr)	mg/L	<0.0050	<0.0050	7379961	<0.0050	0.0050	7379961
Dissolved Cobalt (Co)	mg/L	<0.00050	0.00074	7379961	<0.00050	0.00050	7379961
Dissolved Copper (Cu)	mg/L	<0.00090	<0.00090	7379961	<0.00090	0.00090	7379961
Dissolved Iron (Fe)	mg/L	<0.10	<0.10	7379961	<0.10	0.10	7379961
Dissolved Lead (Pb)	mg/L	<0.00050	<0.00050	7379961	<0.00050	0.00050	7379961
Dissolved Magnesium (Mg)	mg/L	42	37	7379961	38	0.050	7379961
Dissolved Manganese (Mn)	mg/L	0.052	0.065	7379961	0.046	0.0020	7379961
Dissolved Molybdenum (Mo)	mg/L	0.0042	0.0012	7379961	0.0034	0.00050	7379961
Dissolved Nickel (Ni)	mg/L	<0.0010	<0.0010	7379961	<0.0010	0.0010	7379961
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	7379961	<0.10	0.10	7379961
Dissolved Potassium (K)	mg/L	2.4	1.7	7379961	2.0	0.20	7379961
Dissolved Selenium (Se)	mg/L	<0.0020	<0.0020	7379961	<0.0020	0.0020	7379961
Dissolved Silicon (Si)	mg/L	7.3	8.0	7379961	8.7	0.050	7379961
Dissolved Silver (Ag)	mg/L	<0.000090	<0.000090	7379961	<0.000090	0.000090	7379961
Dissolved Sodium (Na)	mg/L	33	5.7	7379961	13	0.10	7379961
Dissolved Strontium (Sr)	mg/L	1.0	0.36	7379961	0.52	0.0010	7379961
Dissolved Thallium (Tl)	mg/L	<0.000050	<0.000050	7379961	<0.000050	0.000050	7379961
Dissolved Titanium (Ti)	mg/L	<0.0050	<0.0050	7379961	<0.0050	0.0050	7379961
Dissolved Uranium (U)	mg/L	0.0017	0.0011	7379961	0.0027	0.00010	7379961
Dissolved Vanadium (V)	mg/L	<0.00050	0.00053	7379961	<0.00050	0.00050	7379961
Dissolved Zinc (Zn)	mg/L	<0.0050	<0.0050	7379961	<0.0050	0.0050	7379961
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							



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Client Project #: 161413217.777  
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Sampler Initials: AH

### RCAP - COMPREHENSIVE (WATER)

BV Labs ID		PRQ481			PRQ482		
Sampling Date		2021/05/27 15:00			2021/05/27 15:05		
COC Number		158433			158433		
	UNITS	BH05-21 Lab-Dup	RDL	QC Batch	QC-01	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	me/L				7.42	N/A	7378596
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				280	1.0	7378589
Calculated TDS	mg/L				400	1.0	7378601
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				3.2	1.0	7378589
Cation Sum	me/L				7.65	N/A	7378596
Hardness (CaCO <sub>3</sub> )	mg/L				350	1.0	7378593
Ion Balance (% Difference)	%				1.56	N/A	7378595
Langelier Index (@ 20C)	N/A				0.972		7378599
Langelier Index (@ 4C)	N/A				0.724		7378600
Saturation pH (@ 20C)	N/A				7.10		7378599
Saturation pH (@ 4C)	N/A				7.35		7378600
<b>Inorganics</b>							
Total Ammonia-N	mg/L				0.093	0.050	7382520
Conductivity	umho/cm				670	1.0	7380237
Dissolved Organic Carbon	mg/L				1.0	0.40	7380569
Orthophosphate (P)	mg/L	<0.010	0.010	7380176	<0.010	0.010	7380176
pH	pH				8.08		7380241
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	70	1.0	7380185	68	1.0	7380185
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L				280	1.0	7380240
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	12	1.0	7380181	11	1.0	7380181
Nitrite (N)	mg/L	<0.010	0.010	7380287	0.015	0.010	7380282
Nitrate (N)	mg/L	0.12	0.10	7380287	<0.10	0.10	7380282
Nitrate + Nitrite (N)	mg/L	0.12	0.10	7380287	0.11	0.10	7380282
<b>Metals</b>							
Dissolved Aluminum (Al)	mg/L				0.0053	0.0049	7379961
Dissolved Antimony (Sb)	mg/L				<0.00050	0.00050	7379961
Dissolved Arsenic (As)	mg/L				0.0027	0.0010	7379961
Dissolved Barium (Ba)	mg/L				0.13	0.0020	7379961
Dissolved Beryllium (Be)	mg/L				<0.00040	0.00040	7379961
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
Lab-Dup = Laboratory Initiated Duplicate							
N/A = Not Applicable							



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### RCAP - COMPREHENSIVE (WATER)

BV Labs ID		PRQ481			PRQ482		
Sampling Date		2021/05/27 15:00			2021/05/27 15:05		
COC Number		158433			158433		
	UNITS	BH05-21 Lab-Dup	RDL	QC Batch	QC-01	RDL	QC Batch
Dissolved Boron (B)	mg/L				0.029	0.010	7379961
Dissolved Cadmium (Cd)	mg/L				<0.000090	0.000090	7379961
Dissolved Calcium (Ca)	mg/L				77	0.20	7379961
Dissolved Chromium (Cr)	mg/L				<0.0050	0.0050	7379961
Dissolved Cobalt (Co)	mg/L				<0.00050	0.00050	7379961
Dissolved Copper (Cu)	mg/L				<0.00090	0.00090	7379961
Dissolved Iron (Fe)	mg/L				<0.10	0.10	7379961
Dissolved Lead (Pb)	mg/L				<0.00050	0.00050	7379961
Dissolved Magnesium (Mg)	mg/L				38	0.050	7379961
Dissolved Manganese (Mn)	mg/L				0.043	0.0020	7379961
Dissolved Molybdenum (Mo)	mg/L				0.0036	0.00050	7379961
Dissolved Nickel (Ni)	mg/L				<0.0010	0.0010	7379961
Dissolved Phosphorus (P)	mg/L				<0.10	0.10	7379961
Dissolved Potassium (K)	mg/L				2.0	0.20	7379961
Dissolved Selenium (Se)	mg/L				<0.0020	0.0020	7379961
Dissolved Silicon (Si)	mg/L				8.5	0.050	7379961
Dissolved Silver (Ag)	mg/L				<0.000090	0.000090	7379961
Dissolved Sodium (Na)	mg/L				14	0.10	7379961
Dissolved Strontium (Sr)	mg/L				0.53	0.0010	7379961
Dissolved Thallium (Tl)	mg/L				<0.000050	0.000050	7379961
Dissolved Titanium (Ti)	mg/L				<0.0050	0.0050	7379961
Dissolved Uranium (U)	mg/L				0.0028	0.00010	7379961
Dissolved Vanadium (V)	mg/L				<0.00050	0.00050	7379961
Dissolved Zinc (Zn)	mg/L				<0.0050	0.0050	7379961
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
Lab-Dup = Laboratory Initiated Duplicate							



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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

### RESULTS OF ANALYSES OF WATER

BV Labs ID		PRQ479		PRQ480	PRQ481	PRQ482		
Sampling Date		2021/05/27 14:30		2021/05/27 16:15	2021/05/27 15:00	2021/05/27 15:05		
COC Number		158433		158433	158433	158433		
	UNITS	BH01-21	RDL	BH03-21	BH05-21	QC-01	RDL	QC Batch
<b>Inorganics</b>								
Total Suspended Solids	mg/L	1700	20	55000	85000	59000	100	7379053
Turbidity	NTU	1800	0.5	4700	2100	3500	0.5	7379924
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								





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BV Labs Job #: C1E5622

Report Date: 2021/06/04

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AH

## TEST SUMMARY

**BV Labs ID:** PRQ479

**Sample ID:** BH01-21

**Matrix:** Water

**Collected:** 2021/05/27

**Shipped:**

**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7380240	N/A	2021/06/01	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7378589	N/A	2021/06/02	Automated Statchk
Chloride by Automated Colourimetry	KONE	7380194	N/A	2021/06/02	Avneet Kour Sudan
Conductivity	AT	7380237	N/A	2021/06/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7380569	N/A	2021/05/31	Nimarta Singh
Hardness (calculated as CaCO <sub>3</sub> )		7378593	N/A	2021/06/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7379961	N/A	2021/06/02	Azita Fazaeli
Ion Balance (% Difference)	CALC	7378595	N/A	2021/06/03	Automated Statchk
Anion and Cation Sum	CALC	7378596	N/A	2021/06/03	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	7382520	N/A	2021/06/03	Amanpreet Sappal
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7380282	N/A	2021/06/01	Chandra Nandlal
pH	AT	7380241	2021/05/31	2021/06/01	Surinder Rai
Orthophosphate	KONE	7380186	N/A	2021/06/02	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7378599	N/A	2021/06/03	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7378600	N/A	2021/06/03	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7380196	N/A	2021/06/02	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7378601	N/A	2021/06/03	Automated Statchk
Total Suspended Solids	BAL	7379053	2021/06/01	2021/06/02	Sandeep Kaur
Turbidity	AT	7379924	N/A	2021/05/31	Neil Dassanayake

**BV Labs ID:** PRQ480

**Sample ID:** BH03-21

**Matrix:** Water

**Collected:** 2021/05/27

**Shipped:**

**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7380240	N/A	2021/06/01	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7378589	N/A	2021/06/02	Automated Statchk
Chloride by Automated Colourimetry	KONE	7380194	N/A	2021/06/02	Avneet Kour Sudan
Conductivity	AT	7380237	N/A	2021/06/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7380569	N/A	2021/05/31	Nimarta Singh
Hardness (calculated as CaCO <sub>3</sub> )		7378593	N/A	2021/06/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7379961	N/A	2021/06/02	Azita Fazaeli
Ion Balance (% Difference)	CALC	7378595	N/A	2021/06/03	Automated Statchk
Anion and Cation Sum	CALC	7378596	N/A	2021/06/03	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	7382520	N/A	2021/06/03	Amanpreet Sappal
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7380282	N/A	2021/06/01	Chandra Nandlal
pH	AT	7380241	2021/05/31	2021/06/01	Surinder Rai
Orthophosphate	KONE	7380186	N/A	2021/06/02	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7378599	N/A	2021/06/03	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7378600	N/A	2021/06/03	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7380196	N/A	2021/06/02	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7378601	N/A	2021/06/03	Automated Statchk
Total Suspended Solids	BAL	7379053	2021/06/01	2021/06/02	Sandeep Kaur
Turbidity	AT	7379924	N/A	2021/05/31	Neil Dassanayake



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BV Labs Job #: C1E5622

Report Date: 2021/06/04

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AH

## TEST SUMMARY

**BV Labs ID:** PRQ481  
**Sample ID:** BH05-21  
**Matrix:** Water

**Collected:** 2021/05/27  
**Shipped:**  
**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7380946	N/A	2021/06/01	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7378589	N/A	2021/06/02	Automated Statchk
Chloride by Automated Colourimetry	KONE	7380181	N/A	2021/06/03	Avneet Kour Sudan
Conductivity	AT	7380953	N/A	2021/06/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7379930	N/A	2021/06/01	Nimarta Singh
Hardness (calculated as CaCO <sub>3</sub> )		7378593	N/A	2021/06/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7379961	N/A	2021/06/02	Azita Fazaeli
Ion Balance (% Difference)	CALC	7378595	N/A	2021/06/03	Automated Statchk
Anion and Cation Sum	CALC	7378596	N/A	2021/06/03	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	7382520	N/A	2021/06/03	Amanpreet Sappal
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7380287	N/A	2021/06/01	Chandra Nandlal
pH	AT	7380962	2021/05/31	2021/06/01	Surinder Rai
Orthophosphate	KONE	7380176	N/A	2021/06/03	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7378599	N/A	2021/06/03	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7378600	N/A	2021/06/03	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7380185	N/A	2021/06/03	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7378601	N/A	2021/06/03	Automated Statchk
Total Suspended Solids	BAL	7379053	2021/06/01	2021/06/02	Sandeep Kaur
Turbidity	AT	7379924	N/A	2021/05/31	Neil Dassanayake

**BV Labs ID:** PRQ481 Dup  
**Sample ID:** BH05-21  
**Matrix:** Water

**Collected:** 2021/05/27  
**Shipped:**  
**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	7380181	N/A	2021/06/03	Avneet Kour Sudan
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7380287	N/A	2021/06/01	Chandra Nandlal
Orthophosphate	KONE	7380176	N/A	2021/06/03	Avneet Kour Sudan
Sulphate by Automated Colourimetry	KONE	7380185	N/A	2021/06/03	Avneet Kour Sudan

**BV Labs ID:** PRQ482  
**Sample ID:** QC-01  
**Matrix:** Water

**Collected:** 2021/05/27  
**Shipped:**  
**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7380240	N/A	2021/06/01	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7378589	N/A	2021/06/02	Automated Statchk
Chloride by Automated Colourimetry	KONE	7380181	N/A	2021/06/03	Avneet Kour Sudan
Conductivity	AT	7380237	N/A	2021/06/01	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7380569	N/A	2021/05/31	Nimarta Singh
Hardness (calculated as CaCO <sub>3</sub> )		7378593	N/A	2021/06/03	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	7379961	N/A	2021/06/02	Azita Fazaeli
Ion Balance (% Difference)	CALC	7378595	N/A	2021/06/03	Automated Statchk
Anion and Cation Sum	CALC	7378596	N/A	2021/06/03	Automated Statchk



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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

## TEST SUMMARY

**BV Labs ID:** PRQ482  
**Sample ID:** QC-01  
**Matrix:** Water

**Collected:** 2021/05/27  
**Shipped:**  
**Received:** 2021/05/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH4	7382520	N/A	2021/06/03	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7380282	N/A	2021/06/01	Chandra Nandlal
pH	AT	7380241	2021/05/31	2021/06/01	Surinder Rai
Orthophosphate	KONE	7380176	N/A	2021/06/03	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7378599	N/A	2021/06/03	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7378600	N/A	2021/06/03	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7380185	N/A	2021/06/03	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7378601	N/A	2021/06/03	Automated Statchk
Total Suspended Solids	BAL	7379053	2021/06/01	2021/06/02	Sandeep Kaur
Turbidity	AT	7379924	N/A	2021/05/31	Neil Dassanayake



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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

### GENERAL COMMENTS

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

Package 1	0.7°C
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Results relate only to the items tested.

