



GEMTEC

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**Hydrogeological Investigation &
Terrain Analysis
Zoning By-Law Amendment
4296 Anderson Road
Ottawa, Ontario**

April 21, 2026

File: 100011.121

Neol's Ottawa Snow Inc.
4296 Anderson Road
Ottawa, Ontario
K0A 1K0

Attention: Jake Clifford, Administrative Director

**Re: Hydrogeological Investigation and Terrain Analysis
Zoning By-Law Amendment
4296 Anderson Road, Ottawa, Ontario**

This report presents the results of a groundwater quality and quantity assessment, and septic impact assessment in support of the proposed Zoning By-Law Amendment for modifications to the existing infrastructure at 4296 Anderson Road in Ottawa, Ontario. This property is referred to herein as 'the Site'.

This document is subject to the *Conditions and Limitations of this Report*, which follow the main text and are considered an integral part of this report.

1.0 INTRODUCTION AND BACKGROUND

Plans are being prepared for a Zoning By-Law Amendment for the Site. The Site location is shown on Figure 1 and 2 following the text of this report. At the time of reporting, the Site was occupied by two free-standing maintenance garages, a free-standing dwelling partially converted to an administrative office, several other accessory structures for storage, and a storage area for landscape materials and construction equipment. There was also an existing septic system and a well located on the Site.

Based on the background information provided to GEMTEC, the following changes to the lot layout are being proposed:

- Relocating the metal storage shed along the south property line and
- Relocating the small shed along the north property line.

The above structures will likely be repositioned to the same general locations with a minimum 1-metre setback from the property lines. It is understood that no new foundation elements are proposed for the relocated structures. It is understood that all other buildings and structures will remain in place. Soft landscaping work is also anticipated within portions of the property. The draft grading and resurfacing plans are provided in Appendix A.

The hydrogeological and terrain analysis study requirements outlined in the City of Ottawa pre-consultation meeting notes dated October 23, 2024, are provided in Appendix B. As recommended, a technical consultation with the City of Ottawa Hydrogeologist Travis Smith was carried out on July 10th, 2025. Travis Smith provided the following guidance via email on July 16th, 2025 (included in Appendix B):

“As a follow-up to last week’s meeting, please find additional information regarding proceeding with a non-potable supply and modified dug well requirements. Please note that these dug well requirements are site-specific and have been reduced given several factors.

Existing dug well

- *The reporting should identify and evaluate issues associated with dug wells, including vulnerability to contamination, insufficient yield, seasonal variability, and inconsistent construction.*
- *Ensure compliance with construction requirements as per O. Reg. 903. It was noted that the well is currently located within one of the service garages. If remedial work is required, it must be completed by a licensed well contractor who employs a Class III well technician who can construct dug or bored wells.*
- *Pumping test should be done in low water season (August/September) to account for seasonality or provide support and rationale as to long term water quantity and quality.*

Non-potable water supply for the proposed industrial use

- *The site is within the extents of the East Ottawa Aquifer Capability Screening Tool and is an area of known poor water quality in both shallow and deep aquifers. The City would not expect a newly constructed bedrock well to intercept improved water quality; therefore, a non-potable water supply is being sought. The City’s HTAG requires that ‘every effort’ be made to find an adequate water supply in general; however, as discussed in the meeting, it will not be required for this Site.*
- *Approvals for non-potable uses are on a site-specific bases and would be subject to the following conditions for this site;*
 - *Discussion in report along with corresponding recommendation that the water supply is non-potable and will only be used as such. Clarification of how the non-potable supply will be used (flushing, etc.)*
 - *Clearly segregate or clarify the recommendations for treatment systems to be clear that they are for using the water supply as a non-potable use (e.g., water softener used to protect plumbing).*

- *Registration of notice on title regarding exceedances, incl. any associated fact sheet from OPH as available.*
- *Reference to Ontario Building Code requirements, section 7.7.2.1. Markings Required and 3.7.4.18. Drinking Water.”*

1.1 Previous Geotechnical Investigation – GEMTEC (2025a)

GEMTEC carried out a geotechnical investigation at the Site in support of the proposed modifications. The findings of that investigation were provided in GEMTEC’s report titled “Geotechnical Assessment, Proposed Development, 4296 Anderson Road, Ottawa, Ontario”, dated October 2025. That report is referred to herein as GEMTEC (2025a).

The GEMTEC (2025a) investigation included seven boreholes, identified as 25-01 to 25-07 inclusive, which were advanced to depths ranging from about 4.9 to 15.2 metres. At one borehole, a dynamic probe test was carried out from the base of the borehole at 15.2 metres to about 30.5 metres. The borehole logs, which include the dynamic probe test blow counts, are provided in Appendix C. The findings of GEMTEC (2025a) are discussed in greater detail later in this document.

1.2 Previous Phase Two Environmental Site Assessment – GEMTEC (2025b)

GEMTEC prepared a Phase Two Environmental Site Assessment for the Site titled “Phase Two Environmental Site Assessment, Zoning By-Law Amendment Application, 4296 Anderson Road, Ottawa, Ontario”, dated October 2025. That report is referred to herein as GEMTEC (2025b). Soil and groundwater within the six areas of potential environmental concern (APECs) identified in GEMTEC’s preceding Phase One ESA were investigated through sample collection and analysis of the identified contaminants of potential concern (COPCs). Soil and groundwater exceedances against the limits in Table 2: Full Depth Generic Site Condition Standards (SCS) in a Potable Ground Water Condition for Residential/Parkland/Institutional (RPI) land use with coarse textured soil and Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for All Types of Property Use with coarse textured soil were documented. The findings of GEMTEC (2025b) are discussed in greater detail later in this document.

1.3 MECP Water Well Records

A search of the Ministry of Environment, Conservation and Parks (MECP) water well records (accessed from <https://www.ontario.ca/environment-and-energy/map-well-records>) was carried out by GEMTEC. The records were accessed January 28, 2026. No water well records were found within 500 metres of the Site. The closest well record was associated with the Anderson Links Golf and Country Club mapped approximately 600 metres to the northeast, which is connected to the municipal Carlsbad Trickle Feed system. A summary review of the well record is presented below for completeness:

- The well is identified as a water supply well with domestic usage, installed in 1971;
- The noted overburden thickness at the well location is about 50 metres;
- Well depth is about 85 metres;
- Casing depth is 50 metres;
- The well is reported to be screened (open hole) in shale bedrock.

2.0 TERRAIN ANALYSIS

The Site covers an approximate area of 1.13 acres, fronts along Anderson Road, and is occupied by five structures owned and operated by Noel's Ottawa Snow Inc. As described in GEMTEC (2025b), the Site was used historically for residential and agricultural purposes. The current industrial Site uses include the storage of landscape materials and construction equipment, two detached maintenance garages, several other accessory structures for storage, and a detached dwelling that has been partially converted to an administrative office.

2.1 Source Water Protection Overview

According to the MECP Source Protection Information Atlas (access from <https://www.lioapplications.lrc.gov.on.ca/SourceWaterProtection/index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-CA>) the following is known about the Site is:

- Within the South Nation Source Protection Area;
- Not within an intake or well head protection zone;
- Not within a mapped significant groundwater recharge area; and
- Not within an area designated as a highly vulnerable aquifer.

2.2 Topography and Drainage

The Site has a relatively flat topography and is at elevations between approximately 80 and 82 metres (m) above sea level (asl). The Site generally appears to be at the same grade as the surrounding properties. Regional and local topography indicates a downwards slope in elevation towards the east. Shallow groundwater flow directions are expected to flow towards the east, corresponding with surficial flow patterns.

2.3 Surficial Geology and Bedrock Geology

A review of surficial geology maps of the Ottawa area and reported well records by the MECP indicates that the Site is underlain by glaciomarine deposits of silt and clay. Bedrock geology maps indicate that the bedrock below the soil cover is comprised of shale and limestone of the Carlsbad Formation, which is found at depths ranging from about 25 to 50 metres below ground surface. The bedrock beneath the Site is unlikely to host karst features.

As outlined in the pre-consultation meeting feedback notes (Appendix B), the Site is within the extents of the East Ottawa Aquifer Screening Tool, which identified that the groundwater quality beneath the Site is poor, with both shallow and deep wells susceptible to water quality exceedances.

2.4 Subsurface Conditions – GEMTEC (2025a)

A total of seven boreholes and one dynamic cone penetration test were advanced across the Site between June 16 and 18, 2025, to characterize the surficial geology, overburden thickness, and correlation of geologic conditions with available geological mapping resources. A single monitoring well was installed in boreholes 25-01 to 25-06, inclusive, to measure the groundwater levels, conduct hydraulic testing, and to allow groundwater sampling. The boreholes were advanced using a Geoprobe 7822DT drill rig (direct push drill rig) supplied and operated by Strata Drilling Group of Ottawa, Ontario. Following completion of the boreholes, soil samples were returned to GEMTEC's laboratory for examination by a geotechnical engineer, and selected samples were submitted for moisture content, grain size distribution, and Atterberg limit testing. The following presents an overview of the subsurface conditions encountered in the boreholes advanced as part of GEMTEC (2025a):

- Asphaltic concrete was encountered at the ground surface at boreholes 25-02, 25-03, 25-06, and 25-07. The asphaltic concrete has a thickness of about 30 millimetres.
- Fill material, which generally consists of silty sand and gravel, was encountered at the ground surface at boreholes 25-01, 25-04, and 25-05, and below the asphaltic concrete at boreholes 25-02, 25-03, 25-06, and 25-07. The fill material extends to depths ranging from about 0.6 to 1.7 metres. The fill also contains organic matter and pieces of asphalt, concrete, plastic, and wood.
- Silty sand or sand and silt with trace gravel was encountered in all the boreholes below the fill material to depths ranging from about 2.4 to 3.2 metres.
- High plasticity clay with trace sand was encountered in all boreholes below the silty sand. The base of the clay layer was not confirmed with certainty but may extend to greater than 30.5 metres according to the results of the dynamic cone penetration test.
- Measured groundwater levels ranged from 1.7 to 3.0 metres, or elevation 77.6 to 78.8 in readings taken across June and August 2025.

3.0 GROUNDWATER SUPPLY

A groundwater supply investigation was carried out by GEMTEC in general accordance with MECP Procedure D-5-5 Technical Guideline for Private Wells: Water Supply Assessment using an existing test well located at the Site. The purpose of the investigation was to determine the quantity and quality of groundwater available from the test well, identified as TW25-1, for a commercial water supply. The test well is located inside one of the existing buildings, as shown in Figure 1.

3.1 On-Site Water Supply Well Construction

A water well record for TW25-1 was not available, and well construction details were assessed by Air Rock Drilling Company Limited on October 1, 2025. The following details were recorded:

- Water supply well located inside of an existing building. Concrete cover over the well pit.
- Concrete casing with diameter of approximately 0.92 metres. Top of concrete casing situated below floor slab.
- Well depth of approximately 6.15 metres
- Static water level of 2.53 metres below top of concrete casing at 8:00 AM on October 1, 2025.
- Photos of the dug well are provided in Appendix C.

Based on the on-site boreholes advanced on-site, the water supply well is completed in clay with trace sand and sand seams noted at various depths.

3.2 Pumping Test Field Procedure and Water Quality Sampling

An 8-hour constant rate pumping test within TW25-1 was attempted by a member of GEMTEC staff on October 1, 2025, but was terminated at 7 hours. The well was pumped using an electric submersible pump and portable generator supplied by Air Rock Drilling Company Limited, and the pump discharge was directed outside of the building, with flow directed away from the building to prevent pooling. Based on the distance from the well, low permeability clay soils near surface, and topography, it is not expected that the overburden aquifer experienced recharge from the discharged groundwater.

The standpipe installed in borehole 25-05 during GEMTEC (2025a), completed in the overburden, was used as an observation well throughout the pumping test (with details as provided in Table 3.2).

3.2.1 Water Level Measurements

During the pumping test, water level measurements were taken at regular intervals in TW25-1 and the observation well in borehole 25-05 using an digital water level tape. After the pump in TW25-1 was shut off, water level data was measured until the water level in the well had returned to 95% of static water level before the start of the test, which occurred in less than 12 hours after pump shut off. The pumping test drawdown and recovery graph is provided in Appendix D.