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BV Labs Job #: C1E5622

Report Date: 2021/06/04

## QUALITY ASSURANCE REPORT

Stantec Consulting Ltd  
 Client Project #: 161413217.777  
 Site Location: WELLESLEY  
 Sampler Initials: AH

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7379053	Total Suspended Solids	2021/06/02					<10	mg/L	13	25	99	85 - 115
7379924	Turbidity	2021/05/31			96	85 - 115	<0.1	NTU	5.5	20		
7379930	Dissolved Organic Carbon	2021/05/31	92	80 - 120	95	80 - 120	<0.40	mg/L	3.5	20		
7379961	Dissolved Aluminum (Al)	2021/06/02	104	80 - 120	104	80 - 120	<0.0049	mg/L	11	20		
7379961	Dissolved Antimony (Sb)	2021/06/02	107	80 - 120	102	80 - 120	<0.00050	mg/L				
7379961	Dissolved Arsenic (As)	2021/06/02	103	80 - 120	99	80 - 120	<0.0010	mg/L				
7379961	Dissolved Barium (Ba)	2021/06/02	103	80 - 120	101	80 - 120	<0.0020	mg/L				
7379961	Dissolved Beryllium (Be)	2021/06/02	103	80 - 120	99	80 - 120	<0.00040	mg/L				
7379961	Dissolved Boron (B)	2021/06/02	NC	80 - 120	98	80 - 120	<0.010	mg/L				
7379961	Dissolved Cadmium (Cd)	2021/06/02	102	80 - 120	100	80 - 120	<0.000090	mg/L				
7379961	Dissolved Calcium (Ca)	2021/06/02	NC	80 - 120	99	80 - 120	<0.20	mg/L				
7379961	Dissolved Chromium (Cr)	2021/06/02	104	80 - 120	100	80 - 120	<0.0050	mg/L				
7379961	Dissolved Cobalt (Co)	2021/06/02	101	80 - 120	99	80 - 120	<0.00050	mg/L				
7379961	Dissolved Copper (Cu)	2021/06/02	104	80 - 120	100	80 - 120	<0.00090	mg/L				
7379961	Dissolved Iron (Fe)	2021/06/02	98	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
7379961	Dissolved Lead (Pb)	2021/06/02	98	80 - 120	96	80 - 120	<0.00050	mg/L				
7379961	Dissolved Magnesium (Mg)	2021/06/02	NC	80 - 120	100	80 - 120	<0.050	mg/L				
7379961	Dissolved Manganese (Mn)	2021/06/02	101	80 - 120	99	80 - 120	<0.0020	mg/L				
7379961	Dissolved Molybdenum (Mo)	2021/06/02	108	80 - 120	102	80 - 120	<0.00050	mg/L				
7379961	Dissolved Nickel (Ni)	2021/06/02	100	80 - 120	100	80 - 120	<0.0010	mg/L				
7379961	Dissolved Phosphorus (P)	2021/06/02	111	80 - 120	110	80 - 120	<0.10	mg/L				
7379961	Dissolved Potassium (K)	2021/06/02	102	80 - 120	99	80 - 120	<0.20	mg/L				
7379961	Dissolved Selenium (Se)	2021/06/02	101	80 - 120	99	80 - 120	<0.0020	mg/L				
7379961	Dissolved Silicon (Si)	2021/06/02	102	80 - 120	99	80 - 120	<0.050	mg/L				
7379961	Dissolved Silver (Ag)	2021/06/02	91	80 - 120	100	80 - 120	<0.000090	mg/L				
7379961	Dissolved Sodium (Na)	2021/06/02	NC	80 - 120	101	80 - 120	<0.10	mg/L				
7379961	Dissolved Strontium (Sr)	2021/06/02	NC	80 - 120	99	80 - 120	<0.0010	mg/L				
7379961	Dissolved Thallium (Tl)	2021/06/02	98	80 - 120	95	80 - 120	<0.000050	mg/L				
7379961	Dissolved Titanium (Ti)	2021/06/02	100	80 - 120	93	80 - 120	<0.0050	mg/L				
7379961	Dissolved Uranium (U)	2021/06/02	105	80 - 120	103	80 - 120	<0.00010	mg/L				
7379961	Dissolved Vanadium (V)	2021/06/02	105	80 - 120	101	80 - 120	<0.00050	mg/L	7.8	20		

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BV Labs Job #: C1E5622

Report Date: 2021/06/04

## QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd  
 Client Project #: 161413217.777  
 Site Location: WELLESLEY  
 Sampler Initials: AH

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7379961	Dissolved Zinc (Zn)	2021/06/02	99	80 - 120	99	80 - 120	<0.0050	mg/L	4.6	20		
7380176	Orthophosphate (P)	2021/06/03	114	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
7380181	Dissolved Chloride (Cl-)	2021/06/03	101	80 - 120	105	80 - 120	<1.0	mg/L	0.41	20		
7380185	Dissolved Sulphate (SO4)	2021/06/03	NC	75 - 125	104	80 - 120	<1.0	mg/L	0.023	20		
7380186	Orthophosphate (P)	2021/06/02	108	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
7380194	Dissolved Chloride (Cl-)	2021/06/02	NC	80 - 120	100	80 - 120	<1.0	mg/L	1.7	20		
7380196	Dissolved Sulphate (SO4)	2021/06/02	NC	75 - 125	105	80 - 120	<1.0	mg/L	1.4	20		
7380237	Conductivity	2021/06/01			100	85 - 115	<1.0	umho/cm	0.39	25		
7380240	Alkalinity (Total as CaCO3)	2021/06/01			95	85 - 115	<1.0	mg/L	0.39	20		
7380241	pH	2021/06/01			102	98 - 103			0.45	N/A		
7380282	Nitrate (N)	2021/06/01	96	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
7380282	Nitrite (N)	2021/06/01	104	80 - 120	105	80 - 120	<0.010	mg/L	NC	20		
7380287	Nitrate (N)	2021/06/01	93	80 - 120	91	80 - 120	<0.10	mg/L	3.3	20		
7380287	Nitrite (N)	2021/06/01	107	80 - 120	105	80 - 120	<0.010	mg/L	NC	20		
7380569	Dissolved Organic Carbon	2021/05/31	93	80 - 120	96	80 - 120	<0.40	mg/L	0.41	20		
7380946	Alkalinity (Total as CaCO3)	2021/06/01			96	85 - 115	<1.0	mg/L	3.4	20		
7380953	Conductivity	2021/06/01			101	85 - 115	<1.0	umho/cm	0.33	25		
7380962	pH	2021/06/01			102	98 - 103			1.2	N/A		
7382520	Total Ammonia-N	2021/06/03	NC	75 - 125	98	80 - 120	<0.050	mg/L	0.11	20		

N/A = Not Applicable

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

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

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

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

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

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

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



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BV Labs Job #: C1E5622  
Report Date: 2021/06/04

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AH

### VALIDATION SIGNATURE PAGE

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

---

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

---

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









Your Project #: 161413217.777  
Your C.O.C. #: 829092-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2021/06/23**  
Report #: R6689237  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1G5523**

**Received: 2021/06/16, 08:31**

Sample Matrix: Water  
# Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/06/18	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/06/21	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2021/06/18	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2021/06/18	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/06/19	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2021/06/18	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2021/06/18	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2021/06/21		
Anion and Cation Sum	1	N/A	2021/06/21		
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/06/16	CAM SOP-00551	MOE E3407
Total Ammonia-N	1	N/A	2021/06/21	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2021/06/22	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/06/18	2021/06/18	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2021/06/18	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/06/21		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/06/21		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2021/06/18	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/06/21		Auto Calc
Total Suspended Solids	1	2021/06/19	2021/06/21	CAM SOP-00428	SM 23 2540D m
Turbidity	1	N/A	2021/06/17	CAM SOP-00417	SM 23 2130 B m

**Remarks:**

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

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



Your Project #: 161413217.777  
Your C.O.C. #: 829092-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2021/06/23**  
Report #: R6689237  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1G5523**

**Received: 2021/06/16, 08:31**

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless 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



**AUTHORIZED REPORT  
RAPPORT AUTORISÉ**

Bureau Veritas

23 Jun 2021 16:34:21

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.

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BV Labs Job #: C1G5523

Report Date: 2021/06/23

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

**RCAP - COMPREHENSIVE (DRINKING WATER)**

<b>BV Labs ID</b>		PVV199		
<b>Sampling Date</b>		2021/06/15 15:27		
<b>COC Number</b>		829092-01-01		
	<b>UNITS</b>	<b>RW01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Anion Sum	me/L	9.36	N/A	7412409
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	230	1.0	7411294
Calculated TDS	mg/L	530	1.0	7412416
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	2.1	1.0	7411294
Cation Sum	me/L	8.68	N/A	7412409
Hardness (CaCO <sub>3</sub> )	mg/L	420	1.0	7411169
Ion Balance (% Difference)	%	3.76	N/A	7411296
Langelier Index (@ 20C)	N/A	0.919		7412412
Langelier Index (@ 4C)	N/A	0.671		7412414
Saturation pH (@ 20C)	N/A	7.07		7412412
Saturation pH (@ 4C)	N/A	7.32		7412414
<b>Inorganics</b>				
Total Ammonia-N	mg/L	0.33	0.050	7416599
Conductivity	umho/cm	840	1.0	7416565
Dissolved Organic Carbon	mg/L	0.60	0.40	7417389
Orthophosphate (P)	mg/L	<0.010	0.010	7414881
pH	pH	7.99		7416562
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	220	1.0	7414879
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	230	1.0	7416560
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	2.7	1.0	7414878
Nitrite (N)	mg/L	<0.010	0.010	7417724
Nitrate (N)	mg/L	<0.10	0.10	7417724
<b>Metals</b>				
Aluminum (Al)	mg/L	<0.0049	0.0049	7415349
Antimony (Sb)	mg/L	<0.00050	0.00050	7415349
Arsenic (As)	mg/L	<0.0010	0.0010	7415349
Barium (Ba)	mg/L	0.064	0.0020	7415349
Beryllium (Be)	mg/L	<0.00040	0.00040	7415349
Boron (B)	mg/L	0.024	0.010	7415349
Cadmium (Cd)	mg/L	<0.000090	0.000090	7415349
Calcium (Ca)	mg/L	110	1.0	7415349
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				
N/A = Not Applicable				



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BV Labs Job #: C1G5523  
Report Date: 2021/06/23

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Sampler Initials: AH

### RCAP - COMPREHENSIVE (DRINKING WATER)

<b>BV Labs ID</b>		PVV199		
<b>Sampling Date</b>		2021/06/15 15:27		
<b>COC Number</b>		829092-01-01		
	<b>UNITS</b>	<b>RW01</b>	<b>RDL</b>	<b>QC Batch</b>
Chromium (Cr)	mg/L	<0.0050	0.0050	7415349
Cobalt (Co)	mg/L	<0.00050	0.00050	7415349
Copper (Cu)	mg/L	0.0029	0.00090	7415349
Iron (Fe)	mg/L	0.43	0.10	7415349
Lead (Pb)	mg/L	<0.00050	0.00050	7415349
Lithium (Li)	mg/L	0.0053	0.0050	7415349
Magnesium (Mg)	mg/L	35	0.050	7415349
Manganese (Mn)	mg/L	0.013	0.0020	7415349
Molybdenum (Mo)	mg/L	0.0013	0.00050	7415349
Nickel (Ni)	mg/L	<0.0010	0.0010	7415349
Phosphorus (P)	mg/L	<0.10	0.10	7415349
Potassium (K)	mg/L	1.1	0.20	7415349
Selenium (Se)	mg/L	<0.0020	0.0020	7415349
Silicon (Si)	mg/L	6.8	0.050	7415349
Silver (Ag)	mg/L	<0.000090	0.000090	7415349
Sodium (Na)	mg/L	6.9	0.10	7415349
Strontium (Sr)	mg/L	35	0.0010	7415349
Thallium (Tl)	mg/L	<0.000050	0.000050	7415349
Titanium (Ti)	mg/L	<0.0050	0.0050	7415349
Uranium (U)	mg/L	0.00090	0.00010	7415349
Vanadium (V)	mg/L	<0.00050	0.00050	7415349
Zinc (Zn)	mg/L	0.021	0.0050	7415349
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



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BV Labs Job #: C1G5523  
Report Date: 2021/06/23

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Sampler Initials: AH

### RESULTS OF ANALYSES OF WATER

<b>BV Labs ID</b>		PVV199		
<b>Sampling Date</b>		2021/06/15 15:27		
<b>COC Number</b>		829092-01-01		
	<b>UNITS</b>	<b>RW01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>				
Total Suspended Solids	mg/L	<10	10	7416785
Turbidity	NTU	1.5	0.1	7413299
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



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BV Labs Job #: C1G5523

Report Date: 2021/06/23

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

### MICROBIOLOGY (WATER)

<b>BV Labs ID</b>		PVV199	
<b>Sampling Date</b>		2021/06/15 15:27	
<b>COC Number</b>		829092-01-01	
	<b>UNITS</b>	<b>RW01</b>	<b>QC Batch</b>
<b>Microbiological</b>			
Background	CFU/100mL	0	7412803
Total Coliforms	CFU/100mL	0	7412803
Escherichia coli	CFU/100mL	0	7412803
QC Batch = Quality Control Batch			



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BV Labs Job #: C1G5523

Report Date: 2021/06/23

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

## TEST SUMMARY

**BV Labs ID:** PVV199

**Sample ID:** RW01

**Matrix:** Water

**Collected:** 2021/06/15

**Shipped:**

**Received:** 2021/06/16

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7416560	N/A	2021/06/18	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7411294	N/A	2021/06/21	Automated Statchk
Chloride by Automated Colourimetry	KONE	7414878	N/A	2021/06/18	Alina Dobreanu
Conductivity	AT	7416565	N/A	2021/06/18	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7417389	N/A	2021/06/19	Nimarta Singh
Hardness (calculated as CaCO <sub>3</sub> )		7411169	N/A	2021/06/18	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7415349	N/A	2021/06/18	Arefa Dabhad
Ion Balance (% Difference)	CALC	7411296	N/A	2021/06/21	Automated Statchk
Anion and Cation Sum	CALC	7412409	N/A	2021/06/21	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7412803	N/A	2021/06/16	Ranju Chaudhari
Total Ammonia-N	LACH/NH <sub>4</sub>	7416599	N/A	2021/06/21	Amanpreet Sappal
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7417724	N/A	2021/06/22	Chandra Nandlal
pH	AT	7416562	2021/06/18	2021/06/18	Surinder Rai
Orthophosphate	KONE	7414881	N/A	2021/06/18	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7412412	N/A	2021/06/21	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7412414	N/A	2021/06/21	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7414879	N/A	2021/06/18	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7412416	N/A	2021/06/21	Automated Statchk
Total Suspended Solids	BAL	7416785	2021/06/19	2021/06/21	Sandeep Kaur
Turbidity	AT	7413299	N/A	2021/06/17	Khushbu Vijay kumar Patel



BUREAU  
VERITAS

BV Labs Job #: C1G5523

Report Date: 2021/06/23

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

### GENERAL COMMENTS

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

Package 1	0.3°C
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Results relate only to the items tested.