3.2.2 Flow Rate Measurements

TW25-1 was pumped at a rate of approximately 15 litres per minute (L/min). The flow rate of the pump discharge hose was constantly monitored by GEMTEC using a timed-volume method. Multiple flow measurements were taken during the first hour and then at 30- to 60-minute intervals to confirm that the discharge rate remained within 5% of the selected flow rate.

3.2.3 Groundwater Sampling

Groundwater quality samples were collected from the on-site water supply well on two occasions. The first, from an untreated outdoor tap on April 15, 2025, and the second within the last hour of the pumping test on October 1, 2025. Both samples were submitted to an accredited laboratory for the analysis of 'subdivision package parameters', and the sample taken on October 1, 2025, was also submitted for the analysis of 'trace metals' and volatile organic compounds. In addition, a groundwater quality sample was collected from the on-site overburden monitoring well BH25-02 for the analysis of chloride and nitrate. The water quality results are provided on the Certificates of Analysis in Appendix E.

Total chlorine tests were conducted in the field using a Hach DR900 colorimeter to ensure that chlorine levels were at non-detectable concentrations prior to bacteriological testing. The temperature, conductivity, total dissolved solids, pH, turbidity, colour, and free chlorine levels of the groundwater were measured at periodic intervals during the pumping tests and are summarized in Appendix E. The field equipment used during the pumping test was calibrated by GEMTEC. Details regarding the field equipment are provided in Table 3.1.

Table 3.1 – Field Equipment Overview

Field Parameters	Manufacturer	Model No.	Detection Limit
Total and Free Chlorine	Hach	DR900	0.02 mg/L
pH, temperature, Conductivity	Hanna	HI 98129	-
Turbidity	Hanna	HI 98703	0.05 NTU
Colour	Hach	DR900	5 TCU

Notes:

1. Hach DR900: colour and chlorine zeroed using distilled water prior to measuring field parameters.
2. Hanna HI 98129 calibration check using 4.0 and 7.0 pH solutions (within 5%).
3. Hanna HI98703 calibration check using <0.10, 15.0, 100 NTU (within 5%).

3.3 Groundwater Quantity

The groundwater demand of the property was not well defined when this report was prepared; therefore, the well was pumped at an estimate of the maximum sustainable rate from the well using available equipment from local subcontractors. The aquifer was anticipated to have limited yield due to the clay materials, so 15 L/min was adopted, which is slightly above the minimum pumping rate for residential uses of 13.7 L/min. Because the proposed re-zoning is for a commercial/industrial operation, the pumping test was conducted over an 8-hour period, rather than the standard 6-hour test outlined in MECP Procedure D-5-5, to better reflect anticipated operational conditions.

The drawdown and recovery graph of the pumping test are provided in Appendix D. These data were analysed in Aqtesolv version 4.5, a commercially available software developed by HydroSOLVE Inc. (2007), the results of which are also included in Appendix D. The water level in the test well drew down approximately 3.1 m over approximately 7 hours of pumping, after which the test was stopped due to limited head remaining in the well. Flow rate measurements confirmed that the pumping was maintained at a constant rate of approximately 15 L/min for those 7 hours. Following cessation of pumping, the well recovered to 95% within approximately 9 hours. The pumping test withdrew a total volume of approximately 6,225 litres.

The aquifer transmissivity was estimated as 8 m²/day using the Cooper–Jacob method assuming confined aquifer conditions. Water yield is thought to largely be associated with sand seams that cause the overburden system to behave as a leaky to unconfined water yielding unit. The results suggest that the well cannot yield 15 L/min for 8 hours consecutively; however, the well recovered rapidly following pumping for 7 hours at 15 L/min, suggesting that producing 6,225 litres per day is likely to be sustainable under the testing conditions. This well yield will likely limit the use of the property to a subset of commercial or industrial applications but is reported to meet the current needs of the landowner. The pumping test details are summarized in Table 3.2.

The productivity of shallow wells often varies considerably over the year due to seasonal fluctuations in precipitation and groundwater levels; however, the test was performed following a summer of drought conditions and a September with greatly below average precipitation, which may produce below average yields from the well. With consideration of the drought conditions of the pumping test and the qualitative evidence from the well owner that water quantity has not been an issue for their needs, the well productivity is considered sufficient to meet the current needs of the commercial/industrial use and conservatively representative of future yield from the dug well.

Table 3.2 – Pumping Tests Details

Parameter	TW25-1
Duration (minutes)	415
Flow Rate (litres per minute)	15
Static Water Level (m TOC ¹)	2.5
Static Water Level (m BGS ²)	2.8
Well Depth (m BGS ²)	6.2

Parameter	TW25-1
Available Drawdown ³ (m)	3.1
Water Level at End of Pumping (m TOC)	5.6
Observed Drawdown at End of Pumping (m)	3.1
Percent Drawdown Utilized (%)	100

Notes:

1. TOC = top of casing. Casing depth of approximately 0.3 metres below ground surface.
2. BGS = below ground surface
3. Available drawdown (water column above pump) assumes the pump intake was approximately 30 cm above the bottom of the well and is measured from the static water level.

3.4 Test Well Water Quality

The below sections provide comments regarding the drinking water quality in TW25-01 and exceedances of the Ontario Drinking Water Quality Standards (ODWQS), objectives, and guidelines. The field and laboratory water quality results are provided in Appendix E.

3.4.1 Bacteriological Results

Total and free chlorine measured at the time of bacteriological sampling confirmed that total chlorine concentrations in the groundwater were non-detectable.

The results of the bacteriological analyses from two separate sampling events indicated non-detectable concentrations of indicator species total coliform, *E. coli* and fecal coliforms, meeting the ODWQS maximum acceptable concentration of 0 CFU/100mL.

Based on the bacteriological testing, the water is suitable for consumption; however, it should be noted that shallow overburden wells are more susceptible to bacterial contamination from surface sources and seasonal sampling is recommended to confirm acceptable bacteria levels.

3.4.2 Other Water Quality Parameters Summary

The water quality of the well was not considered fit for consumption under the ODWQS or MECP Procedure D-5-5, as it meets the definition of a mineralised well due to elevated sulphate (517 to 567 mg/L) and chloride concentrations (2,150 to 3,670 mg/L). Water quality issues identified are anticipated to be naturally occurring, as this region of Ottawa is known to have these water quality challenges.

The water quality of the bedrock system is expected to be of comparably poor quality, as the water quality is indicated as 'salty' in a bedrock well record reported nearby. As there is no

municipal system nearby currently approved for connection, two options for a safe drinking water supply to the property are apparent:

- Bottled water can be provided for drinking water needs, or
- A full-system or point-of-use reverse osmosis or distillation system is installed (treatment may be costly due to excessive constituent concentrations).

As per the Wells Regulation, mineralized wells must be immediately abandoned unless written consent is provided by the Director.

Chloride concentrations were not the only parameter of concern. Other aesthetic objectives (AO), operational guidelines (OG), and health-related parameters that were exceeded in the water quality samples taken from TW25-1 include:

- Colour (AO)
- Dissolved Organic Carbon (AO)
- Hardness (OG)
- Total Dissolved Solids (AO)
- Sulphide (AO)
- Iron (AO)
- Manganese (AO of 0.05 mg/L and health-related limit of 0.12 mg/L in water from the Canadian Drinking Water Quality Guidelines prepared by Health Canada).
 - An informational letter prepared by the City of Ottawa is included in Appendix E following the water quality results for greater detail on manganese concentrations in water supply aquifers.
- Sodium (AO of 200 mg/L and health-related warning level of 20 mg/L for people on sodium-restricted diets)
 - The ODWQS stipulate that the 'local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L, so that this information may be passed on to local physicians'.
 - Procedure D-5-5 stipulates that 'warning clauses should be addressed to people on sodium restricted diets and should be registered on title'.

The well owner reports that an extensive treatment system is in place for the existing building, including ultraviolet disinfection, carbon filter, and an in-line reverse osmosis system, which is reported to treat the water quality adequately for consumption (not confirmed). Water is withdrawn

from the well for treatment using a jet pump in the basement of the existing building. Storage tanks are also utilized.

3.4.3 Vulnerability to Surface Impacts

By virtue of being a shallow dug/bored well located beneath the floor level of an actively used workshop, the well is considered vulnerable to surface impacts. Water quality results indicate tannin and lignin, elevated organic nitrogen and carbon, fluctuating pH, and increasing temperature, all of which may be symptomatic of the shallow and vulnerable nature of the source water.

4.0 GROUNDWATER IMPACTS

The impact on groundwater resources due to wastewater treatment and disposal by the existing on-site sewage disposal system and development on the Site is assessed in the following sections.

4.1 Hydrogeological Sensitivity

Areas of thin soils cover, highly permeable soils, exposed fractured bedrock at ground surface, and karst environments can contribute to the hydrogeological sensitivity of a site, which may not allow for sufficient attenuative processes for on-site septic systems, negatively impacting the receiving aquifer. The Site is underlain by silty sands to sands and silts over clay with trace sands, to depths of approximately 5.8 metres. Background mapping indicates that the bedrock supply aquifer is overlain by approximately 50 metres of clays; accordingly, the Site is not considered to be hydrogeologically sensitive.

However, the water supply well is completed in the shallow overburden aquifer, which is inherently more susceptible to surface contamination, and protective measures are recommended to safeguard the water supply aquifer.

4.2 Septic Impact Assessment

The potential risk to groundwater resources on and off the Site was assessed in accordance with MECP Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment.

Step Two: System Isolation Considerations from MECP Procedure D-5-4 states that 'developments will normally be considered as low risk where it can be demonstrated that sewage effluent is hydrogeologically isolated from existing or potential supply aquifer(s)'. The consultant is responsible for assessing the potential risk to groundwater and are expected to:

- a. 'evaluate the most probable groundwater receiver for sewage effluent: its definition must be defended by hydrogeological data and information obtained through a test pit, auger hole and/or test drilling program; and

- b. define the most probable lower hydraulic or physical boundary of the groundwater receiving the sewage effluent.'

The overburden at the Site is mapped as glaciomarine silt and clay deposits ranging from approximately 25 to 50 m in thickness. The nearest water well record (Well ID 1511284) reports bedrock at a depth of 50 m, overlain by clay from ground surface to 43 m and hardpan from 43 m to 50 m. On-site boreholes advanced to depths of up to 15.2 m encountered sands and silts underlain by more than 10 m of clay, with sand seams noted within the upper 5 m. A hydrometer analysis of the clay (BH25-02, Sample 7) indicates a clay content of approximately 62%, confirming low-permeability aquitard conditions.

The on-site dug well is completed within these clay aquitard materials, with sand seams providing limited water yield. The Site is located within the East Ottawa Aquifer Screening Tool area, which identifies both shallow and deep groundwater as having poor water quality and being susceptible to exceedances. On-site testing confirms that the dug well is mineralized due to elevated chlorides. Similarly, the nearby bedrock well (Well ID 1511284) reports "salty" water at a depth of 57 m, indicating that the deeper bedrock aquifer is also anticipated to be mineralized.

Under the City of Ottawa Hydrogeological Guidelines (March 2021), the receiving aquifer is defined as "*the first aquifer encountered that will receive effluent from a sewage system... capable of accommodating a drinking water well meeting the requirements of the Wells Regulation.*" The on-site water supply is not installed within a geological layer that meets this definition, as it is completed in aquitard materials and produces mineralized, non-potable water.

The most probable groundwater receiver for septic effluent is the upper overburden where sand seams are present or may extend to surface (e.g., surface water). However, this unit is not considered a potable groundwater supply aquifer due to its mineralized nature and predominantly aquitard materials. The closest surface water feature, with the exception of roadside ditches) is the Smith-Gooding Municipal Drain located approximately 350 metres north of the Site. Given the hydrogeological setting, lack of sensitive surface water or wetland features, and distance to municipal drains, the on-site septic system is not anticipated to produce surface water impacts due to phosphorous loading.

With respect to MECP Procedure D-5-4 Monitoring-Based Assessments, the existing dug well has been in operation for several decades (existing residential dwelling constructed prior to 1976 based on available aerial photos) and showed no evidence of septic influence during our investigation (i.e., multi-season water quality monitoring indicates non-detectable nitrate and nitrite concentrations). The only potential groundwater user within 500 m is the Anderson Links Golf and Country Club based on a review of available water well records; however, the golf course is serviced by the municipal Carlsbad Springs Trickle Feed system. Therefore, there are no existing groundwater users within 500 m that could be impacted by the proposed system. Future users are also unlikely to be affected, as the most probable water supply aquifer (the deeper

bedrock aquifer) is isolated from surface impacts by approximately 50 m of low-permeability clay and connections to the Carlsbad Trickle Feed municipal system may also become available in the future (pending approvals from the City).

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the results of this investigation, the following conclusions and professional opinions are provided:

- The Site is not hydrogeologically sensitive due to thin soil cover, taken to be less than two metres in thickness, highly permeable soils (e.g., coarse sands and gravels) or mapped karst features.
 - It is noted that the Site is serviced with a shallow dug/bored well, which is generally susceptible to surface impacts, and water quality results during the pumping test corroborate this vulnerability.
- The proposed water supply well is completed within primarily aquitard materials (e.g., clays) with sand seams being the primary water bearing units / zones. The proposed water supply is considered to be unconfined to partially confined (leaky).
- The on-site water supply well is low-yielding, supplying up to 6,225 litres per day, which has been reported to be sufficient for the existing operations. Based on the rapid water level recovery following cessation of pumping, the well is anticipated to be capable of repeat pumping at this rate in the long-term.
 - A pumping test was completed in September 2025 following drought conditions observed in the Ottawa area over the summer of 2025. Therefore, the pumping test is considered to be representative of low water level conditions.
- The proposed water demand of the Site was not well defined when this report was prepared; however, it was reported by the well owner that the water supply well has always provided sufficient groundwater quantity for their commercial/residential uses. It is understood that a storage tank is also in use in the basement of the home. Storage can further increase the available daily water demands depending on usage requirements.
- The impacts to the well water supply-were assessed in general accordance with the MECP Procedure D-5-4 for commercial/industrial properties. The existing and future septic systems with total daily design sanitary flows of less than 10,000 litres per day are not anticipated to negatively impact groundwater users.
 - Step Two: System Isolation Consideration applied. Receiving groundwater consists of aquitard clay with minor sand seams, providing limited yield and

non-potable water due to chloride mineralization, consistent with the East Ottawa Aquifer Screening Tool.

- The bedrock water supply aquifer, although not directly assessed in this study, is likely mineralized (East Ottawa Aquifer Screening Tool; Well ID 1511284) and is isolated from surface impacts by approximately 50 metres of low-permeability clay.
 - The existing dug well, in operation for several decades, showed no septic influence and no impacts from surrounding agricultural land uses over a multi-seasonal water quality monitoring program, indicating functional isolation from surface sources despite its shallow completion.
 - There are no existing groundwater users within 500 metres of the Site.
 - Future users are also unlikely to be affected, as the most probable aquifer (bedrock) is isolated by approximately 50 metres of clay and this area may ultimately be serviced by a municipal supply via the Carlsbad Springs Trickle Feed system (subject to City approvals).
- The results of the physical, chemical and bacterial groundwater analyses (subdivision package and trace metals) after 7 hours of pumping indicate that the water quality from TW25-1 is considered mineralised due to elevated chloride and sulphate concentrations. The groundwater is considered to be non-potable.
 - The well owner reports that an extensive treatment system is in place for the existing building, including ultraviolet disinfection, carbon filter, and an in-line reverse osmosis system, which is reported to treat the water quality adequately for consumption (not confirmed).
 - It is our professional opinion that the Site can accommodate limited commercial development on private water and septic services. The groundwater is considered to be non-potable, which would limit future use. There are constraints with water quality, quantity, and septic loading (less than 10,000 litres per day) that must be considered.
 - The current water supply well does not meet *Wells Regulation* (O. Reg. 903) construction standards, as the well is located inside of a building and is below ground surface. If not abandoned, a well exemption from the MECP due to mineralized groundwater is required for continued usage.
 - For the purposes of re-zoning, the existing well is suitable for assessing water supply conditions. Well modifications and/or construction of a new water supply well are recommended in order to meet the current well construction practices.

The following provides recommendations regarding well construction specifications and water quality treatment are provided below.

5.2 Water Supply Recommendations

- Any new water well, if required, should be constructed in accordance with local and MECP regulations (O. Reg. 903). The bedrock aquifer would be recommended for any new wells due to a decreased vulnerability to surface water and septic impacts, but the mineral water quality is unlikely to improve (i.e., still non-potable).
- The separation distance between drinking water wells and on-site or neighbouring septic systems and other sources of contamination should be at least 15 meters (and up to 18 metres for fully raised septic beds) for bedrock wells in accordance with O. Reg. 903 requirements and increased if possible. The minimum separation distance for dug wells increases to 30 metres.
- It is recommended that the property owners construct, maintain and test their drinking water well in accordance with the MECP document “Water Supply Wells - Requirements and Best Management Practices, Revised April 2015”.
 - O. Reg. 903 applies to newly constructed wells. The current water supply well is existing; however, it is recommended that its construction is enhanced to meet O. Reg. 903 standards.
 - Any remedial or construction work must be completed by a licensed well contractor who employs a Class III well technician who can construct dug or bored wells.
 - If mineralized groundwater is encountered, the newly constructed well must be immediately abandoned unless written permission from the MECP director is granted for the continued use of the well.
- The groundwater is considered to be non-potable and to be used for plumbing only. No maximum acceptable concentrations for bacteriological exceedances were recorded and as such, the groundwater can be used for all indoor plumbing uses (toilets, hand washing, showering, etc.).
 - A water quality treatment specialist should be retained to appropriately size treatment systems (e.g., water softener) such that exceedances are treated to within acceptable levels to protect plumbing. If internal plumbing systems are being replaced or upgraded, PEX should be considered, as it is less susceptible to corrosive, acidic or hard water.
 - Rigorous water treatment would be required to ensure the safety of the water supply for consumption. Suitable treatment would likely be expensive due to the widespread exceedances of different drinking water standards (See section 3.4 and Appendix E).
 - Registration of notice on title is recommended to indicate that the groundwater is non-potable.
- Appropriate signage should be in place at possible points of consumption to inform users that the groundwater is non-potable. Signage must follow the Ontario Building Code requirements, section 7.7.2.1. Markings Required and 3.7.4.18. Drinking Water.

5.3 Septic System Recommendations

Following the MECP D-5-4 guidelines, the Site meets the considerations for on-site sewage disposal systems with daily design sanitary sewage flows of less than 10,000 litres per day. The following provides recommendations regarding septic system design:

- It is recommended that the property owners construct, maintain and check their Site septic system in accordance with the Ontario Building Code and best management practices.
- If advanced treatment systems are utilized, it is recommended that the systems are NSF or BQN certified (or equivalent certification) for a minimum nitrate reduction of 50%.
 - It is required that the property owners enter into a maintenance agreement with authorized agents of the advanced treatment septic system manufacturer for the service life of the system.
- It is recommended that the property owners construct, maintain and check their on-site septic system in accordance with the Ontario Building Code and best management practices (Ministry of Municipal Affairs and Housing, 2021).

6.0 CLOSURE

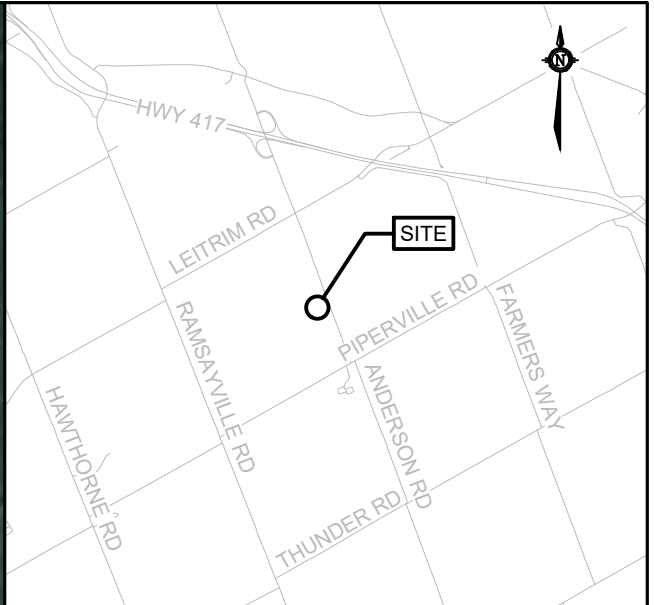
We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.



Andrius Paznekas, M.Sc., P.Geo.
Hydrogeologist



AP / JKA / DC



LEGEND

BH # ← BOREHOLE ID
XX.XX ← GROUND SURFACE ELEVATION, IN METRES

 BOREHOLE
(CURRENT INVESTIGATION BY GEMTEC)

 EXISTING PRIVATE WELL

 PROPERTY BOUNDARY

DATA SOURCES AND REFERENCES

1. Coordinate system: NAD83 (CSRS), UTM ZONE 18N
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
3. This drawing is a schematic representation and should not be taken as a substitute for a legal survey.
4. Image @2025 Google Maps, CNES / Airbus, First Base Solutions, Maxar Technologies
5. Contains information licensed under the Open Government Licence – Ontario
6. Geographic dataset source: Ontario GeoHub



DRAWING

SITE PLAN

CLIENT

NOEL'S OTTAWA SNOW INC.

PROJECT

HYDROGEOLOGICAL INVESTIGATION
PROPOSED LOT SEVERANCE
SEVERANCE ALONG THOMAS ARGUE ROAD AT
1500 THOMAS ARGUE ROAD
OTTAWA, ONTARIO

DRAWN BY **SL** CHECKED BY **AP**

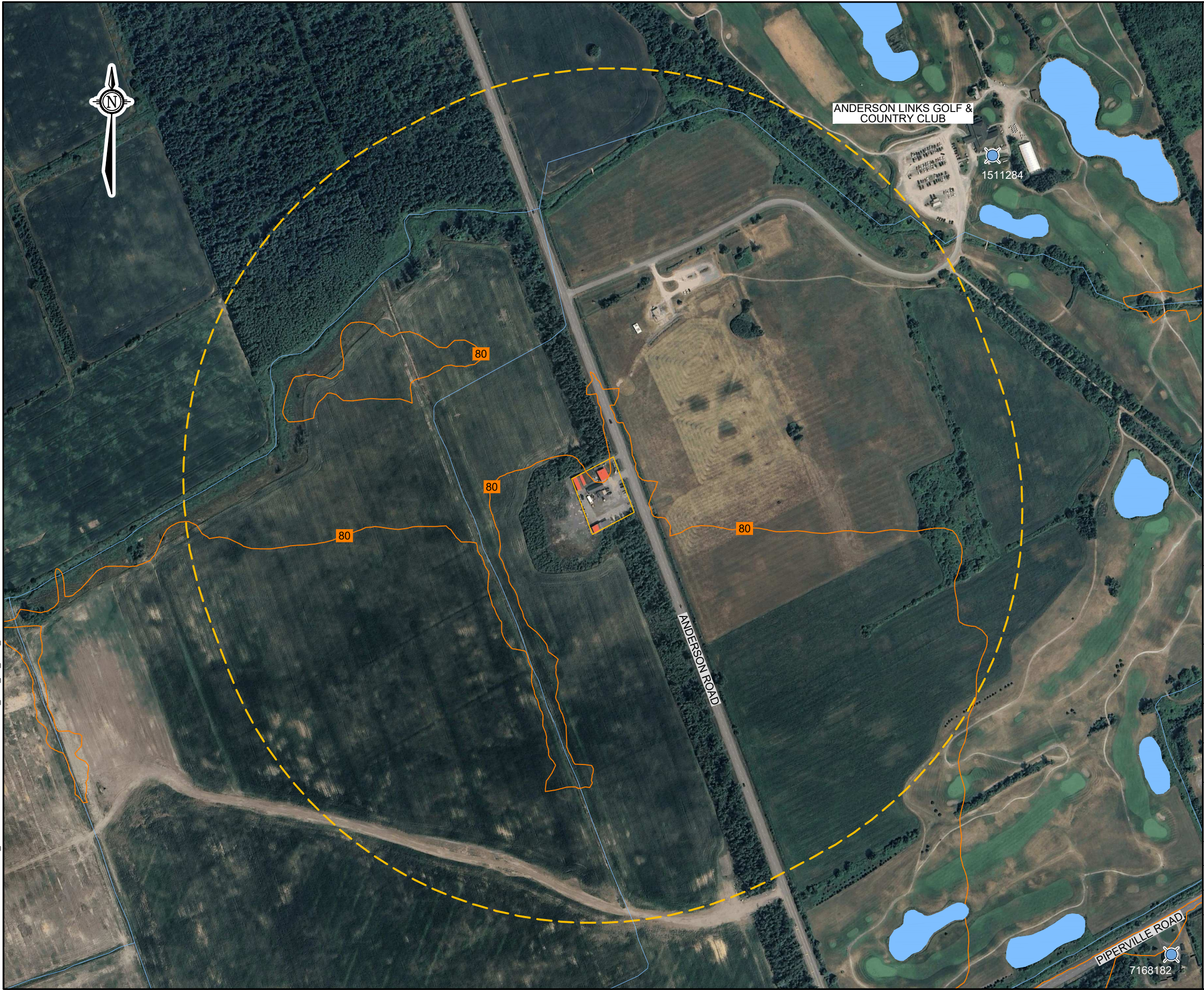
PROJECT NO. **100011.121** REVISION NO. **0**