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BV Labs Job #: C1G5523

Report Date: 2021/06/23

## QUALITY ASSURANCE REPORT

Stantec Consulting Ltd  
 Client Project #: 161413217.777  
 Sampler Initials: AH

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7413299	Turbidity	2021/06/17			94	85 - 115	<0.1	NTU				
7414878	Dissolved Chloride (Cl-)	2021/06/18	NC	80 - 120	104	80 - 120	<1.0	mg/L	7.5	20		
7414879	Dissolved Sulphate (SO4)	2021/06/18	83	75 - 125	103	80 - 120	<1.0	mg/L	1.0	20		
7414881	Orthophosphate (P)	2021/06/18	108	75 - 125	101	80 - 120	<0.010	mg/L	NC	25		
7415349	Aluminum (Al)	2021/06/18	104	80 - 120	103	80 - 120	<0.0049	mg/L	NC	20		
7415349	Antimony (Sb)	2021/06/18	108	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
7415349	Arsenic (As)	2021/06/18	104	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20		
7415349	Barium (Ba)	2021/06/18	99	80 - 120	99	80 - 120	<0.0020	mg/L	0.17	20		
7415349	Beryllium (Be)	2021/06/18	111	80 - 120	103	80 - 120	<0.00040	mg/L	NC	20		
7415349	Boron (B)	2021/06/18	105	80 - 120	96	80 - 120	<0.010	mg/L	0.67	20		
7415349	Cadmium (Cd)	2021/06/18	104	80 - 120	99	80 - 120	<0.000090	mg/L	NC	20		
7415349	Calcium (Ca)	2021/06/18	NC	80 - 120	101	80 - 120	<0.20	mg/L	4.0	20		
7415349	Chromium (Cr)	2021/06/18	100	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20		
7415349	Cobalt (Co)	2021/06/18	100	80 - 120	97	80 - 120	<0.00050	mg/L	2.2	20		
7415349	Copper (Cu)	2021/06/18	100	80 - 120	96	80 - 120	<0.00090	mg/L	NC	20		
7415349	Iron (Fe)	2021/06/18	102	80 - 120	99	80 - 120	<0.10	mg/L	1.4	20		
7415349	Lead (Pb)	2021/06/18	102	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20		
7415349	Lithium (Li)	2021/06/18	107	80 - 120	102	80 - 120	<0.0050	mg/L	2.7	20		
7415349	Magnesium (Mg)	2021/06/18	NC	80 - 120	101	80 - 120	<0.050	mg/L	3.1	20		
7415349	Manganese (Mn)	2021/06/18	100	80 - 120	98	80 - 120	<0.0020	mg/L	4.3	20		
7415349	Molybdenum (Mo)	2021/06/18	110	80 - 120	101	80 - 120	<0.00050	mg/L	4.1	20		
7415349	Nickel (Ni)	2021/06/18	100	80 - 120	98	80 - 120	<0.0010	mg/L	0.52	20		
7415349	Phosphorus (P)	2021/06/18	105	80 - 120	104	80 - 120	<0.10	mg/L	NC	20		
7415349	Potassium (K)	2021/06/18	109	80 - 120	103	80 - 120	<0.20	mg/L	2.7	20		
7415349	Selenium (Se)	2021/06/18	105	80 - 120	104	80 - 120	<0.0020	mg/L	NC	20		
7415349	Silicon (Si)	2021/06/18	104	80 - 120	102	80 - 120	<0.050	mg/L	3.7	20		
7415349	Silver (Ag)	2021/06/18	100	80 - 120	99	80 - 120	<0.000090	mg/L	NC	20		
7415349	Sodium (Na)	2021/06/18	NC	80 - 120	101	80 - 120	<0.10	mg/L	1.9	20		
7415349	Strontium (Sr)	2021/06/18	NC	80 - 120	96	80 - 120	<0.0010	mg/L	5.3	20		
7415349	Thallium (Tl)	2021/06/18	105	80 - 120	99	80 - 120	<0.000050	mg/L	NC	20		
7415349	Titanium (Ti)	2021/06/18	101	80 - 120	98	80 - 120	<0.0050	mg/L	NC	20		



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BV Labs Job #: C1G5523

Report Date: 2021/06/23

## QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7415349	Uranium (U)	2021/06/18	106	80 - 120	101	80 - 120	<0.00010	mg/L	4.3	20		
7415349	Vanadium (V)	2021/06/18	104	80 - 120	98	80 - 120	<0.00050	mg/L	NC	20		
7415349	Zinc (Zn)	2021/06/18	101	80 - 120	98	80 - 120	<0.0050	mg/L	1.1	20		
7416560	Alkalinity (Total as CaCO <sub>3</sub> )	2021/06/18			98	85 - 115	<1.0	mg/L	1.8	20		
7416562	pH	2021/06/18			102	98 - 103			0.26	N/A		
7416565	Conductivity	2021/06/18			100	85 - 115	<1.0	umho/cm	0.32	25		
7416599	Total Ammonia-N	2021/06/21	97	75 - 125	98	80 - 120	<0.050	mg/L	0.36	20		
7416785	Total Suspended Solids	2021/06/21					<10	mg/L	NC	25	97	85 - 115
7417389	Dissolved Organic Carbon	2021/06/18	94	80 - 120	99	80 - 120	<0.40	mg/L	3.0	20		
7417724	Nitrate (N)	2021/06/22	106	80 - 120	105	80 - 120	<0.10	mg/L	0.25	20		
7417724	Nitrite (N)	2021/06/22	107	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		

N/A = Not Applicable

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference  $\leq 2 \times \text{RDL}$ ).



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BV Labs Job #: C1G5523

Report Date: 2021/06/23

Stantec Consulting Ltd

Client Project #: 161413217.777

Sampler Initials: AH

### VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

Ranju Chaudhari, Senior Analyst

---

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.



# MICRO

## ONTARIO DRINKING WATER CHAIN OF CUSTODY RECORD

6660 & 6740 Campbell Rd, Mississauga, Ontario Canada L5N 2L8  
 Tel: (905) 817-5700 Toll-free: 800-563-6266 Fax: 905-817-5779  
 www.bvlabs.com

Bottle Order #:



829092

COC #:



C829092-01-01

Please indicate which regulation applies to the samples being submitted:

- ☐ 170    ☐ 318/319    ☐ 243    ☐ 170Pb  
☒ Not regulated (however water is for human consumption)

### INVOICE TO:

Company Name: #9197 Stantec Consulting Ltd  
 Attention: Accounts Payable  
 Address: 300 Hagey Blvd Suite 100 Waterloo ON N2L 0A4  
 Tel: (519) 579-4410 Project: 161413217.777  
 Fax: (519) 579-6733 P.O. #:  
 Email: SAPinvoices@Stantec.com

### REPORT TO:

Same as Invoice To ☐  
 Company Name:  
 Attention: Grant Whitehead  
 Address:  
 Tel: (519) 585-7400 Fax: (519) 579-4239  
 Email: grant.whitehead@stantec.com jedd@stantec.com

CAM FCD-01101/2

Page of

\*DRINKING WATER TYPE LEGEND: [R=Raw Water] [T=Treated/POE] [D=Distribution] [P=Plumbing] [S=Standing] [F=Flushed]

Sample Identification/Location	Date Sampled	Time Sampled	*WATER TYPE (R,T,D,P,S,F)	MOE/MOH Adverse Notification Required?		Field Chlorine		Field Turbidity	Field pH	Watertrax SPL#	Resample Y/N?	# of Bottles	Analysis Requested			
				Yes	No	Free	Total						RCap - Comprehensive Drinking	Total Suspended Solids	Turbidity	Total Coliforms/ E. coli, CFU/100mL
1 RWO1	16-Jun-21	15:27	R		X			0.48	7.26			6	X	X	X	X
2					X											
3					X											
4					X											
5					X											
6					X											
7					X											
8																
9																
10																

16-Jun-21 08:31

Ronkin Gracian



C1G5523

DSG ENV 025

# MICRO

REC'D IN WATERLOO

\*IT IS MANDATORY THAT ALL NOTIFICATION INFORMATION BELOW BE COMPLETED PRIOR TO ANALYSIS FOR REGULATED DRINKING WATER SUBMISSIONS.\*

TAT (TURNAROUND TIME):		ADVERSE NOTIFICATION INFORMATION		LABORATORY USE ONLY	
RUSH TAT MUST HAVE PRIOR APPROVAL	Waterworks Name: .	Medical Officer of Health/Public Health Unit		Received By (Print):	JASPREET KAUR
APPROVAL	Waterworks Number: .	Name/Region:		Received By (Sign):	Jaspreet Kaur
<input checked="" type="checkbox"/> Regular (5-15 Working Days)	Address:	Contact:		Date:	2021/06/16 Time: 08:31
<input type="checkbox"/> RUSH (Specify Below)	Contact:	Address:		Comments:	Open Ice
Date Due:	Tel:	Tel:		Receiving Temp:	10/0/0
RUSH #	Cell:	Fax:		Cooling Media Present Y/N?	<input checked="" type="checkbox"/>
Sampled By (Print): A. Healey	Sampled By (Sign): [Signature]	Date:	15 Jun 21	Time:	16:50
*Relinquished By (Print): A. Healey	*Relinquished By (Sign): [Signature]	Metals Preservation Check Y/N? <input checked="" type="checkbox"/>			

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BVL'S 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.

WB# 205545  
 FAISHA VAHORA Aisha 2,2,1 2021/06/16 16:00



Your Project #: 161413217.777  
 Site Location: WELLESLEY  
 Your C.O.C. #: 15552

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
 300 Hagey Blvd  
 Suite 100  
 Waterloo, ON  
 CANADA N2L 0A4

**Report Date: 2021/08/12**  
 Report #: R6762261  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1M2547**

**Received: 2021/08/06, 14:25**

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/08/10	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/08/10	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2021/08/10	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2021/08/10	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/08/10	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2021/08/12	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2021/08/11	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2021/08/12		
Anion and Cation Sum	1	N/A	2021/08/12		
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/08/06	CAM SOP-00551	MOE E3407
Total Ammonia-N	1	N/A	2021/08/10	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2021/08/09	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/08/07	2021/08/10	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2021/08/09	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/08/12		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/08/12		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2021/08/09	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/08/12		Auto Calc
Total Suspended Solids	1	2021/08/10	2021/08/11	CAM SOP-00428	SM 23 2540D m
Turbidity	1	N/A	2021/08/09	CAM SOP-00417	SM 23 2130 B m

**Remarks:**

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

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



Your Project #: 161413217.777  
Site Location: WELLESLEY  
Your C.O.C. #: 15552

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2021/08/12**  
Report #: R6762261  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BV LABS JOB #: C1M2547**

**Received: 2021/08/06, 14:25**

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless 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



**AUTHORIZED REPORT  
RAPPORT AUTORISÉ**

Bureau Veritas

12 Aug 2021 17:28:03

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 #: C1M2547  
Report Date: 2021/08/12

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AV

### RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QHU792			QHU792		
Sampling Date		2021/08/06 10:40			2021/08/06 10:40		
COC Number		15552			15552		
	UNITS	RW02	RDL	QC Batch	RW02 Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	me/L	13.0	N/A	7504994			
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	200	1.0	7504991			
Calculated TDS	mg/L	780	1.0	7504997			
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	3.3	1.0	7504991			
Cation Sum	me/L	12.3	N/A	7504994			
Hardness (CaCO <sub>3</sub> )	mg/L	580	1.0	7506368			
Ion Balance (% Difference)	%	2.50	N/A	7504993			
Langelier Index (@ 20C)	N/A	1.21		7504995			
Langelier Index (@ 4C)	N/A	0.958		7504996			
Saturation pH (@ 20C)	N/A	7.03		7504995			
Saturation pH (@ 4C)	N/A	7.28		7504996			
<b>Inorganics</b>							
Total Ammonia-N	mg/L	0.065	0.050	7510353			
Conductivity	umho/cm	1200	1.0	7507152			
Dissolved Organic Carbon	mg/L	0.64	0.40	7510708			
Orthophosphate (P)	mg/L	<0.010	0.010	7507377			
pH	pH	8.23		7507154			
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	420	2.0	7507376			
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	210	1.0	7507135			
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	2.9	1.0	7507375			
Nitrite (N)	mg/L	<0.010	0.010	7507369	<0.010	0.010	7507369
Nitrate (N)	mg/L	<0.10	0.10	7507369	<0.10	0.10	7507369
<b>Metals</b>							
Aluminum (Al)	mg/L	<0.0049	0.0049	7508999			
Antimony (Sb)	mg/L	<0.00050	0.00050	7508999			
Arsenic (As)	mg/L	0.0010	0.0010	7508999			
Barium (Ba)	mg/L	0.024	0.0020	7508999			
Beryllium (Be)	mg/L	<0.00040	0.00040	7508999			
Boron (B)	mg/L	0.047	0.010	7508999			
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							



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VERITAS

BV Labs Job #: C1M2547

Report Date: 2021/08/12

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

### RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QHU792			QHU792		
Sampling Date		2021/08/06 10:40			2021/08/06 10:40		
COC Number		15552			15552		
	UNITS	RW02	RDL	QC Batch	RW02 Lab-Dup	RDL	QC Batch
Cadmium (Cd)	mg/L	<0.000090	0.000090	7508999			
Calcium (Ca)	mg/L	150	1.0	7508999			
Chromium (Cr)	mg/L	<0.0050	0.0050	7508999			
Cobalt (Co)	mg/L	<0.00050	0.00050	7508999			
Copper (Cu)	mg/L	<0.00090	0.00090	7508999			
Iron (Fe)	mg/L	5.9	0.10	7508999			
Lead (Pb)	mg/L	<0.00050	0.00050	7508999			
Lithium (Li)	mg/L	0.0087	0.0050	7508999			
Magnesium (Mg)	mg/L	50	0.050	7508999			
Manganese (Mn)	mg/L	0.080	0.0020	7508999			
Molybdenum (Mo)	mg/L	0.0016	0.00050	7508999			
Nickel (Ni)	mg/L	<0.0010	0.0010	7508999			
Phosphorus (P)	mg/L	<0.10	0.10	7508999			
Potassium (K)	mg/L	1.4	0.20	7508999			
Selenium (Se)	mg/L	<0.0020	0.0020	7508999			
Silicon (Si)	mg/L	4.7	0.050	7508999			
Silver (Ag)	mg/L	<0.000090	0.000090	7508999			
Sodium (Na)	mg/L	11	0.10	7508999			
Strontium (Sr)	mg/L	38	0.0010	7508999			
Thallium (Tl)	mg/L	<0.000050	0.000050	7508999			
Titanium (Ti)	mg/L	<0.0050	0.0050	7508999			
Uranium (U)	mg/L	0.00016	0.00010	7508999			
Vanadium (V)	mg/L	<0.00050	0.00050	7508999			
Zinc (Zn)	mg/L	<0.0050	0.0050	7508999			
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							





BUREAU  
VERITAS

BV Labs Job #: C1M2547

Report Date: 2021/08/12

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

### RESULTS OF ANALYSES OF WATER

<b>BV Labs ID</b>		QHU792			QHU792		
<b>Sampling Date</b>		2021/08/06 10:40			2021/08/06 10:40		
<b>COC Number</b>		15552			15552		
	<b>UNITS</b>	<b>RW02</b>	<b>RDL</b>	<b>QC Batch</b>	<b>RW02 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>							
Total Suspended Solids	mg/L	15	10	7509445			
Turbidity	NTU	49	0.1	7507047	48	0.1	7507047
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
Lab-Dup = Laboratory Initiated Duplicate							



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BV Labs Job #: C1M2547

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Sampler Initials: AV

### MICROBIOLOGY (WATER)

<b>BV Labs ID</b>		QHU792	
<b>Sampling Date</b>		2021/08/06 10:40	
<b>COC Number</b>		15552	
	<b>UNITS</b>	<b>RW02</b>	<b>QC Batch</b>
<b>Microbiological</b>			
Total Coliforms	CFU/100mL	0	7506507
Escherichia coli	CFU/100mL	0	7506507
QC Batch = Quality Control Batch			



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BV Labs Job #: C1M2547

Report Date: 2021/08/12

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

## TEST SUMMARY

**BV Labs ID:** QHU792

**Sample ID:** RW02

**Matrix:** Water

**Collected:** 2021/08/06

**Shipped:**

**Received:** 2021/08/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7507135	N/A	2021/08/10	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7504991	N/A	2021/08/10	Automated Statchk
Chloride by Automated Colourimetry	KONE	7507375	N/A	2021/08/10	Alina Dobreanu
Conductivity	AT	7507152	N/A	2021/08/10	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7510708	N/A	2021/08/10	Julianna Castiglione
Hardness (calculated as CaCO <sub>3</sub> )		7506368	N/A	2021/08/12	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7508999	N/A	2021/08/11	Nan Raykha
Ion Balance (% Difference)	CALC	7504993	N/A	2021/08/12	Automated Statchk
Anion and Cation Sum	CALC	7504994	N/A	2021/08/12	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7506507	N/A	2021/08/06	Soham Patel
Total Ammonia-N	LACH/NH <sub>4</sub>	7510353	N/A	2021/08/10	Amanpreet Sappal
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7507369	N/A	2021/08/09	Chandra Nandlal
pH	AT	7507154	2021/08/07	2021/08/10	Surinder Rai
Orthophosphate	KONE	7507377	N/A	2021/08/09	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7504995	N/A	2021/08/12	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7504996	N/A	2021/08/12	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7507376	N/A	2021/08/09	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7504997	N/A	2021/08/12	Automated Statchk
Total Suspended Solids	BAL	7509445	2021/08/10	2021/08/11	Shaneil Hall
Turbidity	AT	7507047	N/A	2021/08/09	Neil Dassanayake

**BV Labs ID:** QHU792 Dup

**Sample ID:** RW02

**Matrix:** Water

**Collected:** 2021/08/06

**Shipped:**

**Received:** 2021/08/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate (NO <sub>3</sub> ) and Nitrite (NO <sub>2</sub> ) in Water	LACH	7507369	N/A	2021/08/09	Chandra Nandlal
Turbidity	AT	7507047	N/A	2021/08/09	Neil Dassanayake



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BV Labs Job #: C1M2547

Report Date: 2021/08/12

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

### GENERAL COMMENTS

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

Package 1	5.0°C
-----------	-------

Results relate only to the items tested.

BUREAU  
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BV Labs Job #: C1M2547

Report Date: 2021/08/12

## QUALITY ASSURANCE REPORT

Stantec Consulting Ltd  
Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7507047	Turbidity	2021/08/09			94	85 - 115	<0.1	NTU	2.7	20		
7507135	Alkalinity (Total as CaCO <sub>3</sub> )	2021/08/10			96	85 - 115	<1.0	mg/L	0.82	20		
7507152	Conductivity	2021/08/10			103	85 - 115	<1.0	umho/cm	0.68	25		
7507154	pH	2021/08/10			102	98 - 103			0.47	N/A		
7507369	Nitrate (N)	2021/08/09	98	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
7507369	Nitrite (N)	2021/08/09	107	80 - 120	109	80 - 120	<0.010	mg/L	NC	20		
7507375	Dissolved Chloride (Cl <sup>-</sup> )	2021/08/10	NC	80 - 120	105	80 - 120	<1.0	mg/L	2.2	20		
7507376	Dissolved Sulphate (SO <sub>4</sub> )	2021/08/09	NC	75 - 125	102	80 - 120	<1.0	mg/L	1.5	20		
7507377	Orthophosphate (P)	2021/08/09	124	75 - 125	101	80 - 120	<0.010	mg/L	2.3	25		
7508999	Aluminum (Al)	2021/08/11	92	80 - 120	93	80 - 120	<0.0049	mg/L				
7508999	Antimony (Sb)	2021/08/11	105	80 - 120	106	80 - 120	<0.00050	mg/L				
7508999	Arsenic (As)	2021/08/11	104	80 - 120	104	80 - 120	<0.0010	mg/L				
7508999	Barium (Ba)	2021/08/11	99	80 - 120	101	80 - 120	<0.0020	mg/L				
7508999	Beryllium (Be)	2021/08/11	98	80 - 120	99	80 - 120	<0.00040	mg/L				
7508999	Boron (B)	2021/08/11	96	80 - 120	94	80 - 120	<0.010	mg/L				
7508999	Cadmium (Cd)	2021/08/11	101	80 - 120	102	80 - 120	<0.000090	mg/L				
7508999	Calcium (Ca)	2021/08/11	NC	80 - 120	92	80 - 120	<0.20	mg/L	5.2	20		
7508999	Chromium (Cr)	2021/08/11	100	80 - 120	99	80 - 120	<0.0050	mg/L				
7508999	Cobalt (Co)	2021/08/11	98	80 - 120	99	80 - 120	<0.00050	mg/L				
7508999	Copper (Cu)	2021/08/11	97	80 - 120	98	80 - 120	<0.00090	mg/L				
7508999	Iron (Fe)	2021/08/11	99	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
7508999	Lead (Pb)	2021/08/11	100	80 - 120	102	80 - 120	<0.00050	mg/L				
7508999	Lithium (Li)	2021/08/11	106	80 - 120	104	80 - 120	<0.0050	mg/L				
7508999	Magnesium (Mg)	2021/08/11	NC	80 - 120	103	80 - 120	<0.050	mg/L	1.1	20		
7508999	Manganese (Mn)	2021/08/11	97	80 - 120	98	80 - 120	<0.0020	mg/L	2.4	20		
7508999	Molybdenum (Mo)	2021/08/11	106	80 - 120	103	80 - 120	<0.00050	mg/L				
7508999	Nickel (Ni)	2021/08/11	97	80 - 120	99	80 - 120	<0.0010	mg/L				
7508999	Phosphorus (P)	2021/08/11	93	80 - 120	107	80 - 120	<0.10	mg/L				
7508999	Potassium (K)	2021/08/11	95	80 - 120	96	80 - 120	<0.20	mg/L				
7508999	Selenium (Se)	2021/08/11	102	80 - 120	97	80 - 120	<0.0020	mg/L				



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VERITAS

BV Labs Job #: C1M2547

Report Date: 2021/08/12

## QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd

Client Project #: 161413217.777

Site Location: WELLESLEY

Sampler Initials: AV

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7508999	Silicon (Si)	2021/08/11	92	80 - 120	90	80 - 120	<0.050	mg/L				
7508999	Silver (Ag)	2021/08/11	101	80 - 120	101	80 - 120	<0.000090	mg/L				
7508999	Sodium (Na)	2021/08/11	97	80 - 120	102	80 - 120	<0.10	mg/L				
7508999	Strontium (Sr)	2021/08/11	NC	80 - 120	100	80 - 120	<0.0010	mg/L				
7508999	Thallium (Tl)	2021/08/11	103	80 - 120	102	80 - 120	<0.000050	mg/L				
7508999	Titanium (Ti)	2021/08/11	91	80 - 120	92	80 - 120	<0.0050	mg/L				
7508999	Uranium (U)	2021/08/11	105	80 - 120	103	80 - 120	<0.00010	mg/L				
7508999	Vanadium (V)	2021/08/11	101	80 - 120	100	80 - 120	<0.00050	mg/L				
7508999	Zinc (Zn)	2021/08/11	98	80 - 120	101	80 - 120	<0.0050	mg/L				
7509445	Total Suspended Solids	2021/08/11					<10	mg/L	NC	25	96	85 - 115
7510353	Total Ammonia-N	2021/08/10	106	75 - 125	101	80 - 120	<0.050	mg/L	2.8	20		
7510708	Dissolved Organic Carbon	2021/08/10	95	80 - 120	99	80 - 120	<0.40	mg/L	0.42	20		

N/A = Not Applicable

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference  $\leq 2 \times \text{RDL}$ ).





BUREAU  
VERITAS

BV Labs Job #: C1M2547  
Report Date: 2021/08/12

Stantec Consulting Ltd  
Client Project #: 161413217.777  
Site Location: WELLESLEY  
Sampler Initials: AV

### VALIDATION SIGNATURE PAGE

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

---

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

---

Soham Patel, Analyst 2

---

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.



6440 Campobello Road, Mississauga, Ontario L5N 2L8  
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266  
CAM FCD-01191/6

### CHAIN OF CUSTODY RECORD

155552

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required	
Company Name: #9197 STANTEC CONSULTING LTD		Company Name:		Quotation #: C01624		<input checked="" type="checkbox"/> Regular TAT (5-7 days) Most analyses	
Contact Name: ACCOUNTS PAYABLE		Contact Name: GRANT WHITEHEAD		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address: 300 HARBOR BLVD SUITE 100 WATERLOO ON N2L 0A4		Address: edd@stantec.com		Project #: 1413217-777		Rush TAT (Surcharges will be applied)	
Phone: 519-579-4410 Fax: 519-579-6753		Phone: 519-585-7400 Fax:		Site Location: Wellesley		<input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days	
Email: SAPINVOICES@STANTEC.COM		Email: grant.whitehead@stantec.com		Site Location Province: ON		Date Required:	
<small>MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS LABORATORIES' DRINKING WATER CHAIN OF CUSTODY</small>				Sampled By: A. VANDEENHOFF		Rush Confirmation #:	
Regulation 153		Other Regulations		Analysis Requested		LABORATORY USE ONLY	
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE)    Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQO <input type="checkbox"/> Region <input checked="" type="checkbox"/> Other (Specify) ODMS <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED) <input type="checkbox"/> REG 406 Table _____		Analysis Requested: RSC - Comprehensive Drinking Water Total Coli./E. Coli. (Coliforms) Total Suspended Solids Turbidity		CUSTOMER SEAL Y: <input checked="" type="checkbox"/> N: <input type="checkbox"/> Present    Intact COOLER TEMPERATURES 6/4/5 0/2/4 COOLING MEDIA PRESENT: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N COMMENTS	
Include Criteria on Certificate of Analysis:    Y / N				SAMPLER MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS			
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX			
1 RWO2		2021/08/06	1040	GW	6 M		
2							
3							
4							
5							
6							
7							
8							
9							
10							
06-Aug-21 14:25 Ronklin Gracian  C1M2547 ATM    ENV 627							
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)
AARON VANDEENHOFF		2021/08/06	14:24	Jaspreet Kaur		2021/08/06	14:25
				DIPIKA SINGH		2021/08/06	17:44
				On Ice BV JOB #			

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas Laboratories' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms available at <http://www.bvlabs.com/terms-and-conditions>

COC-1004 (06/19)

WB#421136

White: BV Labs - Yellow: Client



Your Project #: 161413217.778  
Your C.O.C. #: 927351-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2023/04/20**  
Report #: R7595176  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BUREAU VERITAS JOB #: C3A5628**