DATE **FEBRUARY 2026** FIGURE NO. **FIGURE 1**

 **GEMTEC**
CONSULTING ENGINEERS
AND SCIENTISTS

32 Steacie Drive
Ottawa, ON, K2K 2A9
Tel: (613) 836-1422
www.gemtec.ca
ottawa@gemtec.ca

N:\PROJECTS\1000000\100011.121\06_CIVIL DRAFTING\HYD R0\100011.121_HYD_R0_2026_02.DWG



LEGEND

- MECP PUBLIC WELL RECORD
- PROPERTY BOUNDARY
- STUDY AREA (500 m RADIUS AROUND PROPERTY BOUNDARY)
- GROUND SURFACE CONTOUR
- WATERCOURSE
- WATERBODY

DATA SOURCES AND REFERENCES

- Coordinate system: NAD83 (CSRS), UTM ZONE 18N
- Distances, elevations, and coordinates are shown in metres unless denoted otherwise
- This drawing is a schematic representation and should not be taken as a substitute for a legal survey.
- Image @2025 Google Maps, CNES / Airbus, First Base Solutions, Maxar Technologies
- Contains information licensed under the Open Government Licence – Ontario
- Geographic dataset source: Ontario GeoHub

SCALE 1:3,000

0 100 200m

DRAWING	
STUDY AREA	
CLIENT	
NOEL'S OTTAWA SNOW INC.	
PROJECT	
HYDROGEOLOGICAL INVESTIGATION PROPOSED LOT SEVERANCE SEVERANCE ALONG THOMAS ARGUE ROAD AT 1500 THOMAS ARGUE ROAD OTTAWA, ONTARIO	
DRAWN BY	CHECKED BY
SL	AP
PROJECT NO.	REVISION NO.
100011.121	0
DATE	FIGURE NO.
FEBRUARY 2026	FIGURE 2

GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

32 Steacie Drive
Ottawa, ON, K2K 2A9
Tel: (613) 836-1422
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ottawa@gemtec.ca

CONDITIONS AND LIMITATIONS OF THIS REPORT

1. **Standard of Care:** GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty, expressed or implied is made.
2. **Copyright:** The contents of this report are subject to copyright owned by GEMTEC, save to the extent that copyright has been legally assigned by us to another party or is used by GEMTEC under license. To the extent that GEMTEC owns the copyright in this report, it may not be copied without our prior written agreement for any purpose other than the purpose indicated in this report. The methodology (if any) contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of GEMTEC. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.
3. **Complete Report:** This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC cannot be responsible for use of portions of the report without reference to the entire report.
4. **Basis of Report:** This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.
5. **Time Dependence:** If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.
6. **Use of This Report:** The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process.

Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.
7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.
8. **Decrease in Property Value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions,

misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

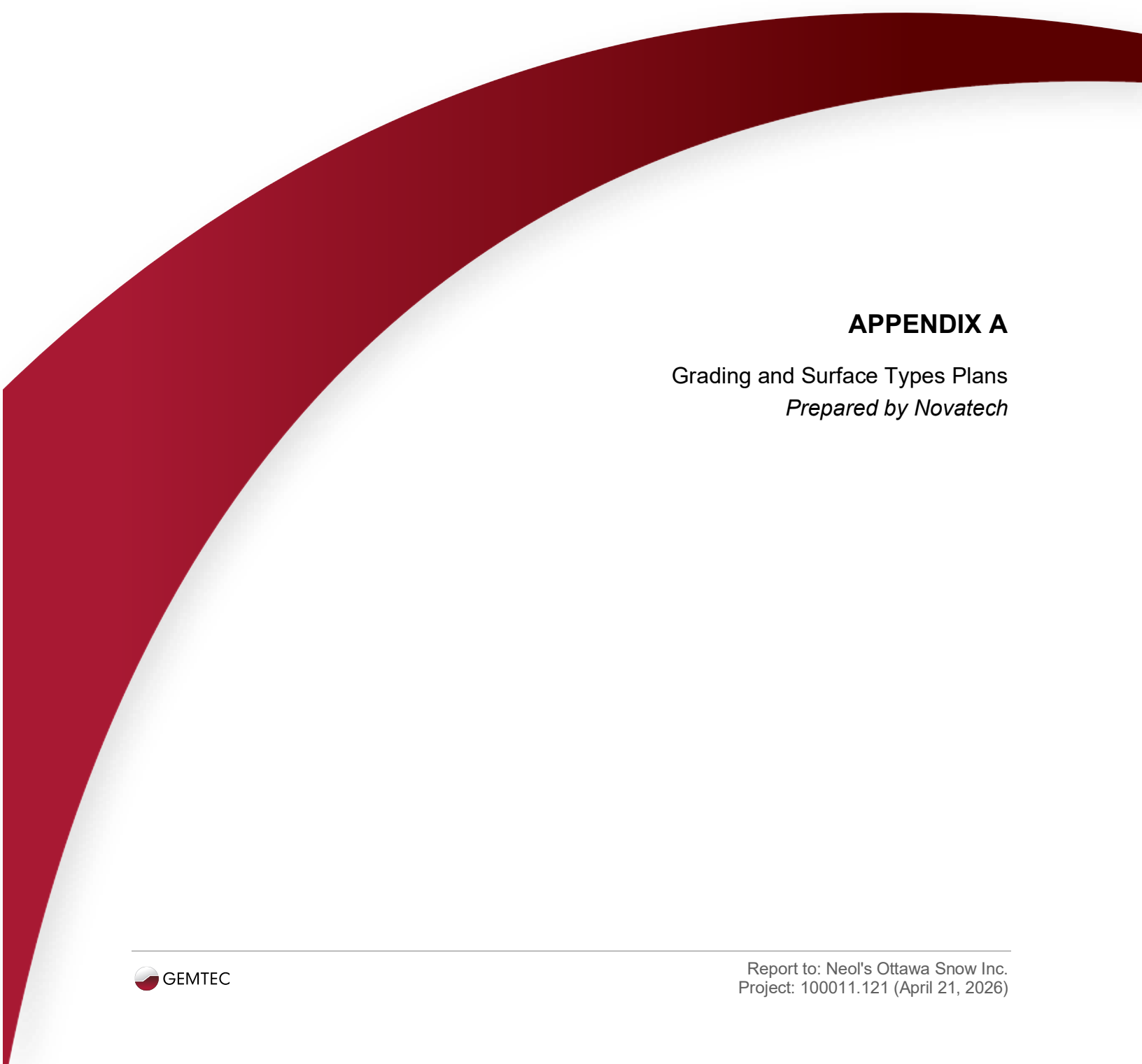
10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. Accordingly, GEMTEC does not warrant or guarantee the exactness of the subsurface descriptions.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

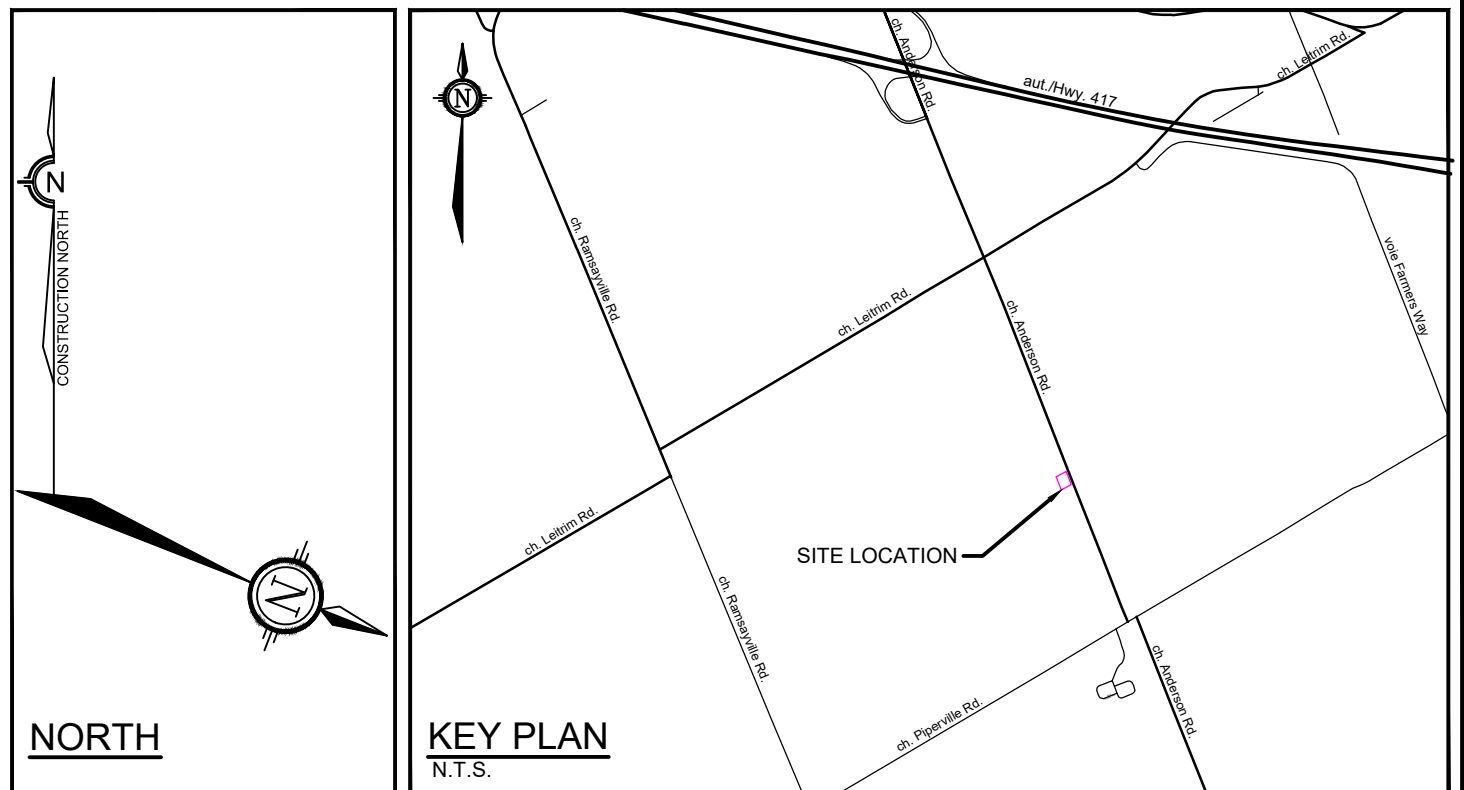
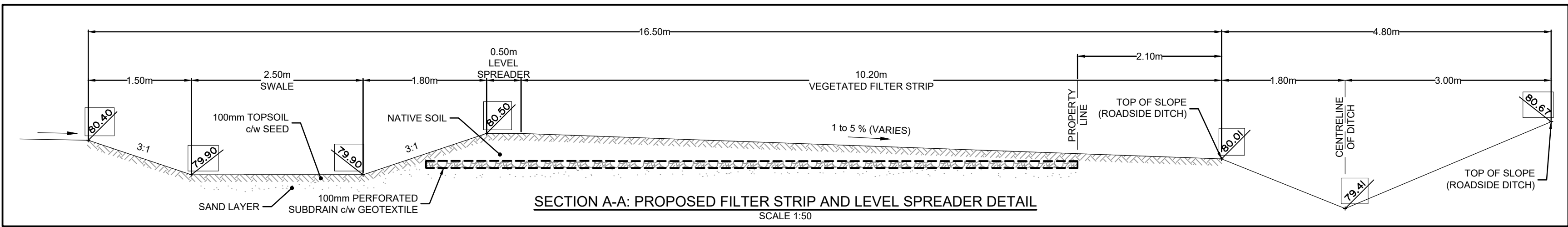
11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fill materials or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.
During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.
13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



APPENDIX A

Grading and Surface Types Plans

Prepared by Novatech



Erosion and Sediment Control Responsibilities [1]:									
ESC Measures	Symbol	OPSD No.	Installation Responsibility	Inspection Responsibility	Inspection Frequency	Maintenance Responsibility	Removal Responsibility	Inspection Frequency	
Straw Bale Check Dam		219.180	Developer's Contractor	Developer's Contractor	Weekly (as minimum)	Developer's Contractor	Developer's Contractor	Weekly until site stabilization and after rainfall events	
Light-Duty Silt Fence		219.110	Developer's Contractor	Developer's Contractor	Weekly (as minimum)	Developer's Contractor	Developer's Contractor	Weekly until site stabilization and after rainfall events	

[1] ESC MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE TOWNSHIP OR CONSERVATION AUTHORITY. THIS IS CONSIDERED A VIOLATION.

LEGEND

- PROPERTY BOUNDARY
- PROPOSED ELEVATION
- EXISTING ELEVATION
- PROPOSED DIRECTION OF OVERLAND FLOW
- PROPOSED 100-yr PONDING LIMITS (ELEV=80.50 PRIOR TO OVERTOPPING LEVEL SPREADER)
- PROPOSED GREENSPACE
- PROPOSED TERRACING (3:1 MAX)
- PROPOSED MARKER BUOLDERS
- BOTTOM OF SLOPE
- TOP OF SLOPE
- CENTERLINE OF DITCH AND FLOW DIRECTION
- EXISTING FENCE LINE
- OHW
- EXISTING OVERHEAD WIRE
- EXISTING GUY WIRE AND ANCHOR
- EXISTING UTILITY POLE
- EXISTING ASPHALT
- EXISTING GRAVEL
- STANDARD IRON BAR (SIB)
- EXISTING OVERHEAD DOOR
- EXISTING MAN DOOR
- EXISTING ROOF LEAD
- EXISTING CULVERT



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS. AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

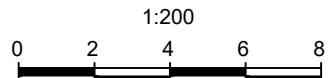
SOURCE REFERENCE:

Legal/Topo Information: PART 1: PLAN OF SURVEY OF PART LOT 16 - CONCESSION 7 (OTTAWA FRONT) - GEOGRAPHIC TOWNSHIP OF GLOUCESTER - CITY OF OTTAWA / ANNIS, O'SULLIVAN, VOLLEBEKK LTD. / DEC. 16, 2024 / MTM ZONE 9 NAD-83 (CSRS)(2010)

No.	REVISION	DATE	BY
1.	ISSUED FOR COORDINATION	SEP 04/25	LKC

SCALE

1:200



DESIGN	TGS
CHECKED	LAB
DRAWN	TGS
CHECKED	LAB
APPROVED	JLS

FOR REVIEW ONLY

NOVATECH

Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
4296 ANDERSON ROAD

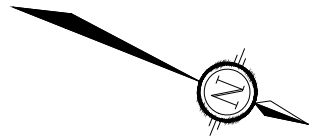
GRADING NAME
GRADING, EROSION, SEDIMENT
CONTROL AND DRAINAGE PLAN

PROJECT No. 124156

REV. REV # 1

DRAWING No. 124156-GR

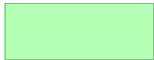
124156-GR



LEGEND



TOTAL SITE AREA = 4,605m²



PERVIOUS AREA = 1,194m²



SOURCE REFERENCE:
Legal Information: *Parcel Fabric*
GeoOttawa / MTM Zone9, NAD83 ORIG
Topographic Information: *1:2000*
City of Ottawa / 2004 / MTM Zone 9, NAD83 ORIG



Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
4296 ANDERSON ROAD

SURFACE TYPES

SCALE	1 : 500	0	5	10	15	20
DATE	SEP 4/25	JOB	124156	FIGURE	124156-ST	



APPENDIX B

Technical Pre-Consultation Meeting Feedback
Prepared by the City of Ottawa



Outlook

Re: Technical Pre-Consultation - 4296 Anderson - Site Plan Control & Zoning By-Law Amendment

Organizer Smith, Travis <travis.smith@ottawa.ca>
Meeting time This event occurred 6 days ago (Thu 2025-07-10 11:00 AM - 12:00 PM)
Location Microsoft Teams Meeting
My response Not yet responded
Required attendees Smith, Travis, Samuel Esenwa
Optional attendees Andrius Paznekas
Message sent Wed 2025-07-16 10:08 AM

Hi Sam,

As a follow-up to last week's meeting, please find additional information regarding proceeding with a non-potable supply and modified dug well requirements. Please note that these dug well requirements are site-specific and have been reduced given several factors.

Existing dug well

- The reporting should identify and evaluate issues associated with dug wells, including vulnerability to contamination, insufficient yield, seasonal variability, and inconsistent construction.
- Ensure compliance with construction requirements as per O.Reg. 903. It was noted that the well is currently located within one of the service garages. If remedial work is required, it must be completed by a licensed well contractor who employs a Class III well technician who can construct dug or bored wells.
- Pumping test should be done in low water season (August/September) to account for seasonality or provide support and rationale as to long term water quantity and quality.

Non-potable water supply for the proposed industrial use

- The site is located within the East Ottawa Aquifer Capability Screening Tool and is an area of known poor water quality in both shallow and deep aquifers. The City would not expect that bedrock well would intercept improved water quality, and therefore a non-potable water supply is being sought. The City's HTAG requires that 'every effort' be used to find an adequate water supply, however as discussed in the meeting, it will not be required for this site.
- Approvals for non-potable uses are on a site-specific basis and would be subject to the following conditions for this site;
 - o Discussion in report along with corresponding recommendation that the water supply is non-potable and will only be used as such. Clarification of how the non-potable supply will be used (flushing, etc.)
 - o Clearly segregate or clarify the recommendations for treatment systems to be clear that they are for using the water supply as a non-potable use.
 - E.g. water softener only to protect plumbing or for another reason.
 - o Registration of notice on title regarding exceedances, incl. any associated fact sheet from OPH as available.
 - o Reference to Ontario Building Code requirements, section 7.7.2.1. Markings Required and 3.7.4.18. Drinking Water.

Regards,

Travis Smith, P.Eng., (He/Him)
Senior Project Manager, Hydrogeology

Planning, Development and Building Services Department / Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - Planning Operations
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West, Ottawa, ON | 110, Avenue. Laurier Ouest, Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 16544, travis.smith@ottawa.ca

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Smith, Travis <travis.smith@ottawa.ca>
Sent: Monday, July 7, 2025 2:10 PM
To: Samuel Esenwa <samuel.esenwa@gemtec.ca>
Cc: Andrius Paznekas <andrius.paznekas@gemtec.ca>
Subject: Technical Pre-Consultation - 4296 Anderson - Site Plan Control & Zoning By-Law Amendment
When: Thursday, July 10, 2025 11:00 AM-12:00 PM.
Where: Microsoft Teams Meeting

Technical pre-consultation to discuss the work plan for the site plan control and zoning by-law amendment applications at 4296 Anderson. Pre-application consultation number PC2024-0405, feedback form attached.

Microsoft Teams [Need help?](#)

[Join the meeting now](#)

Meeting ID: 260 166 633 430 2

Passcode: 4UX6L3P8

Dial in by phone

[+1 613-319-1080](tel:+16133191080),530538429# Canada, Ottawa

[Find a local number](#)

Phone conference ID: 530 538 429#

Join on a video conferencing device

Tenant key: teams@vc.ottawa.ca

Video ID: 111 123 687 4

[More info](#)

For organizers: [Meeting options](#) | [Reset dial-in PIN](#)

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October 23, 2024

Kayla Blakely
Novatech

Via email: k.blakely@novatech-eng.com

**Subject: Pre-Consultation: Meeting Feedback
Proposed Zoning By-law Amendment and Site Plan Control
Application – 4296 Anderson Road**

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on October 18, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	2 ☐	3 ☒	4 ☐	5 ☐
----------------------------	----------------------------	---------------------------------------	----------------------------	----------------------------

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Pre-consultations are no longer mandatory, if another Pre-consultation is desired, please proceed to complete a Pre-consultation Application Form and submit together with the necessary revised studies and/or plans to planningcirculations@ottawa.ca.
2. Please note, responses to any additional comments provided below may be included within a subsequent pre-consultation submission or addressed as part of a formal application submission.
3. In the subsequent pre-consultation or formal application submission, please ensure that all comments detailed herein are addressed. A detailed cover letter stating how each comment has been addressed must be included with the submission materials. Please coordinate the Page 2 of 20 numbering of your responses within the cover letter with the number(s) herein. If all review comments are not sufficiently addressed as a part of the formal application submission, the application may be deemed incomplete and will not be circulated or reviewed until Staff deem the application complete.

General Questions

1. Please confirm if salt is stored on the property as part of the snow removal operation.

Planning

Comments:

1. Official Plan

- a. The subject property is designated as Rural Countryside as per Schedule B9-Rural Transect of the Official Plan.
 - i. The intent of the Rural Countryside designation is to accommodate a variety of land uses that are appropriate for a rural location, limiting the amount of residential development and supporting industries that serve the travelling public, while ensuring that the character of the rural area is persevered.
- b. As per Section 2(b) of the Official Plan, small light industrial and commercial uses **may** be permitted in the Rural Countryside designation if **all** criteria outlined in *Section 9.2.2.2(2)(b) are met*.

2. Zoning By-law

- a. The property is currently zoned RU – Rural Countryside.
- b. The proposed zoning is RG – Rural General Industrial Zone.
 - i. The purpose of the RG Zone is to accommodate a range of light industrial uses and limited service commercial uses for the travelling public and regulate development in a manner that respects adjacent land uses and will have a minimal impact on the surrounding rural area.
 - ii. Please refer to [Sections 219-220 of the Zoning By-law](#) to view all permitted and conditional permitted uses in the RG Zone.

3. Zoning By-law Provisions

- a. Please review Table 207 below for RG Zone Provisions:

TABLE 219 - RG ZONE PROVISIONS

I ZONING MECHANISMS		II PROVISIONS
(a) Minimum lot width (m)		30
(b) Minimum lot area (m ²)		4,000
(c) Minimum front yard setback (m)		15
(d) Minimum rear yard setback (m)		15
(e) Minimum interior side yard setback (m)	(i) Abutting a RG, RH or RC zone	3
	(ii) Other cases	8
(f) Minimum corner side yard setback (m)		12
(g) Maximum principal building height (m)		15
(h) Maximum lot coverage (%)		50
(i) Outdoor storage		(a) outside storage is not permitted within any required front yard or corner side yard (b) outside storage must be screened from abutting residential uses or zones and public streets by an opaque screen at least 1.8 m in height from finished grade

- b. The provided Site Plan, along with existing buildings on the subject property does not comply with the proposed zone provisions:
 - i. Outdoor storage is not to be located within the 15 metre front yard setback.
 - ii. The required rear yard setback of 15 metres is not respected.
 - iii. The interior side yard setback abutting an RU zone of 8 metres is not respected. In addition, the two rear building located in both rear corners of the property are crossing over the property lines.
- c. Please ensure outdoor storage is screened from Anderson Road, at least 1.8 metres in height as per the zoning provisions listed above.
- d. What is the intention of the existing office use located in the dwelling? For example, is the office use for administrative purpose and/or as a dispatch office?
 - i. The office will be considered accessory to the existing business currently operating on the subject property, including the use of a dispatch office. As such, a dispatch office is a permitted accessory use in an RG zone.