**Received: 2023/04/14, 12:50**

Sample Matrix: Water  
# Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2023/04/18	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	6	N/A	2023/04/18	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	6	N/A	2023/04/18	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	6	N/A	2023/04/18	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	6	N/A	2023/04/17	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	6	N/A	2023/04/18	CAM SOP 00102/00408/00447	EPA 6010D m
Dissolved Metals by ICPMS	6	N/A	2023/04/17	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	5	N/A	2023/04/18		
Ion Balance (% Difference)	1	N/A	2023/04/19		
Anion and Cation Sum	6	N/A	2023/04/18		
Total Ammonia-N	6	N/A	2023/04/19	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	6	N/A	2023/04/18	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	6	2023/04/17	2023/04/18	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	6	N/A	2023/04/18	CAM SOP-00461	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	5	N/A	2023/04/18		Auto Calc
Sat. pH and Langelier Index (@ 20C)	1	N/A	2023/04/19		Auto Calc
Sat. pH and Langelier Index (@ 4C)	5	N/A	2023/04/18		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2023/04/19		Auto Calc
Sulphate by Automated Turbidimetry	6	N/A	2023/04/18	CAM SOP-00464	SM 23 4500-SO42- E m
Total Dissolved Solids (TDS calc)	5	N/A	2023/04/18		Auto Calc
Total Dissolved Solids (TDS calc)	1	N/A	2023/04/19		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



Your Project #: 161413217.778  
Your C.O.C. #: 927351-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2023/04/20**  
Report #: R7595176  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BUREAU VERITAS JOB #: C3A5628**

**Received: 2023/04/14, 12:50**

Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless 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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to:

Julie Clement, Technical Account Manager

Email: Julie.CLEMENT@bureauveritas.com

Phone# (613)868-6079

=====

This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

**RCAP - COMPREHENSIVE (WATER)**

Bureau Veritas ID		VOD656	VOD657	VOD658	VOD659		
Sampling Date		2023/04/13 11:10	2023/04/13 12:05	2023/04/13 14:05	2023/04/13 14:50		
COC Number		927351-01-01	927351-01-01	927351-01-01	927351-01-01		
	UNITS	BH04-21	BH06-21	BH05-21	BH02-21	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	me/L	5.08	6.92	8.21	6.83	N/A	8610005
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	190	280	290	270	1.0	8610001
Calculated TDS	mg/L	290	370	450	370	1.0	8610000
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	2.7	3.7	3.0	3.2	1.0	8610001
Cation Sum	me/L	5.42	7.08	8.57	6.95	N/A	8610005
Hardness (CaCO <sub>3</sub> )	mg/L	190	280	390	270	1.0	8610003
Ion Balance (% Difference)	%	3.22	1.20	2.13	0.860	N/A	8610004
Langelier Index (@ 20C)	N/A	0.695	0.871	0.987	0.833		8610006
Langelier Index (@ 4C)	N/A	0.446	0.622	0.739	0.585		8610007
Saturation pH (@ 20C)	N/A	7.49	7.28	7.05	7.27		8610006
Saturation pH (@ 4C)	N/A	7.74	7.53	7.29	7.52		8610007
<b>Inorganics</b>							
Total Ammonia-N	mg/L	0.082	<0.050	0.090	<0.050	0.050	8611996
Conductivity	umho/cm	500	640	740	650	1.0	8611440
Dissolved Organic Carbon	mg/L	1.3	0.83	0.97	0.76	0.40	8611466
Orthophosphate (P)	mg/L	<0.010	<0.010	<0.010	0.017	0.010	8611552
pH	pH	8.19	8.15	8.03	8.11		8611148
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	44	60	93	59	1.0	8611561
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	190	280	300	270	1.0	8611439
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	13	2.2	12	5.3	1.0	8611567
Nitrite (N)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	8611162
Nitrate (N)	mg/L	<0.10	<0.10	<0.10	0.60	0.10	8611162
Nitrate + Nitrite (N)	mg/L	<0.10	<0.10	<0.10	0.60	0.10	8611162
<b>Metals</b>							
Dissolved Aluminum (Al)	mg/L	<0.0049	0.0072	0.0049	0.015	0.0049	8611983
Dissolved Antimony (Sb)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	8611983
Dissolved Arsenic (As)	mg/L	<0.0010	<0.0010	0.0027	<0.0010	0.0010	8611983
Dissolved Barium (Ba)	mg/L	0.061	0.12	0.14	0.11	0.0020	8611983
Dissolved Beryllium (Be)	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8611983
Dissolved Boron (B)	mg/L	0.14	0.13	0.024	0.12	0.010	8611983
Dissolved Cadmium (Cd)	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	0.000090	8611983
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
N/A = Not Applicable							



BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628  
Report Date: 2023/04/20

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: R

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		VOD656	VOD657	VOD658	VOD659		
Sampling Date		2023/04/13 11:10	2023/04/13 12:05	2023/04/13 14:05	2023/04/13 14:50		
COC Number		927351-01-01	927351-01-01	927351-01-01	927351-01-01		
	UNITS	BH04-21	BH06-21	BH05-21	BH02-21	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	44	52	87	54	0.20	8611983
Dissolved Chromium (Cr)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8611983
Dissolved Cobalt (Co)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	8611983
Dissolved Copper (Cu)	mg/L	0.0022	0.0018	0.0010	<0.00090	0.00090	8611983
Dissolved Iron (Fe)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	8611983
Dissolved Lead (Pb)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	8611983
Dissolved Magnesium (Mg)	mg/L	19	37	41	33	0.050	8611983
Dissolved Manganese (Mn)	mg/L	0.053	0.0056	0.076	0.0042	0.0020	8611983
Dissolved Molybdenum (Mo)	mg/L	0.0085	0.0063	0.0024	0.0084	0.00050	8611983
Dissolved Nickel (Ni)	mg/L	<0.0010	<0.0010	0.0015	<0.0010	0.0010	8611983
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	8611983
Dissolved Potassium (K)	mg/L	1.3	2.0	1.8	2.1	0.20	8611983
Dissolved Selenium (Se)	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	8611983
Dissolved Silicon (Si)	mg/L	6.3	6.3	8.6	6.2	0.050	8611983
Dissolved Silver (Ag)	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	0.000090	8611983
Dissolved Sodium (Na)	mg/L	37	33	18	34	0.10	8611983
Dissolved Strontium (Sr)	mg/L	0.59	1.8	0.46	1.3	0.0010	8611983
Dissolved Thallium (Tl)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	8611983
Dissolved Titanium (Ti)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8611983
Dissolved Uranium (U)	mg/L	0.0017	0.0032	0.0021	0.0028	0.00010	8611983
Dissolved Vanadium (V)	mg/L	<0.00050	0.00084	<0.00050	0.00076	0.00050	8611983
Dissolved Zinc (Zn)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8611983
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							





BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628  
Report Date: 2023/04/20

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: R

### RCAP - COMPREHENSIVE (WATER)

<b>Bureau Veritas ID</b>		VOD659			VOD660	VOD661		
<b>Sampling Date</b>		2023/04/13 14:50			2023/04/13 15:06	2023/04/13 16:30		
<b>COC Number</b>		927351-01-01			927351-01-01	927351-01-01		
	<b>UNITS</b>	<b>BH02-21 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>	<b>BH03-21</b>	<b>BH01-21</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Anion Sum	me/L				8.68	11.5	N/A	8610005
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				350	310	1.0	8610001
Calculated TDS	mg/L				460	660	1.0	8610000
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				2.9	3.1	1.0	8610001
Cation Sum	me/L				8.98	13.0	N/A	8610005
Hardness (CaCO <sub>3</sub> )	mg/L				440	440	1.0	8610003
Ion Balance (% Difference)	%				1.68	6.10	N/A	8610004
Langelier Index (@ 20C)	N/A				1.08	1.02		8610006
Langelier Index (@ 4C)	N/A				0.834	0.774		8610007
Saturation pH (@ 20C)	N/A				6.87	7.01		8610006
Saturation pH (@ 4C)	N/A				7.11	7.25		8610007
<b>Inorganics</b>								
Total Ammonia-N	mg/L				0.070	0.10	0.050	8611996
Conductivity	umho/cm				780	1200	1.0	8611440
Dissolved Organic Carbon	mg/L				0.98	1.4	0.40	8611466
Orthophosphate (P)	mg/L	<0.010	0.010	8611552	<0.010	<0.010	0.010	8611552
pH	pH				7.95	8.03		8611148
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	60	1.0	8611561	69	68	1.0	8611561
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L				350	310	1.0	8611439
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	5.0	1.0	8611567	6.0	140	1.0	8611567
Nitrite (N)	mg/L				<0.010	<0.010	0.010	8611162
Nitrate (N)	mg/L				<0.10	<0.10	0.10	8611162
Nitrate + Nitrite (N)	mg/L				<0.10	<0.10	0.10	8611162
<b>Metals</b>								
Dissolved Aluminum (Al)	mg/L				<0.0049	0.32	0.0049	8611983
Dissolved Antimony (Sb)	mg/L				<0.00050	<0.00050	0.00050	8611983
Dissolved Arsenic (As)	mg/L				0.0013	0.0017	0.0010	8611983
Dissolved Barium (Ba)	mg/L				0.12	0.16	0.0020	8611983
Dissolved Beryllium (Be)	mg/L				<0.00040	<0.00040	0.00040	8611983
Dissolved Boron (B)	mg/L				0.015	0.048	0.010	8611983
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								
Lab-Dup = Laboratory Initiated Duplicate								
N/A = Not Applicable								



BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628  
Report Date: 2023/04/20

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: R

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		VOD659			VOD660	VOD661		
Sampling Date		2023/04/13 14:50			2023/04/13 15:06	2023/04/13 16:30		
COC Number		927351-01-01			927351-01-01	927351-01-01		
	UNITS	BH02-21 Lab-Dup	RDL	QC Batch	BH03-21	BH01-21	RDL	QC Batch
Dissolved Cadmium (Cd)	mg/L				<0.000090	<0.000090	0.000090	8611983
Dissolved Calcium (Ca)	mg/L				110	100	0.20	8611983
Dissolved Chromium (Cr)	mg/L				<0.0050	<0.0050	0.0050	8611983
Dissolved Cobalt (Co)	mg/L				<0.00050	<0.00050	0.00050	8611983
Dissolved Copper (Cu)	mg/L				<0.00090	0.0014	0.00090	8611983
Dissolved Iron (Fe)	mg/L				0.21	0.29	0.10	8611983
Dissolved Lead (Pb)	mg/L				<0.00050	<0.00050	0.00050	8611983
Dissolved Magnesium (Mg)	mg/L				38	47	0.050	8611983
Dissolved Manganese (Mn)	mg/L				0.044	0.054	0.0020	8611983
Dissolved Molybdenum (Mo)	mg/L				0.00087	0.0040	0.00050	8611983
Dissolved Nickel (Ni)	mg/L				<0.0010	<0.0010	0.0010	8611983
Dissolved Phosphorus (P)	mg/L				<0.10	<0.10	0.10	8611983
Dissolved Potassium (K)	mg/L				1.3	2.6	0.20	8611983
Dissolved Selenium (Se)	mg/L				<0.0020	<0.0020	0.0020	8611983
Dissolved Silicon (Si)	mg/L				7.9	9.2	0.050	8611983
Dissolved Silver (Ag)	mg/L				<0.000090	<0.000090	0.000090	8611983
Dissolved Sodium (Na)	mg/L				5.4	93	0.10	8611983
Dissolved Strontium (Sr)	mg/L				0.39	1.1	0.0010	8611983
Dissolved Thallium (Tl)	mg/L				<0.000050	<0.000050	0.000050	8611983
Dissolved Titanium (Ti)	mg/L				<0.0050	0.014	0.0050	8611983
Dissolved Uranium (U)	mg/L				0.00062	0.0037	0.00010	8611983
Dissolved Vanadium (V)	mg/L				<0.00050	0.00079	0.00050	8611983
Dissolved Zinc (Zn)	mg/L				<0.0050	<0.0050	0.0050	8611983
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate								



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

## TEST SUMMARY

**Bureau Veritas ID:** VOD656

**Sample ID:** BH04-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/19	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/19	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/19	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/19	Automated Statchk

**Bureau Veritas ID:** VOD657

**Sample ID:** BH06-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/18	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/18	Automated Statchk



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

## TEST SUMMARY

**Bureau Veritas ID:** VOD658  
**Sample ID:** BH05-21  
**Matrix:** Water

**Collected:** 2023/04/13  
**Shipped:**  
**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/18	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/18	Automated Statchk

**Bureau Veritas ID:** VOD659  
**Sample ID:** BH02-21  
**Matrix:** Water

**Collected:** 2023/04/13  
**Shipped:**  
**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/18	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/18	Automated Statchk



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

## TEST SUMMARY

**Bureau Veritas ID:** VOD659 Dup

**Sample ID:** BH02-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan

**Bureau Veritas ID:** VOD660

**Sample ID:** BH03-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/18	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/18	Automated Statchk

**Bureau Veritas ID:** VOD661

**Sample ID:** BH01-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8611439	N/A	2023/04/18	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8610001	N/A	2023/04/18	Automated Statchk
Chloride by Automated Colourimetry	KONE	8611567	N/A	2023/04/18	Massarat Jan
Conductivity	AT	8611440	N/A	2023/04/18	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8611466	N/A	2023/04/17	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		8610003	N/A	2023/04/18	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8611983	N/A	2023/04/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8610004	N/A	2023/04/18	Automated Statchk
Anion and Cation Sum	CALC	8610005	N/A	2023/04/18	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	8611996	N/A	2023/04/19	Prabhjot Kaur
Nitrate & Nitrite as Nitrogen in Water	LACH	8611162	N/A	2023/04/18	Chandra Nandlal
pH	AT	8611148	2023/04/17	2023/04/18	Kien Tran
Orthophosphate	KONE	8611552	N/A	2023/04/18	Massarat Jan



BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

## TEST SUMMARY

**Bureau Veritas ID:** VOD661

**Sample ID:** BH01-21

**Matrix:** Water

**Collected:** 2023/04/13

**Shipped:**

**Received:** 2023/04/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sat. pH and Langelier Index (@ 20C)	CALC	8610006	N/A	2023/04/18	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8610007	N/A	2023/04/18	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8611561	N/A	2023/04/18	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	8610000	N/A	2023/04/18	Automated Statchk





## GENERAL COMMENTS

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

Package 1	2.0°C
-----------	-------

Sample VOD659 [BH02-21] : Total Phosphorus < ortho-Phosphate: Both values fall within the method uncertainty for duplicates and are likely equivalent.