4. Parking Requirements

- a. Please refer to Section 101 – Table 101A to view minimum parking requirements:
 - i. Storage Yard
 - 1 parking space per 100 m² of gross floor area.
 - ii. Equipment and Rental Servicing
 - 0.75 parking space per 100 m² of gross floor area.
 - iii. Retail Sales
 - 3.4 parking spaces per 100 m² of gross floor area.
 - iv. (Accessory) Office
 - 2.3 parking spaces per 100 m² of gross floor area.
 - v. Detached Dwelling
 - 1 parking space per dwelling unit.
- b. Parking calculations are to be included in the Zoning Chart on the Site Plan. The building breakdown must be included to ensure there is sufficient parking for each use.
 - i. Additional details are required on the Site Plan, such as materials used on surfaces and dimension for site elements such as parking stalls.

5. Planning Discussion

- a. Aerial photography has identified development spreading over the property lines west of the subject property. It is to be noted, the City will not approve development that is occurring on another property. Is there an agreement which permits development on 4296 Anderson Road to occur behind the subject property on the adjacent property?
 - i. The City will not approve development that is occurring on another property that is not under the ownership of this application.
 - ii. If there is no agreement that allows the two building in each rear property corner to cross-over property lines, it will be the responsibility of the applicant/owner to solve this issue. For example, remove or relocate the buildings.

- iii. In addition, the two buildings located in the each of the rear property corners are not zoning compliant. The City will not approve buildings that are not zoning compliant. It will be the responsibility of the applicant/owner of the property to ensure all existing buildings on the property are zoning compliant. Please consider the following as potential solutions to resolve the two corner buildings zoning issues: minor variance to reduce the rear and side yard setbacks, lot line addition, or remove or relocate that buildings so that they comply with the rear and side yard setbacks.
 - Please note that Consent applications (minor variance and lot line adjustment) are handled by the [Committee of Adjustment](#) (CoA). If you would like more information on the Committee of Adjustment, including application forms please visit [Apply for a Minor Variance | City of Ottawa](#). Committee of Adjustment City Planners are available to provide preliminary comments on the potential application(s) prior to submitting an application. City Planners (panel3_planners@ottawa.ca) can identify potential planning concerns, but it is the applicant's responsibility to determine if a variance is required. If contacting the Panel 3 Planners, please provide further details, including a sketch regarding your inquiry/proposed development.
- b. The site contains existing buildings that do not possess a building permit from the City of Ottawa. Upon the formal Site Plan Control application, all buildings located on the property that do not possess a building permit will have to go through the Site Plan Control process, following Site Plan approval, said buildings will have to apply for building permits through Building Code Services – buildingpermits@ottawa.ca.
 - i. Please note, when applying for building permits, the review will consider the buildings 'new' even though they are already built.
- c. Please ensure that the required parking allocated for this project considers the minimum parking rates for all permitted uses currently on site.
- d. Planning staff will be looking at the Planning Rational to demonstrate all permitted and all conditional uses in the RG zone are appropriate for the subject property. If any of the permitted and/or the conditional uses are not determined appropriate to the subject property, the applicant may propose a site-specific amendment.
- e. A Zoning By-law Amendment and Site Plan Control application can be submitted concurrently. The concurrent application will be subject to the 120-day Planning Act timeline.

- f. The subject property is adjacent to the Tewin Expansion Area (Future Neighbourhood – New Tewin Community). Please consider any relevant Official Plan policies specific to Future Neighbour Overlay(s) – Schedule C17.

6. Submission Requirements

- a. The required submission material listed below must meet the [City's Terms of Reference](#).
- b. The following submission material has been identified as a requirement for a Zoning By-law Amendment (ZBA) and/or Site Plan Control (SPC) application.
 - i. Landscape Plan – to identify any existing landscaping elements and natural features that will be preserved and illustrate the proposed landscaping element to support the development (ZBA & SPC).
 - ii. Plan of Survey – to depict legal boundaries (ZBA & SPC).
 - iii. Planning Rational – this document is to organize and validate the planning justification in support of the Zoning By-law Amendment. In addition, this document should demonstrate that all permitted and any conditional permitted uses within the proposed zone are appropriate for the subject property and if not, may propose a site-specific amendment (ZBA).
 - If the Zoning By-law Amendment and Site Plan Control application are submitted concurrently, the Planning Rational can include how the proposed development meets all criteria listed in Section 9.2.2.2(2)(b) of Official Plan.
 - iv. Site Plan – a visual drawing that will illustrate the proposed development of the site and will include a significant amount of information and detail. The Site Plan is based off of the Plan of Survey (ZBA & SPC).
 - v. Zoning Confirmation Report – to identify compliance issues at the beginning of the planning application. If circumstances of the Site Plan do not comply with the proposed zone, a minor variance application to the Committee of Adjustment, may be required (ZBA & SPC).
- c. Public Consultation Strategy Report (PCSR) – a Zoning By-law Amendment typically requires a PCSR. However, this proposed amendment does not meet the assessment criteria listed in the *Public Consultation Strategy Report Terms of Reference*. Therefore, it has been



determined that a PCSR is not required as part of the formal submission material (ZBA).

Feel free to contact Jaime Mallory, File Lead, for follow-up questions.

Urban Design

Preliminary Comments

7. Please ensure that outdoor storage is screened from the Right-of-Way (ROW).
8. Please ensure that there is a substantial landscape buffer along the ROW including space for tree planting.
9. The above should be incorporated into the proposed zoning provisions for the site and addressed in the Planning Rational.

Required Plans for Future Site Plan

10. Site Plan.
11. Landscape Plan.

Feel free to contact Lisa Stern, Urban Design, for follow-up questions.

Engineering

Comments:

12. General
 - a. For a complete description of the Terms of Reference and application submission requirements, please reference the City's web site: [Planning application submission information and materials | City of Ottawa](#).
 - b. All drawings and reports submitted for engineering review must be stamped and dated by a Professional Civil Engineer, Civil Engineering Technologist registered in the Province of Ontario, or Ontario Land Surveyor.
13. Environmental Site Assessment (Phase 1 & 2 ESA)
 - a. A Phase One Environmental Site Assessment (ESA) is required for the Site Plan Control of the site.
 - b. ESAs are required to ensure that development only takes place on sites where the environmental conditions are suitable for the proposed use in accordance with provincial legislation and regulations.

- c. The Phase 1 ESA report will determine whether a Phase 2 ESA is required.

14. Geotechnical Study

- a. A Geotechnical report is required to support the design and construction of this project.
- b. The Geotechnical report should provide sufficient soils and engineering information to confirm that the site(s) are suitable or can be made suitable for development. The geotechnical report shall adequately discuss the fill requirements, grade raise restrictions, and other limitations and earthworks required for development within a floodplain or adjacent to a watercourse, and wetland.
- c. The Geotechnical report might typically include: borehole logs, Atterberg limits, consolidation testing, shear strength testing, grade raise restrictions, or a sieve analysis as required.
- d. The report should clearly state whether sensitive marine clays or organic soils are present on this site, or not.
- e. The report should clearly state whether soil liquefaction is a risk on this site, or not.
- f. The report should clearly state thin soils or karst topography are present on this site, or not.
- g. If the proposal intends to include infiltration or soak-away areas as part of the stormwater management design, be advised that:
 - i. The soil must be tested and proved to have an infiltration rate in excess of 15mm/hr. ref: Low Impact Development Technical Guidance Report (Feb 2021), Section 3.5.1 page 23).
 - ii. Depth to groundwater should be measured over a considerable amount of time that includes the Spring freshet. Low Impact Development Technical Guidance Report (Feb 2021), Section 3.5.3, page 26).(Also Ref: Ottawa Sewer Design Guidelines (2012), update: ISTB 2018-04 Section 8.2).
 - iii. The seasonal groundwater level must be at least 1.0 metre below the bottom of the trench or infiltration structure. (ref: MOECP SWM Planning and Design Manual (March 2003) page 164 of 379). (Also Ref: Low Impact Development Technical Guidance Report (Feb 2021) Section 3.5.3 pages 25 of 68).

15. Grading and Drainage Plan

- a. A Grading and Drainage Plan is required to support the design and construction of this project.
- b. A Grading and Drainage Plan establishes the grading relationships between connecting (or abutting) properties. It serves as the basis for controlling surface runoff. A grading plan directs water from the building. The focus is on the landscaping around the building and soil elevation. The goal is to provide proper yard grading for drainage away from buildings.
- c. Grading Plans provided to the City of Ottawa should include:
 - i. All elevations must be referenced to a geodetic reference point.
 - ii. Please indicate the Site Benchmark and the external reference that provides the horizontal and vertical datum of the reference used to set this benchmark.
 - iii. All measurements must be in metric units, imperial measure may be provided as a secondary measurement.
 - iv. Provide top of curb (TC) and bottom of curb (BC) elevations.
 - v. Please maintain a minimum 150 mm difference between the proposed finished floor elevation and the finished grade at the structure. Maintain positive surface drainage away from the foundation wall.
 - vi. A 0.3 m freeboard should be provided between the 100-year water elevation and the finished floor elevation.
 - vii. Please include the Pavement Design provided in the Geotechnical Report. Typically, this should include a low-density and a heavy - duty pavement design.
- d. It appears that infilling for parking spaces along Anderson Road may have partially filled in the roadside ditch. The ditches must be dug out and returned to their required profile.

16. Site Servicing Study [*Item #7 on the SPIL*]

- a. A Site Servicing Study is required to support the design and construction of this project.

- b. Applications for new development are required to demonstrate, to the City's satisfaction, that adequate services are available and can be allocated to support the proposal.
- c. An Erosion and Sediment Control Plan is required in support of the design and construction of this project.
- d. If required, please include servicing insulation details as per drawing 'W22 - 'Thermal Insulation for Watermains in Shallow Trenches', S35 – 'Insulations for Shallow Sewers', and/or OPSD 1109.030 – 'Insulation for Sewers and Watermains in Shallow Trenches'.
- e. Septic System Review and Approval
 - i. The City will require septic approval from the Ottawa Septic System Office (OSSO) before we can issue Site Plan Approval.
 - ii. If the sanitary sewage daily design flow is less than 10,000 L/day, the septic permit from the OSSO must be issued prior to future Site Plan Approval being granted.
 - iii. If the sanitary sewage daily design flow is greater than 10,000 L/day, the septic system(s) is regulated by the Ministry of the Environment, Conservation and Parks (MECP) and requires a direct submission Environmental Compliance Approval (ECA) application.
 - iv. Be advised that a Groundwater Impact Assessment will be required if the site-wide daily design flow is greater than 10,000 L/day.
 - v. Please ensure that the OSSO is aware if an oil/grit separator or car wash runoff is contributing flows to the septic system.
 - vi. As per the OSSO, the septic system must be at least 3.0 metres from the property lines.
 - vii. Technical consultation with the City's hydrogeologist is encouraged, please contact the City hydrogeologist, Travis Smith, and copy the assigned Infrastructure Project Manager to schedule a technical consultation.
- f. Stormwater Management Report
 - i. A Stormwater Management report is required in support of the design and construction of this project.
 - ii. Stormwater design must adhere to the City's 'Ottawa Design Guidelines -Sewer', Second Edition, document no. SDG002,

October 2012, City of Ottawa, including technical bulletins: ISDTB-2014-01, PIEDTB-2016-01, ISTB 2018-01, ISTB-2018-04, ISTB-2019-02.