**Results relate only to the items tested.**



BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

## QUALITY ASSURANCE REPORT

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: R

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8611148	pH	2023/04/18			102	98 - 103			0.18	N/A
8611162	Nitrate (N)	2023/04/18	103	80 - 120	108	80 - 120	<0.10	mg/L	2.1	20
8611162	Nitrite (N)	2023/04/18	101	80 - 120	105	80 - 120	<0.010	mg/L	NC	20
8611439	Alkalinity (Total as CaCO <sub>3</sub> )	2023/04/18			95	85 - 115	<1.0	mg/L	1.0	20
8611440	Conductivity	2023/04/18			102	85 - 115	<1.0	umho/cm	0.41	25
8611466	Dissolved Organic Carbon	2023/04/17	96	80 - 120	99	80 - 120	<0.40	mg/L	9.2	20
8611552	Orthophosphate (P)	2023/04/18	92	75 - 125	99	80 - 120	<0.010	mg/L	NC	20
8611561	Dissolved Sulphate (SO <sub>4</sub> )	2023/04/18	NC	75 - 125	102	80 - 120	<1.0	mg/L	0.85	20
8611567	Dissolved Chloride (Cl <sup>-</sup> )	2023/04/18	97	80 - 120	100	80 - 120	<1.0	mg/L	5.1	20
8611983	Dissolved Aluminum (Al)	2023/04/17	101	80 - 120	102	80 - 120	<0.0049	mg/L	NC	20
8611983	Dissolved Antimony (Sb)	2023/04/17	104	80 - 120	101	80 - 120	<0.00050	mg/L	11	20
8611983	Dissolved Arsenic (As)	2023/04/17	100	80 - 120	101	80 - 120	<0.0010	mg/L	2.0	20
8611983	Dissolved Barium (Ba)	2023/04/17	101	80 - 120	101	80 - 120	<0.0020	mg/L	1.0	20
8611983	Dissolved Beryllium (Be)	2023/04/17	99	80 - 120	99	80 - 120	<0.00040	mg/L	NC	20
8611983	Dissolved Boron (B)	2023/04/17	100	80 - 120	99	80 - 120	<0.010	mg/L	3.2	20
8611983	Dissolved Cadmium (Cd)	2023/04/17	101	80 - 120	99	80 - 120	<0.000090	mg/L	NC	20
8611983	Dissolved Calcium (Ca)	2023/04/17	NC	80 - 120	100	80 - 120	<0.20	mg/L	6.2	20
8611983	Dissolved Chromium (Cr)	2023/04/17	94	80 - 120	95	80 - 120	<0.0050	mg/L	NC	20
8611983	Dissolved Cobalt (Co)	2023/04/17	102	80 - 120	101	80 - 120	<0.00050	mg/L	NC	20
8611983	Dissolved Copper (Cu)	2023/04/17	97	80 - 120	96	80 - 120	<0.00090	mg/L	5.9	20
8611983	Dissolved Iron (Fe)	2023/04/17	103	80 - 120	101	80 - 120	<0.10	mg/L	NC	20
8611983	Dissolved Lead (Pb)	2023/04/17	96	80 - 120	95	80 - 120	<0.00050	mg/L	NC	20
8611983	Dissolved Magnesium (Mg)	2023/04/17	NC	80 - 120	102	80 - 120	<0.050	mg/L	3.7	20
8611983	Dissolved Manganese (Mn)	2023/04/17	101	80 - 120	101	80 - 120	<0.0020	mg/L	1.4	20
8611983	Dissolved Molybdenum (Mo)	2023/04/17	98	80 - 120	97	80 - 120	<0.00050	mg/L	2.6	20
8611983	Dissolved Nickel (Ni)	2023/04/17	97	80 - 120	100	80 - 120	<0.0010	mg/L	NC	20
8611983	Dissolved Phosphorus (P)	2023/04/17	104	80 - 120	114	80 - 120	<0.10	mg/L	NC	20
8611983	Dissolved Potassium (K)	2023/04/17	107	80 - 120	108	80 - 120	<0.20	mg/L	1.9	20
8611983	Dissolved Selenium (Se)	2023/04/17	99	80 - 120	99	80 - 120	<0.0020	mg/L	NC	20
8611983	Dissolved Silicon (Si)	2023/04/17	103	80 - 120	104	80 - 120	<0.050	mg/L	1.1	20
8611983	Dissolved Silver (Ag)	2023/04/17	97	80 - 120	96	80 - 120	<0.000090	mg/L	NC	20



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

## QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8611983	Dissolved Sodium (Na)	2023/04/17	102	80 - 120	107	80 - 120	<0.10	mg/L	5.4	20
8611983	Dissolved Strontium (Sr)	2023/04/17	NC	80 - 120	100	80 - 120	<0.0010	mg/L	3.0	20
8611983	Dissolved Thallium (Tl)	2023/04/17	97	80 - 120	93	80 - 120	<0.000050	mg/L	NC	20
8611983	Dissolved Titanium (Ti)	2023/04/17	103	80 - 120	104	80 - 120	<0.0050	mg/L	NC	20
8611983	Dissolved Uranium (U)	2023/04/17	99	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20
8611983	Dissolved Vanadium (V)	2023/04/17	98	80 - 120	98	80 - 120	<0.00050	mg/L	NC	20
8611983	Dissolved Zinc (Zn)	2023/04/17	NC	80 - 120	101	80 - 120	<0.0050	mg/L	0.95	20
8611996	Total Ammonia-N	2023/04/19	99	75 - 125	98	80 - 120	<0.050	mg/L	NC	20

N/A = Not Applicable

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

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

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

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

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

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



BUREAU  
VERITAS

Bureau Veritas Job #: C3A5628

Report Date: 2023/04/20

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: R


## VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



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

Page of

CHAIN OF CUSTODY

<b>INVOICE TO:</b> Company Name: #9197 Stantec Consulting Ltd Attention: Accounts Payable Address: 300 Hagey Blvd Suite 100 Waterloo ON N2L 0A4 Tel: (519) 579-4410 Fax: (519) 579-6733 Email: SAPinvoices@Stantec.com		<b>REPORT TO:</b> Company Name: Grant Whitehead Attention: Grant Whitehead Address: Tel: (519) 585-7400 Fax: (519) 579-4239 Email: grant.whitehead@stantec.com		<b>PROJECT INFORMATION:</b> Quotation #: C15856 P.O. #: Project: Project Name: Site #: Sampled By:	
--	--	---	--	--	--

14-Apr-23 12:50

Julie Clement

C3A5628

RUK ENV-965

CHS27351-01-01

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY					ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required: Please provide advance notice for rush projects											
<b>Regulation 153 (2011)</b> <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Medium/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> For RSC <input type="checkbox"/> Table					<b>Other Regulations</b> <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> Reg 558 <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> MISA Municipality <input type="checkbox"/> PWQO <input type="checkbox"/> Reg 406 Table <input checked="" type="checkbox"/> Other <u>ODWS</u>					<b>Special Instructions</b>					Field Filtered (please circle): <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Hg <input type="checkbox"/> Cr VI RCap - Comprehensive										<b>Regular (Standard) TAT:</b> (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.	
Include Criteria on Certificate of Analysis (Y/N)?															<b>Job Specific Rush TAT (if applies to entire submission)</b> 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		BH04-21		Apr13	11:10	GW	X										Not from potable GW sources									
2		BH06-21		Apr13	12:05	GW	X										"									
3		BH05-21		Apr13	14:05	GW	X										"									
4		BH02-21		Apr13	14:50	GW	X										"									
5		BH03-21		Apr13	15:06	GW	X										"									
6		BH01-21		Apr13	16:30	GW	X										"									
7																										
8																										
9																	REC'D IN WATERLOO									
10																										

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted		Laboratory Use Only				
[Signature]		23/04/14	12:50	[Signature]		2023/04/14	12:50	0		Time Sensitive	Temperature (°C) on Reel	Custody Seal	Yes	No
											21212	Present		
												Intact		✓

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S 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.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-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.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCs.

Bureau Veritas Canada (2019) Inc.

-1/0/0

627173



Your Project #: 161413217.778  
Your C.O.C. #: 965717-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2023/12/11**  
Report #: R7950239  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BUREAU VERITAS JOB #: C3AV735**

**Received: 2023/12/05, 15:09**

Sample Matrix: Water  
# Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2023/12/07	CAM SOP-00448	SM 24 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2023/12/07	CAM SOP-00102	APHA 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	4	N/A	2023/12/08	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	6	N/A	2023/12/07	CAM SOP-00463	SM 24 4500-Cl E m
Conductivity	6	N/A	2023/12/07	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	6	N/A	2023/12/07	CAM SOP-00446	SM 24 5310 B m
Hardness (calculated as CaCO3)	6	N/A	2023/12/07	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	6	N/A	2023/12/07	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2023/12/07		
Ion Balance (% Difference)	4	N/A	2023/12/08		
Anion and Cation Sum	2	N/A	2023/12/07		
Anion and Cation Sum	4	N/A	2023/12/08		
Total Ammonia-N	6	N/A	2023/12/07	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	6	N/A	2023/12/08	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH	6	2023/12/06	2023/12/07	CAM SOP-00413	SM 24th - 4500H+ B
Orthophosphate	6	N/A	2023/12/07	CAM SOP-00461	SM 24 4500-P E
Sat. pH and Langelier Index (@ 20C)	2	N/A	2023/12/07		Auto Calc
Sat. pH and Langelier Index (@ 20C)	4	N/A	2023/12/08		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2023/12/07		Auto Calc
Sat. pH and Langelier Index (@ 4C)	4	N/A	2023/12/08		Auto Calc
Sulphate by Automated Turbidimetry	6	N/A	2023/12/07	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids (TDS calc)	2	N/A	2023/12/07		Auto Calc
Total Dissolved Solids (TDS calc)	4	N/A	2023/12/08		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, MELCCFP, 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





Your Project #: 161413217.778  
Your C.O.C. #: 965717-01-01

**Attention: Grant Whitehead**

Stantec Consulting Ltd  
300 Hagey Blvd  
Suite 100  
Waterloo, ON  
CANADA N2L 0A4

**Report Date: 2023/12/11**  
Report #: R7950239  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**BUREAU VERITAS JOB #: C3AV735**

**Received: 2023/12/05, 15:09**

writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless 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) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to:

Julie Clement, Technical Account Manager

Email: Julie.CLEMENT@bureauveritas.com

Phone# (613)868-6079

=====

This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		XUM766		XUM767	XUM768		
Sampling Date		2023/12/05 10:15		2023/12/05 10:54	2023/12/05 12:01		
COC Number		965717-01-01		965717-01-01	965717-01-01		
	UNITS	BH06-21	QC Batch	BH03-21	BH02-21	RDL	QC Batch
<b>Calculated Parameters</b>							
Anion Sum	me/L	7.08	9094273	8.83	7.08	N/A	9094273
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	290	9094253	350	280	1.0	9094253
Calculated TDS	mg/L	370	9091491	470	380	1.0	9091491
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L	2.7	9094253	2.5	2.6	1.0	9094253
Cation Sum	me/L	7.19	9094273	9.07	7.19	N/A	9094273
Hardness (CaCO <sub>3</sub> )	mg/L	290	9091675	440	280	1.0	9091675
Ion Balance (% Difference)	%	0.780	9092884	1.36	0.730	N/A	9092884
Langelier Index (@ 20C)	N/A	0.758	9094252	1.04	0.769		9094252
Langelier Index (@ 4C)	N/A	0.509	9094254	0.794	0.521		9094254
Saturation pH (@ 20C)	N/A	7.23	9094252	6.84	7.21		9094252
Saturation pH (@ 4C)	N/A	7.48	9094254	7.09	7.46		9094254
<b>Inorganics</b>							
Total Ammonia-N	mg/L	<0.050	9097395	0.068	<0.050	0.050	9097395
Conductivity	umho/cm	660	9095908	800	660	1.0	9095934
Dissolved Organic Carbon	mg/L	0.95	9095162	1.2	0.58	0.40	9095162
Orthophosphate (P)	mg/L	<0.010	9095971	<0.010	<0.010	0.010	9095971
pH	pH	7.99	9095909	7.88	7.98		9095936
Dissolved Sulphate (SO <sub>4</sub> )	mg/L	55	9095976	73	59	1.0	9095976
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	290	9095906	360	290	1.0	9095914
Dissolved Chloride (Cl <sup>-</sup> )	mg/L	2.4	9095969	5.6	3.9	1.0	9095969
Nitrite (N)	mg/L	<0.010	9095978	<0.010	<0.010	0.010	9095978
Nitrate (N)	mg/L	<0.10	9095978	<0.10	0.39	0.10	9095978
Nitrate + Nitrite (N)	mg/L	<0.10	9095978	<0.10	0.39	0.10	9095978
<b>Metals</b>							
Dissolved Aluminum (Al)	mg/L	0.0054	9096389	<0.0049	<0.0049	0.0049	9096389
Dissolved Antimony (Sb)	mg/L	<0.00050	9096389	<0.00050	<0.00050	0.00050	9096389
Dissolved Arsenic (As)	mg/L	<0.0010	9096389	0.0015	<0.0010	0.0010	9096389
Dissolved Barium (Ba)	mg/L	0.11	9096389	0.098	0.11	0.0020	9096389
Dissolved Beryllium (Be)	mg/L	<0.00040	9096389	<0.00040	<0.00040	0.00040	9096389
Dissolved Boron (B)	mg/L	0.12	9096389	0.012	0.10	0.010	9096389
Dissolved Cadmium (Cd)	mg/L	<0.000090	9096389	<0.000090	<0.000090	0.000090	9096389
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							
N/A = Not Applicable							



BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735  
Report Date: 2023/12/11