- iii. The quantity criteria for the development are that the 100-yr post development peak flow rate must match the 2-year pre-development peak flow rate.
- iv. The stormwater management quality criteria for this site are 80% total suspended solids (TSS) removal.
- v. A calculated time of concentration (cannot be less than 10 minutes) is required. (Ref: Section 5.4.3.6 of the City of Ottawa Sewer Design Guidelines (October 2012)).
- vi. Runoff volumes must be calculated using the 'C' values found in Ottawa Design Guidelines (Sewer), Section 5.4.5.2.1 page 5.26. There are no standard or maximum 'C' values in the Rural area.
- vii. Stormwater must outlet to a legal and sufficient outlet.
- viii. A 0.3m freeboard should be provided between the 100-year high-water elevation and the finished floor elevation.
- ix. Stormwater or Drainage plans must include the ponding depth, volume, and ponding extent for 2-year and 100-year storm events.
- x. Please provide pre- & post- development drainage plans clearly identifying the sub-drainage zones, their areas, and 'C' values.
- xi. In regard to proposed LID development, please reference to the City's 'Low Impact Development Technical Guidance Report', in particular 'Section 2.0 Hydrological Constraints', Section 3.3 Geotechnical Investigations, and 'Section 3.5 Current Approaches and Guidance'.

g. Fire Services

- i. The consultant should provide fire flow calculations using both the FUS (Fire Underwriters Survey), and the Ontario Building Code methodologies. The Engineer, Fire Protection (Ottawa Fire Services), will review the proposal and determine the criteria that will govern. Contact Allan Evans in Fire Services (allan.evans@ottawa.ca).
- ii. Fire truck routes should be shown on civil plans. Fire Routes now require designation with By-law through following Site Plan Control Approval by contacting fireroutes@ottawa.ca.

- iii. Underground storage tanks for Fire Fighting purposes may be required if the building(s) is above 600 sq.m. in size.
- iv. Fire Services requires an access point or draft hydrant be located some distance from the building itself. Trucks must be able to physically draft water from a safe distance. For more information contact Allan Evans in Fire Services Allan.evans@ottawa.ca.
- v. The consultant should give careful consideration to the placement of any on-site storage tanks, ensuring that sufficient area and clearances are provided. The designer must also consider the location of the access to the on-site water supply and ensure it can be accessed safely during a fire event.
- vi. The Site Servicing Study must include a section addressing the provision of a water supply for fire suppression, determination of the required fire flow, and confirmation of size and location of any on-site storage required. It is the responsibility of the owner to ensure that an adequate water supply for firefighting is provided. The method for determining required fire flows is under review, currently the FUS (Fire Underwriters Survey), the NFPA 1142, and the Ontario Building Code methodologies for determining required fire flow and storage shall be provided in the reporting. The Engineer, Fire Protection (Ottawa Fire Services), shall review the proposal and determine the criteria that will govern. Highly developed sites will require thought as to the placement of the on-site storage ensuring that sufficient area and clearances are provided. The designer must also consider the location of the access to the on-site water supply and ensure it can be accessed safely during a fire event.

17. Site Lighting Certificate

- a. The City will require an Exterior Lighting Certificate certified by a qualified engineer before issuing Site Plan Approval.
- b. Any exterior lighting proposed for the site is required by the City of Ottawa to be certified by a qualified engineer confirming the design complies with the following criteria:
 - i. It must be designed using only fixtures that meet the criteria for Full-Cut-Off (Sharp cut-off) Classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES).
 - ii. It must result in minimal light spillage onto adjacent properties. As a guide, 0.5 foot-candle is normally the maximum allowable spillage.

- iii. The location of the fixtures, fixture types (make, model, and part number) and the mounting heights must be provided.

18. Ministry of the Environment, Conservation and Parks (MECP) Review

- a. An MECP Environmental Compliance Approval (ECA) may be required for the proposed development. Please contact the Ministry of the Environment, Conservation and Parks, Ottawa District Office for more information.
- b. It is the applicant's responsibility to determine which of the several types of ECA approvals may be required for this application. If a Direct Submission is by the nature of the application required by the MECP, the applicant can request a Transfer of Review in its place by contacting Charles Warnock. charles.warnock@ottawa.ca.
- c. For any water taking of volumes greater than 50,000 L/day, either an Environmental Activity and Sector Registration (EASR) or a Permit To Take Water (PTTW) is required from the MECP, dependent on dewatering requirements.
- d. MECP/ECA Contact info:
 - Patrick Lalonde at (613) 363-1652 patrick.Lalonde@ontario.ca (Site Plans).
 - Shannon Hamilton-Browne at (613) 880-4255 or shannon.hamiltonbrowne@ontario.ca (subdivisions)
 - Charles Warnock at 613-580-2424 x27809 or Charles.warnock@ottawa.ca.

Feel free to contact Brian Morgan, Project Manager, for follow-up questions.

Hydrogeology

Comments:

19. A **Hydrogeological and Terrain Analysis** will be required for the Zoning By-law Amendment and Site Plan Control application(s) to establish that there is an adequate quantity and quality of groundwater to support the proposed development(s) and that there is sufficient septic dilution to accommodate the proposed sewage flows. The scope of the study will be further clarified once the water demands, and sewage flows are determined. Applicant will need to work with Development Review and Building Code Services staff to determine the servicing demands for the present and any proposed uses. A detailed study will be required for the Zoning By-law Amendment. The requirements for the Hydrogeological and Terrain Analysis Report are outlined in the City of Ottawa's

Hydrogeological and Terrain Analysis Guidelines (HTAG), section 5.0 for Site Plans (pages 81 to 83). The study forms part of the requirements for Zoning By-law Amendments and Site Plan Control applications noted in the Studies and Plan Identification List, provided with the feedback documents.

- a. **Quantity/Yield:** A pumping test is required to confirm that the well(s) on-site can supply the required quantity and quality of water at the Zoning Amendment stage. The reporting must demonstrate that the property can provide a water supply suitable for the industrial/proposed zoning and provide the maximum allowable sewage flow that the lot can safely attenuate.
 - i. For commercial/industrial operations, an 8-hour pump test, or longer, is normally recommended, however a minimum of 6-hours is required in the HGTA Guidelines. As part of the proposed Zoning By-law Amendment, a nearby technically representative well can be used. If a nearby, technically representative test well demonstrates poor quality or quantity, a well(s) may need to be drilled on the site.
 - ii. An on-site supply well(s) must be established in the Site Plan Control stage to confirm that the water quality and quantity are suitable for the proposed use prior to Site Plan approval.
 - iii. If an existing well is proposed to be used as the on-site water supply, then a well inspection is required to confirm it meets the Wells Regulations (O.Reg.903) or bring it into conformance with regulations; specifically, confirming that the well casing and grouting are sound, grading is directed away from around the wellhead, and that the casing height is at least 40 cm above ground and meets the rest of the regulations. The existing well forms part of the Planning Act approval and must be brought to standards or consideration provided to drilling of a new well and abandoning the non-conforming well. The Ontario Building Code and the Wells Regulation [R.R.O. 1990, Regulation 903 (Wells) as amended made under the Ontario Water Resources Act, R.S.O. 1990, c. O. 40] set the minimum requirements for well construction and separation distances.
 - iv. The anticipated water demands (average day, maximum daily, and maximum hour) must be presented and justified for the pump test rate. The pumping rate should be the maximum daily demand rate. The pumping rate should consider the actual use, as well as any uses permitted under the proposed zoning. The Ottawa Design Guidelines – Water Distribution provides information for determining water demand rates for the proposed zoning, or uses, in Table 4.2 – Consumption Rates. Should an alternate method be proposed for determining the pump rate, the rate must be converted to a maximum daily demand value, such as the 120-

minute peak demand, as demonstrated in Ministry of Environment, Conservation and Parks (MECP) D-5-5.

- b. **Quality:** The parameters of water quality that will be tested will be the “subdivision suite” known to local well testing companies, as well as trace metals, and volatile organic compounds (VOC). Requirements are outlined in the City of Ottawa Hydrogeological and Terrain Analysis Guidelines. The report should also provide an assessment of adjacent land uses and concerns and determine if any other parameters need to be tested (e.g., petroleum hydrocarbons, etc.).
 - i. The site is within the East Ottawa Aquifer Screening Tool and identifies that water quality is poor with both shallow and deep wells susceptible to water quality exceedances. Wells in this area are often mineralized which must typically be abandoned when observed, but Director written consent not to abandon a well producing mineralized water can be applied for by the applicant. The application would required a Hydrogeological Assessment for the MECP to review the application, and the process could take more than 8 months to complete based on previous review timelines for this application type.
 - ii. Aesthetic and operational water quality exceedances must be identified, treatment systems are to be specified, where they are recommended, and shown on the plans. The development may not be approved if health-related parameters are exceeded in the untreated groundwater.
 - iii. If well water is mineralized, then approval from the MECP will be needed to continue to use the well, as specified in Ontario Regulation 903 (Section 21). The consultant should also consider, and report, the other issues associated with the mineralized water including corrosivity of the water and shortened lifespan of plumbing fixtures and the septic system. Specialized plumbing, and fixtures, may provide some mitigation of issues.
- c. Bollards, or other means of preventing vehicle access, will need to be provided between areas with vehicle access and the existing or proposed well(s).
- d. A **Septic System Impact Assessment** must be completed as part of the Hydrogeological and Terrain Analysis Report, as per the City’s Hydrogeological and Terrain Analysis Report Guidelines and MECP Guideline D-5-4, please refer to the HTAG for the predictive assessment for commercial/industrial developments, pages 30 to 31 (not applicable for residential developments). The sewage system design must be submitted with the Site Plan Control application.

- i. In the Zoning Amendment stage, the septic impact assessment using the assessment above will identify a maximum allowable sewage flow. The actual sewage flows on-site must be shown to be less than the maximum allowable for the zoning to be supported.
 - ii. In the Site Plan stage and not applicable to the Zoning stage, septic treatment (i.e. tertiary treatment with nitrate reduction) may be considered as part of the septic impact assessment calculations (Site Plan Control only, cannot be considered in the Zoning Amendment stage). A septic system certified though NSF or BNQ should be recommended if advanced treatment is needed to meet nitrate impact targets.
 - iii. If the sewage system/s daily design flow is 10,000 L/d or less, the septic permit from the Ottawa Septic System Office must be sent to the City prior to Site Plan Approval being granted.
 - iv. If the sewage system's design flow exceeds 10,000 L/d (per lot), a Reasonable Use Assessment must accompany the application to the City. Sewage systems with design flows exceeding 10,000 L/d require the issuance of an Environmental Compliance Approval (ECA) from the MECP prior to Site Plan Approval being granted (and the duration of approval is anticipated to be lengthy [many months]).
 - v. Note that gravel shall be considered impermeable in the septic impact assessment unless field testing results confirm alternative infiltration rates.
 - vi. If system isolation is contemplated, the technical pre-consultation with the reviewer is mandatory to ensure the assessment meets the minimum requirements identified in City Guidelines, and to convey the minimum on-site testing requirements.
 - vii. Bollards, or other means of preventing vehicle access, will need to be provided between areas with vehicle access and the proposed septic system(s).
- e. Fuel storage or other potential sources of contamination should be located based on the setbacks provided in the Wells Regulation (O.Reg. 903) and Ontario Building Code, from the current or future wells. The list of water quality parameters to be tested should be expanded based on any known potential activities of concern on the property.
- f. Technical consultation with the hydrogeological report reviewer is recommended for all Site Plan Control applications. Please contact the reviewer assigned to the file to arrange for the consultation. The hydrogeological consultant should conduct a background review and

provide a work plan for review prior to the meeting. Please see list below of factors where technical consultation is considered mandatory that may apply to this site:

- i. Where system isolation argument is being put forward,
- ii. Where dug wells are proposed as a water supply, or
- iii. Where septic design flows exceed 10,000 L/d.

Feel free to contact Travis Smith, Sr PM, Hydrogeology, for follow-up questions.

Transportation

Comments:

20. The site's private approach is located on a high-speed road. Ensure that the sightlines exiting the site are not obstructed in any way.

21. Right-of-Way Protection

- a. See [Schedule C16 of the Official Plan](#).
- b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

22. A Transportation Impact Assessment (TIA) is not required.

Feel free to contact Mike Giampa, Transportation Project Manager, for follow-up questions.