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		XUM766		XUM767	XUM768		
Sampling Date		2023/12/05 10:15		2023/12/05 10:54	2023/12/05 12:01		
COC Number		965717-01-01		965717-01-01	965717-01-01		
	UNITS	BH06-21	QC Batch	BH03-21	BH02-21	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	55	9096389	120	59	0.20	9096389
Dissolved Chromium (Cr)	mg/L	<0.0050	9096389	<0.0050	<0.0050	0.0050	9096389
Dissolved Cobalt (Co)	mg/L	<0.00050	9096389	<0.00050	<0.00050	0.00050	9096389
Dissolved Copper (Cu)	mg/L	<0.00090	9096389	<0.00090	<0.00090	0.00090	9096389
Dissolved Iron (Fe)	mg/L	<0.10	9096389	0.45	<0.10	0.10	9096389
Dissolved Lead (Pb)	mg/L	<0.00050	9096389	<0.00050	<0.00050	0.00050	9096389
Dissolved Magnesium (Mg)	mg/L	37	9096389	35	33	0.050	9096389
Dissolved Manganese (Mn)	mg/L	0.018	9096389	0.040	0.0053	0.0020	9096389
Dissolved Molybdenum (Mo)	mg/L	0.0059	9096389	0.00092	0.0076	0.00050	9096389
Dissolved Nickel (Ni)	mg/L	<0.0010	9096389	<0.0010	<0.0010	0.0010	9096389
Dissolved Phosphorus (P)	mg/L	<0.10	9096389	<0.10	<0.10	0.10	9096389
Dissolved Potassium (K)	mg/L	2.1	9096389	1.2	2.1	0.20	9096389
Dissolved Selenium (Se)	mg/L	<0.0020	9096389	<0.0020	<0.0020	0.0020	9096389
Dissolved Silicon (Si)	mg/L	6.5	9096389	8.3	6.4	0.050	9096389
Dissolved Silver (Ag)	mg/L	<0.000090	9096389	<0.000090	<0.000090	0.000090	9096389
Dissolved Sodium (Na)	mg/L	31	9096389	5.0	34	0.10	9096389
Dissolved Strontium (Sr)	mg/L	1.5	9096389	0.34	1.1	0.0010	9096389
Dissolved Thallium (Tl)	mg/L	<0.000050	9096389	<0.000050	<0.000050	0.000050	9096389
Dissolved Titanium (Ti)	mg/L	<0.0050	9096389	<0.0050	<0.0050	0.0050	9096389
Dissolved Uranium (U)	mg/L	0.0031	9096389	0.00053	0.0029	0.00010	9096389
Dissolved Vanadium (V)	mg/L	0.00098	9096389	<0.00050	0.00083	0.00050	9096389
Dissolved Zinc (Zn)	mg/L	<0.0050	9096389	<0.0050	<0.0050	0.0050	9096389
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

**RCAP - COMPREHENSIVE (WATER)**

<b>Bureau Veritas ID</b>		XUM768			XUM769	XUM770		
<b>Sampling Date</b>		2023/12/05 12:01			2023/12/05 12:46	2023/12/05 13:25		
<b>COC Number</b>		965717-01-01			965717-01-01	965717-01-01		
	<b>UNITS</b>	<b>BH02-21 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>	<b>BH05-21</b>	<b>BH04-21</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Anion Sum	me/L				8.11	5.03	N/A	9094273
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				300	200	1.0	9094253
Calculated TDS	mg/L				440	300	1.0	9091491
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				2.4	1.7	1.0	9094253
Cation Sum	me/L				8.19	6.10	N/A	9094273
Hardness (CaCO <sub>3</sub> )	mg/L				380	220	1.0	9091675
Ion Balance (% Difference)	%				0.500	9.59	N/A	9092884
Langelier Index (@ 20C)	N/A				0.886	0.580		9094252
Langelier Index (@ 4C)	N/A				0.637	0.331		9094254
Saturation pH (@ 20C)	N/A				7.03	7.39		9094252
Saturation pH (@ 4C)	N/A				7.28	7.64		9094254
<b>Inorganics</b>								
Total Ammonia-N	mg/L	0.081	0.050	9097395	0.10	0.15	0.050	9097395
Conductivity	umho/cm				750	500	1.0	9095934
Dissolved Organic Carbon	mg/L				1.3	1.5	0.40	9095162
Orthophosphate (P)	mg/L				<0.010	<0.010	0.010	9095971
pH	pH				7.91	7.97		9095936
Dissolved Sulphate (SO <sub>4</sub> )	mg/L				80	38	1.0	9095976
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L				310	200	1.0	9095914
Dissolved Chloride (Cl <sup>-</sup> )	mg/L				12	11	1.0	9095969
Nitrite (N)	mg/L				<0.010	<0.010	0.010	9095978
Nitrate (N)	mg/L				<0.10	<0.10	0.10	9095978
Nitrate + Nitrite (N)	mg/L				<0.10	<0.10	0.10	9095978
<b>Metals</b>								
Dissolved Aluminum (Al)	mg/L				<0.0049	0.44	0.0049	9096389
Dissolved Antimony (Sb)	mg/L				<0.00050	<0.00050	0.00050	9096389
Dissolved Arsenic (As)	mg/L				0.0014	0.0011	0.0010	9096389
Dissolved Barium (Ba)	mg/L				0.11	0.064	0.0020	9096389
Dissolved Beryllium (Be)	mg/L				<0.00040	<0.00040	0.00040	9096389
Dissolved Boron (B)	mg/L				0.016	0.14	0.010	9096389
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								
Lab-Dup = Laboratory Initiated Duplicate								
N/A = Not Applicable								



BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735  
Report Date: 2023/12/11

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		XUM768			XUM769	XUM770		
Sampling Date		2023/12/05 12:01			2023/12/05 12:46	2023/12/05 13:25		
COC Number		965717-01-01			965717-01-01	965717-01-01		
	UNITS	BH02-21 Lab-Dup	RDL	QC Batch	BH05-21	BH04-21	RDL	QC Batch
Dissolved Cadmium (Cd)	mg/L				<0.000090	<0.000090	0.000090	9096389
Dissolved Calcium (Ca)	mg/L				87	54	0.20	9096389
Dissolved Chromium (Cr)	mg/L				<0.0050	<0.0050	0.0050	9096389
Dissolved Cobalt (Co)	mg/L				<0.00050	<0.00050	0.00050	9096389
Dissolved Copper (Cu)	mg/L				<0.00090	0.0022	0.00090	9096389
Dissolved Iron (Fe)	mg/L				<0.10	0.49	0.10	9096389
Dissolved Lead (Pb)	mg/L				<0.00050	0.00065	0.00050	9096389
Dissolved Magnesium (Mg)	mg/L				39	21	0.050	9096389
Dissolved Manganese (Mn)	mg/L				0.050	0.085	0.0020	9096389
Dissolved Molybdenum (Mo)	mg/L				0.0021	0.0074	0.00050	9096389
Dissolved Nickel (Ni)	mg/L				<0.0010	0.0014	0.0010	9096389
Dissolved Phosphorus (P)	mg/L				<0.10	<0.10	0.10	9096389
Dissolved Potassium (K)	mg/L				1.5	1.4	0.20	9096389
Dissolved Selenium (Se)	mg/L				<0.0020	<0.0020	0.0020	9096389
Dissolved Silicon (Si)	mg/L				8.4	6.8	0.050	9096389
Dissolved Silver (Ag)	mg/L				<0.000090	<0.000090	0.000090	9096389
Dissolved Sodium (Na)	mg/L				14	36	0.10	9096389
Dissolved Strontium (Sr)	mg/L				0.30	0.66	0.0010	9096389
Dissolved Thallium (Tl)	mg/L				<0.000050	<0.000050	0.000050	9096389
Dissolved Titanium (Ti)	mg/L				<0.0050	0.018	0.0050	9096389
Dissolved Uranium (U)	mg/L				0.0021	0.0016	0.00010	9096389
Dissolved Vanadium (V)	mg/L				<0.00050	0.0016	0.00050	9096389
Dissolved Zinc (Zn)	mg/L				<0.0050	<0.0050	0.0050	9096389
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate								



BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735  
Report Date: 2023/12/11

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

### RCAP - COMPREHENSIVE (WATER)

<b>Bureau Veritas ID</b>		XUM770			XUM771		
<b>Sampling Date</b>		2023/12/05 13:25			2023/12/05 14:01		
<b>COC Number</b>		965717-01-01			965717-01-01		
	<b>UNITS</b>	<b>BH04-21 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>	<b>BH01-21</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>							
Anion Sum	me/L				9.57	N/A	9094273
Bicarb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				300	1.0	9094253
Calculated TDS	mg/L				520	1.0	9091491
Carb. Alkalinity (calc. as CaCO <sub>3</sub> )	mg/L				2.1	1.0	9094253
Cation Sum	me/L				9.90	N/A	9094273
Hardness (CaCO <sub>3</sub> )	mg/L				370	1.0	9094285
Ion Balance (% Difference)	%				1.71	N/A	9092884
Langelier Index (@ 20C)	N/A				0.784		9094252
Langelier Index (@ 4C)	N/A				0.536		9094254
Saturation pH (@ 20C)	N/A				7.09		9094252
Saturation pH (@ 4C)	N/A				7.34		9094254
<b>Inorganics</b>							
Total Ammonia-N	mg/L				0.11	0.050	9097395
Conductivity	umho/cm	500	1.0	9095934	970	1.0	9095908
Dissolved Organic Carbon	mg/L				1.2	0.40	9095162
Orthophosphate (P)	mg/L				<0.010	0.010	9095971
pH	pH	8.04		9095936	7.88		9095909
Dissolved Sulphate (SO <sub>4</sub> )	mg/L				43	1.0	9095976
Alkalinity (Total as CaCO <sub>3</sub> )	mg/L	200	1.0	9095914	300	1.0	9095906
Dissolved Chloride (Cl <sup>-</sup> )	mg/L				92	1.0	9095969
Nitrite (N)	mg/L	<0.010	0.010	9095978	<0.010	0.010	9095978
Nitrate (N)	mg/L	<0.10	0.10	9095978	<0.10	0.10	9095978
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	9095978	<0.10	0.10	9095978
<b>Metals</b>							
Dissolved Aluminum (Al)	mg/L				<0.0049	0.0049	9096389
Dissolved Antimony (Sb)	mg/L				<0.00050	0.00050	9096389
Dissolved Arsenic (As)	mg/L				0.0020	0.0010	9096389
Dissolved Barium (Ba)	mg/L				0.13	0.0020	9096389
Dissolved Beryllium (Be)	mg/L				<0.00040	0.00040	9096389
Dissolved Boron (B)	mg/L				0.060	0.010	9096389
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable							





BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735  
Report Date: 2023/12/11

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

### RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID		XUM770			XUM771		
Sampling Date		2023/12/05 13:25			2023/12/05 14:01		
COC Number		965717-01-01			965717-01-01		
	UNITS	BH04-21 Lab-Dup	RDL	QC Batch	BH01-21	RDL	QC Batch
Dissolved Cadmium (Cd)	mg/L				<0.000090	0.000090	9096389
Dissolved Calcium (Ca)	mg/L				78	0.20	9096389
Dissolved Chromium (Cr)	mg/L				<0.0050	0.0050	9096389
Dissolved Cobalt (Co)	mg/L				<0.00050	0.00050	9096389
Dissolved Copper (Cu)	mg/L				<0.00090	0.00090	9096389
Dissolved Iron (Fe)	mg/L				<0.10	0.10	9096389
Dissolved Lead (Pb)	mg/L				<0.00050	0.00050	9096389
Dissolved Magnesium (Mg)	mg/L				41	0.050	9096389
Dissolved Manganese (Mn)	mg/L				0.044	0.0020	9096389
Dissolved Molybdenum (Mo)	mg/L				0.0046	0.00050	9096389
Dissolved Nickel (Ni)	mg/L				<0.0010	0.0010	9096389
Dissolved Phosphorus (P)	mg/L				<0.10	0.10	9096389
Dissolved Potassium (K)	mg/L				2.4	0.20	9096389
Dissolved Selenium (Se)	mg/L				<0.0020	0.0020	9096389
Dissolved Silicon (Si)	mg/L				8.0	0.050	9096389
Dissolved Silver (Ag)	mg/L				<0.000090	0.000090	9096389
Dissolved Sodium (Na)	mg/L				58	0.10	9096389
Dissolved Strontium (Sr)	mg/L				1.1	0.0010	9096389
Dissolved Thallium (Tl)	mg/L				<0.000050	0.000050	9096389
Dissolved Titanium (Ti)	mg/L				<0.0050	0.0050	9096389
Dissolved Uranium (U)	mg/L				0.0028	0.00010	9096389
Dissolved Vanadium (V)	mg/L				<0.00050	0.00050	9096389
Dissolved Zinc (Zn)	mg/L				<0.0050	0.0050	9096389
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate							



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3AV735  
Report Date: 2023/12/11

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

## TEST SUMMARY

**Bureau Veritas ID:** XUM766  
**Sample ID:** BH06-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095906	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/07	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095908	N/A	2023/12/07	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9091675	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/07	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/07	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095909	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/07	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/07	Automated Statchk
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/07	Automated Statchk

**Bureau Veritas ID:** XUM767  
**Sample ID:** BH03-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095914	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/08	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095934	N/A	2023/12/07	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9091675	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/08	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/08	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095936	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/08	Automated Statchk
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/08	Automated Statchk



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

## TEST SUMMARY

**Bureau Veritas ID:** XUM768

**Sample ID:** BH02-21

**Matrix:** Water

**Collected:** 2023/12/05

**Shipped:**

**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095914	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/08	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095934	N/A	2023/12/07	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9091675	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/08	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/08	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095936	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/08	Automated Statchk
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/08	Automated Statchk

**Bureau Veritas ID:** XUM768 Dup

**Sample ID:** BH02-21

**Matrix:** Water

**Collected:** 2023/12/05

**Shipped:**

**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani

**Bureau Veritas ID:** XUM769

**Sample ID:** BH05-21

**Matrix:** Water

**Collected:** 2023/12/05

**Shipped:**

**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095914	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/08	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095934	N/A	2023/12/07	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9091675	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/08	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/08	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095936	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/08	Automated Statchk



BUREAU  
VERITAS

Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

## TEST SUMMARY

**Bureau Veritas ID:** XUM769  
**Sample ID:** BH05-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/08	Automated Statchk

**Bureau Veritas ID:** XUM770  
**Sample ID:** BH04-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095914	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/08	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095934	N/A	2023/12/07	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9091675	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/08	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/08	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095936	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/08	Automated Statchk
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/08	Automated Statchk

**Bureau Veritas ID:** XUM770 Dup  
**Sample ID:** BH04-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095914	N/A	2023/12/07	Nachiketa Gohil
Conductivity	AT	9095934	N/A	2023/12/07	Nachiketa Gohil
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095936	2023/12/06	2023/12/07	Nachiketa Gohil

**Bureau Veritas ID:** XUM771  
**Sample ID:** BH01-21  
**Matrix:** Water

**Collected:** 2023/12/05  
**Shipped:**  
**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9095906	N/A	2023/12/07	Nachiketa Gohil
Carbonate, Bicarbonate and Hydroxide	CALC	9094253	N/A	2023/12/07	Automated Statchk
Chloride by Automated Colourimetry	SKAL	9095969	N/A	2023/12/07	Massarat Jan
Conductivity	AT	9095908	N/A	2023/12/07	Nachiketa Gohil



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Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

## TEST SUMMARY

**Bureau Veritas ID:** XUM771

**Sample ID:** BH01-21

**Matrix:** Water

**Collected:** 2023/12/05

**Shipped:**

**Received:** 2023/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9095162	N/A	2023/12/07	Gyulshen Idriz
Hardness (calculated as CaCO <sub>3</sub> )		9094285	N/A	2023/12/07	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	9096389	N/A	2023/12/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	9092884	N/A	2023/12/07	Automated Statchk
Anion and Cation Sum	CALC	9094273	N/A	2023/12/07	Automated Statchk
Total Ammonia-N	LACH/NH <sub>4</sub>	9097395	N/A	2023/12/07	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	9095978	N/A	2023/12/08	Chandra Nandlal
pH	AT	9095909	2023/12/06	2023/12/07	Nachiketa Gohil
Orthophosphate	KONE	9095971	N/A	2023/12/07	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	9094252	N/A	2023/12/07	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	9094254	N/A	2023/12/07	Automated Statchk
Sulphate by Automated Turbidimetry	SKAL	9095976	N/A	2023/12/07	Massarat Jan
Total Dissolved Solids (TDS calc)	CALC	9091491	N/A	2023/12/07	Automated Statchk



### GENERAL COMMENTS

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

Package 1	6.7°C
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Results relate only to the items tested.



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VERITAS

Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

## QUALITY ASSURANCE REPORT

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9095162	Dissolved Organic Carbon	2023/12/06	92	80 - 120	96	80 - 120	<0.40	mg/L	1.0	20
9095906	Alkalinity (Total as CaCO <sub>3</sub> )	2023/12/07			98	85 - 115	<1.0	mg/L	1.0	20
9095908	Conductivity	2023/12/07			103	85 - 115	<1.0	umho/cm	0.40	10
9095909	pH	2023/12/07			101	98 - 103			0.16	N/A
9095914	Alkalinity (Total as CaCO <sub>3</sub> )	2023/12/07			99	85 - 115	<1.0	mg/L	2.1	20
9095934	Conductivity	2023/12/07			103	85 - 115	<1.0	umho/cm	0.60	10
9095936	pH	2023/12/07			101	98 - 103			0.87	N/A
9095969	Dissolved Chloride (Cl <sup>-</sup> )	2023/12/07	NC	80 - 120	102	80 - 120	<1.0	mg/L	0.42	20
9095971	Orthophosphate (P)	2023/12/07	96	75 - 125	94	80 - 120	<0.010	mg/L	NC	20
9095976	Dissolved Sulphate (SO <sub>4</sub> )	2023/12/07	NC	75 - 125	94	80 - 120	<1.0	mg/L	2.1	20
9095978	Nitrate (N)	2023/12/08	98	80 - 120	102	80 - 120	<0.10	mg/L	NC	20
9095978	Nitrite (N)	2023/12/08	105	80 - 120	107	80 - 120	<0.010	mg/L	NC	20
9096389	Dissolved Aluminum (Al)	2023/12/07	101	80 - 120	99	80 - 120	<0.0049	mg/L		
9096389	Dissolved Antimony (Sb)	2023/12/07	105	80 - 120	104	80 - 120	<0.00050	mg/L	NC	20
9096389	Dissolved Arsenic (As)	2023/12/07	99	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20
9096389	Dissolved Barium (Ba)	2023/12/07	96	80 - 120	96	80 - 120	<0.0020	mg/L	1.3	20
9096389	Dissolved Beryllium (Be)	2023/12/07	100	80 - 120	97	80 - 120	<0.00040	mg/L	NC	20
9096389	Dissolved Boron (B)	2023/12/07	100	80 - 120	97	80 - 120	<0.010	mg/L	5.8	20
9096389	Dissolved Cadmium (Cd)	2023/12/07	104	80 - 120	99	80 - 120	<0.000090	mg/L	NC	20
9096389	Dissolved Calcium (Ca)	2023/12/07	NC	80 - 120	100	80 - 120	<0.20	mg/L		
9096389	Dissolved Chromium (Cr)	2023/12/07	91	80 - 120	95	80 - 120	<0.0050	mg/L	NC	20
9096389	Dissolved Cobalt (Co)	2023/12/07	94	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20
9096389	Dissolved Copper (Cu)	2023/12/07	98	80 - 120	95	80 - 120	<0.00090	mg/L	NC	20
9096389	Dissolved Iron (Fe)	2023/12/07	NC	80 - 120	99	80 - 120	<0.10	mg/L		
9096389	Dissolved Lead (Pb)	2023/12/07	95	80 - 120	96	80 - 120	<0.00050	mg/L	NC	20
9096389	Dissolved Magnesium (Mg)	2023/12/07	93	80 - 120	98	80 - 120	<0.050	mg/L		
9096389	Dissolved Manganese (Mn)	2023/12/07	NC	80 - 120	97	80 - 120	<0.0020	mg/L		
9096389	Dissolved Molybdenum (Mo)	2023/12/07	99	80 - 120	93	80 - 120	<0.00050	mg/L	NC	20
9096389	Dissolved Nickel (Ni)	2023/12/07	95	80 - 120	96	80 - 120	<0.0010	mg/L	NC	20
9096389	Dissolved Phosphorus (P)	2023/12/07	106	80 - 120	102	80 - 120	<0.10	mg/L		
9096389	Dissolved Potassium (K)	2023/12/07	102	80 - 120	101	80 - 120	<0.20	mg/L		

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Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

## QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd  
Client Project #: 161413217.778  
Sampler Initials: AV

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9096389	Dissolved Selenium (Se)	2023/12/07	99	80 - 120	98	80 - 120	<0.0020	mg/L	NC	20
9096389	Dissolved Silicon (Si)	2023/12/07	100	80 - 120	99	80 - 120	<0.050	mg/L		
9096389	Dissolved Silver (Ag)	2023/12/07	85	80 - 120	95	80 - 120	<0.000090	mg/L	NC	20
9096389	Dissolved Sodium (Na)	2023/12/07	96	80 - 120	97	80 - 120	<0.10	mg/L	3.2	20
9096389	Dissolved Strontium (Sr)	2023/12/07	NC	80 - 120	98	80 - 120	<0.0010	mg/L		
9096389	Dissolved Thallium (Tl)	2023/12/07	101	80 - 120	102	80 - 120	<0.000050	mg/L	NC	20
9096389	Dissolved Titanium (Ti)	2023/12/07	103	80 - 120	97	80 - 120	<0.0050	mg/L		
9096389	Dissolved Uranium (U)	2023/12/07	101	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20
9096389	Dissolved Vanadium (V)	2023/12/07	94	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20
9096389	Dissolved Zinc (Zn)	2023/12/07	98	80 - 120	98	80 - 120	<0.0050	mg/L	NC	20
9097395	Total Ammonia-N	2023/12/07	101	75 - 125	98	80 - 120	<0.050	mg/L	NC	20

N/A = Not Applicable

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference  $\leq 2 \times \text{RDL}$ ).



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Bureau Veritas Job #: C3AV735

Report Date: 2023/12/11

Stantec Consulting Ltd

Client Project #: 161413217.778

Sampler Initials: AV

## VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



## **APPENDIX J:**

### **Test Pit Photographs**





Photo 1: TP01-24 (May 2, 2024). Looking southeast towards Gerber Road.



Photo 2: TP01-24 (May 3, 2024, after 24 hours of being excavated) Looking southeast towards Gerber Road.



Photo 3: TP01-24 (May 3, 2024). Western face of test pit.



Photo 4: TP01-24 (May 3, 2024). Western face of test pit. From top of dashed white line to test pit bottom the wall is "sweating", an indication that groundwater is very slowly seeping from the wall.





Photo 5: TP02-24 (May 2, 2024). Looking to the northwest.



Photo 6: TP02-24 (May 3, 2024, after 24 hours of being excavated). Looking to the northwest. Note that soil sloughing of the test pit walls has occurred.



Photo 7: TP02-24 (May 3, 2024). Looking at north face of test pit.



Photo 8: TP02-24 (May 3, 2024). Note that from an approximate depth of 1.0 m BGS to base of pit (4.0 m BGS) the wall is "sweating", an indication that groundwater is very slowly seeping from the wall.





Photo 9: TP03-24 (May 2, 2024). Looking to the northwest.



Photo 10: TP03-24 (May 2, 2024). Beginnings of seeping / flowing sand seam in southeast corner of the test pit.

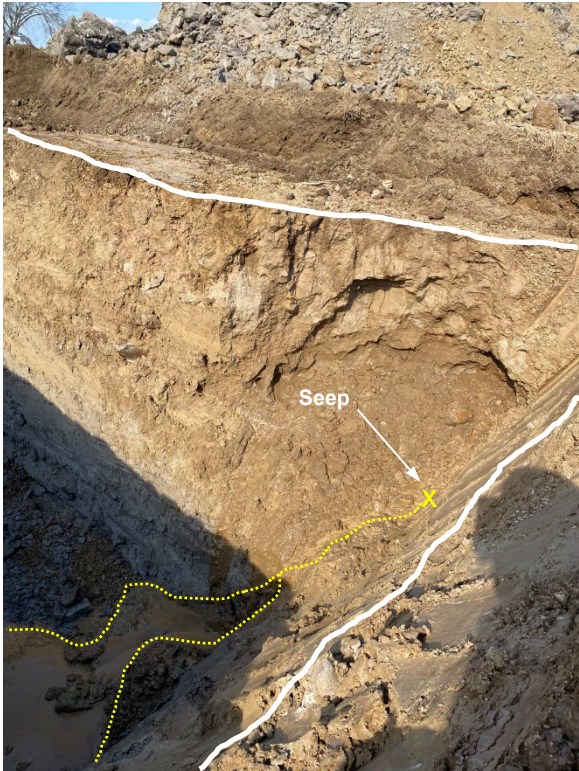


Photo 11: TP03-24 (May 2, 2024). Looking at east face of test pit. Seeping sand seam present in southeast corner of the test pit (marked by 'X').



Photo 12: TP03-24 (May 3, 2024, after 24 hours of being excavated). Note that soil sloughing of the test pit walls have occurred. Standing water is a byproduct of sand seam drainage.





Photo 13: TP04-24 (May 2, 2024). Looking at east face of test pit. Observed draining of gravelly sand seam into test pit at time of excavation.



Photo 14: TP04-24 (May 3, 2024, after 24 hours of being excavated). Standing water is a byproduct of gravelly sand seam drainage.

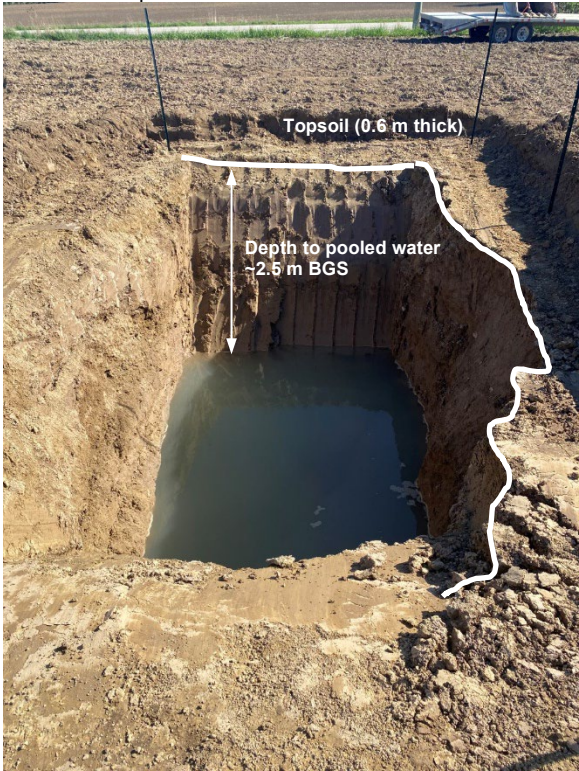


Photo 15: TP04-24 (May 3, 2024). Looking south towards Gerber Road. Standing water is a byproduct of gravelly sand seam drainage.



Photo 16: TP04-24 (May 3, 2024). Looking east towards existing residential subdivision.





Photo 17: TP05-24 (May 2, 2024). Looking to the northwest.



Photo 19: TP05-24 (May 3, 2024). Looking to the northeast. Note that soil sloughing of the test pit walls have occurred. Standing water is a byproduct of sand seam drainage.

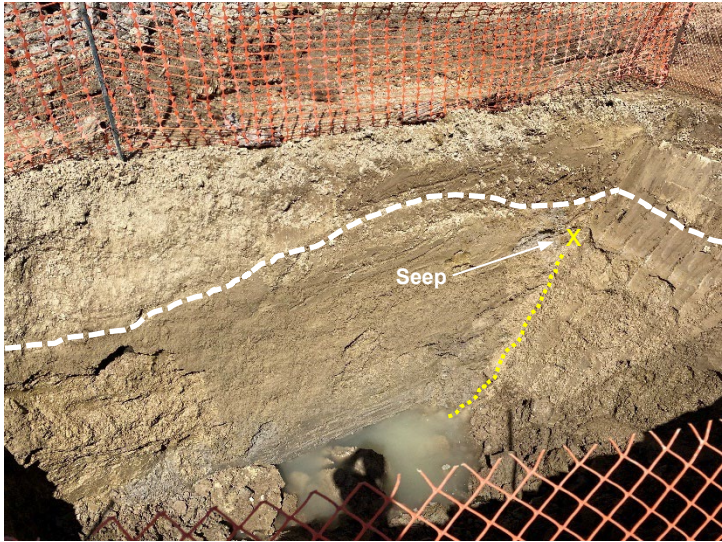


Photo 18: TP05-24 (May 3, 2024, after 16 hours of being excavated). Looking to the northwest. Below dashed white line the test pit wall is "sweating". Seepage (flow) from sand seam marked by 'X'.



Photo 20: TP05-24 (May 3, 2024, after 24 hours of being excavated). Looking to the northwest. Note that seepage from sand seam had stopped (i.e., drained out).