Environment

Comments:

23. An Environmental Impact Statement (EIS) will be required as part of this application. The triggering features are the presence of unevaluated wetlands on the adjacent property surrounding the subject parcel.

- a. The EIS must investigate the potential presence of wetlands on the adjacent property. If present, the setbacks these wetlands are provided may affect development on the subject site. If necessary, the EIS may argue for a reduced setback based on the ecological function of these wetland features and provide necessary mitigation measures to ensure that no negative impact occurs as a result of the proposed development.

- b. The potential impacts of salt, fuel, or other pollutants used in business operations must be addressed as part of the EIS within the context of wetland impacts.
- 24. Species-at-risk must also be addressed in the Environmental Impact Statement. Black Ash are most likely to be on-site, but the potential presence of butternut should also be investigated. Bobolink and wood thrush are noted on the NHIC database as being present nearby and the wetlands/woodlands may also host bat maternity habitat or potentially Blanding's turtles as well.
- 25. Additional tree plantings are always encouraged to help meet the City's forest canopy goals as well as to reduce the impacts of climate change and the urban heat island effect. Please note that the City prefers all plantings to be of native and non-invasive species.

Feel free to contact Mark Elliott, Environmental Planner, for follow-up questions.

Forestry

Comments:

- 26. There are no City owned trees in the Right-of-Way bordering this property.
- 27. No comments/concerns.

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Parkland

Comments:

- 28. The amount of parkland dedication required is to be calculated as per the City of Ottawa [Parkland Dedication By-law No. 2022-280](#). This application will be calculated as 2% of the gross land area of the site being developed for commercial or industrial purposes, including buildings, roads, parking lot and other associated land.
- 29. Please provide the City with a surveyor's area certificate/memo which specifies the exact gross land area of the site being developed/redeveloped, but not including any hazard lands or natural heritage features identified in the official plan, an approved Secondary Plan, or through an environmental impact study accepted by the City.
- 30. Section 11 (1) of the Parkland Dedication By-law states that "The conveyance of parkland or the payment of cash-in-lieu of parkland is not required for development or redevelopment where it is known, or can be demonstrated, that the required parkland conveyance or cash-in-lieu of parkland, or combination

thereof, has been previously satisfied in accordance with the Planning Act, unless:

- a. there is a change in the proposed development or redevelopment that would increase the density providing a net dwelling unit gain;
- b. the proposed development or redevelopment increases the gross floor area of a non-residential use; or
- c. land originally proposed for development or redevelopment for commercial or industrial purposes is now proposed for development or redevelopment for other purposes that have a higher conveyance requirement pursuant to the rates described herein.”

If parkland dedication for the parcel has been satisfied previously, please provide Parks & Facilities Planning with the supporting documentation.

31. Please note that the park comments are preliminary and will be finalized (and subject to change) upon receipt of the development application and any requested supporting documentation. Additionally, if the proposed land use changes, then the parkland dedication requirement will be re-evaluated accordingly.
32. Parks and Facilities Planning will be requesting **cash-in-lieu of conveyance of parkland** for parkland dedication in accordance with the Parkland Dedication By-law No. 2022-280.

Feel free to contact Warren Bedford, Parks Planner, for follow-up questions.

Submission Requirements and Fees

1. Regarding the formal Site Plan Control application, please refer to the application type thresholds provided below. The thresholds below can guide what application type (Rural Small or Standard Rural) this proposal will fall under when more detail is provided.
 - a. Rural Small – on private services
 - 300 – 600 square metres and
 - ≤ 10 parking spaces
 - b. Standard Rural – on private services
 - 600 – 1,860 square metres or
 - ≥ 10 parking spaces
 - c. As the application proposes to develop a property in a manner that deviates from the current zoning, rezoning the property from Rural Countryside to Rural General Industrial, a Major Zoning By-law



Amendment is required. Please refer [Zoning By-law Amendment | City of Ottawa](#) for more information regarding the process and fees.

- d. Additional information regarding fees related to planning applications can be found [here](#).
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
 - a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on [Ottawa.ca](#). These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Consultation with Technical Agencies

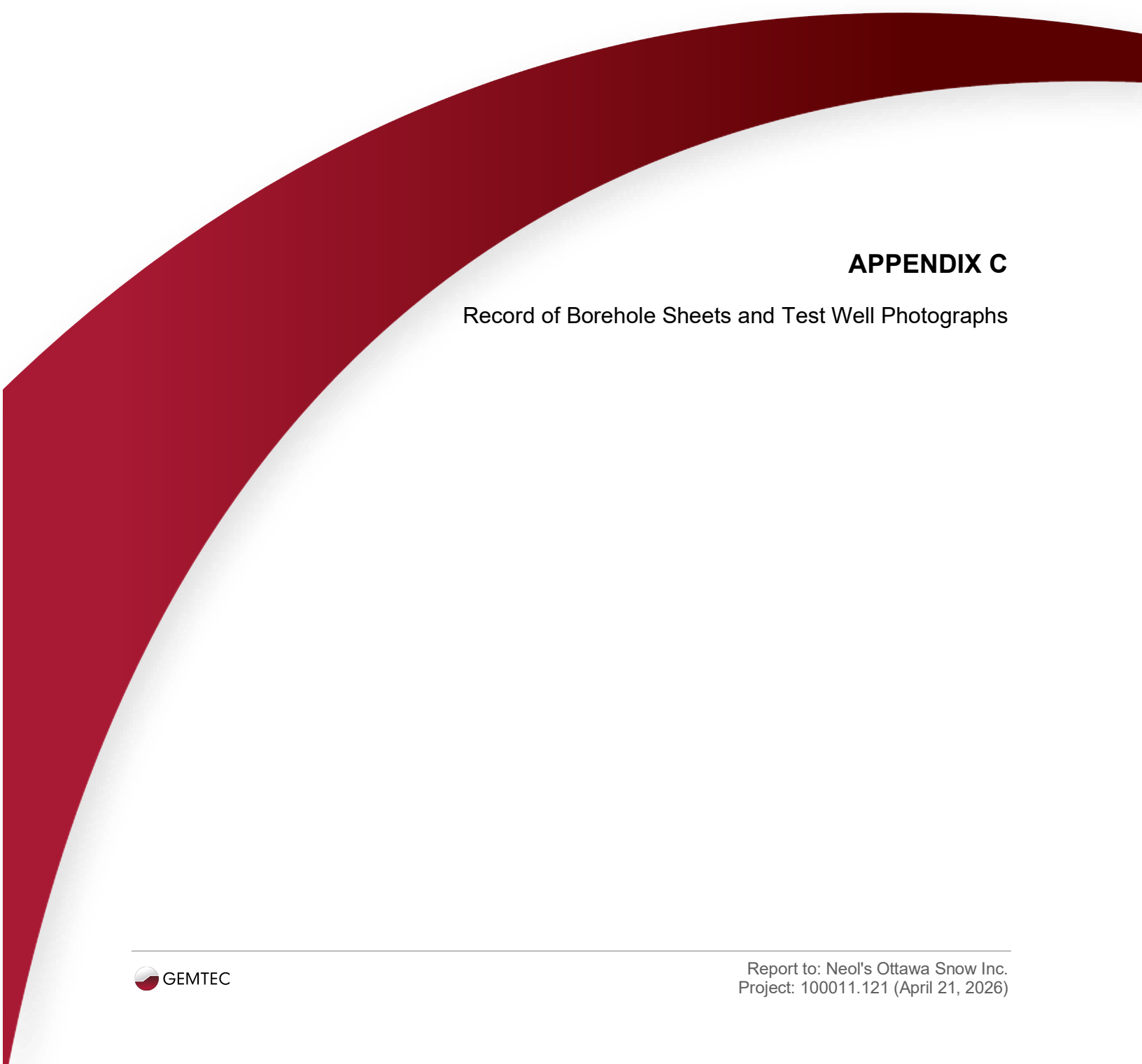
1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Jaime Mallory

Encl. Study and Plan Identification List (SPIL)
List of Technical Agencies
Pre-consultation Supplementary Development Information

c.c. Cheryl McWilliams
Oyin Egbeyemi
Lisa Stern
Brian Morgan
Damien Whittaker
Travis Smith
Mark Elliott
Hayley Murray
Warren Bedford
Joshua Good



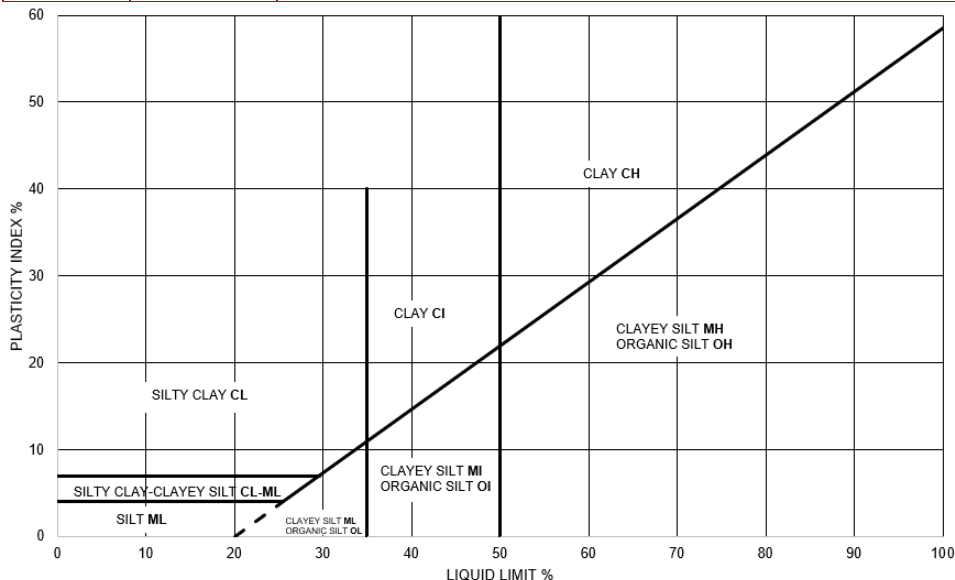
APPENDIX C

Record of Borehole Sheets and Test Well Photographs

Method of Soil Classification

GEMTEC's Soil Classification is based on the MTC Soil Classification Manual (January 1980)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	USCS Group Symbol	Group Name	
Inorganic (Organic Content less than 30%)	Coarse Grained Soils (>50% is larger than 0.075 mm)	Gravel (>50% of coarse fraction is > 4.75 mm)	Gravel with ≤12% fines	Poorly Graded	<4	≤1 or ≥3	GP	Gravel	
				Well Graded	≥4	1 to 3	GW	Gravel	
			Gravel with >12% fines	Below A Line	N/A		GM	Silty Gravel	
				Above A Line	N/A		GC	Clayey Gravel	
		Sand (≥50% coarse fraction is > 4.75 mm)	Sand with ≤12% fines	Poorly Graded	<6	≤1 or ≥3	SP	Sand	
				Well Graded	≥6	1 to 3	SW	Sand	
			Sand with >12% fines	Below A Line	N/A		SM	Silty Sand	
				Above A Line	N/A		SC	Clayey Sand	
	Soil Group	Type of Soil	Liquid Limit	Field Tests			USCS Group Symbol	Group Name	
				Dilatancy	Thread Diameter	Toughness			
	Fine Grained Soils (≥50% is smaller than 0.075 mm)	Silts (Non-Plastic or PI and LL plot below A-Line)	<50	Rapid	>6 mm	N/A	ML	Silt	
				Slow	3 to 6 mm	None to low	ML	Clayey Silt	
				Slow to V. Slow	3 to 6 mm	Low	OL	Organic Silt	
			≥50	Slow to V. Slow	3 to 6 mm	Low to Medium	MH	Clayey Silt	
		None		1 to 3 mm	Medium to High	OH	Organic Silt		
		Clays (PI and LL plot above A-Line)	Liquid Limit <35	None	~3 mm	Low to Medium	CL	Silty Clay	
			Liquid Limit 35 to 50	None	1 to 3 mm	Medium	CI	Silty Clay	
			Liquid Limit >50	None	<1 mm	High	CH	Clay	
	Highly Organic (> 30%)	Peat (Amorphous or Fibrous)						PT	Peat



Dual Symbol – Is used to indicate when soils are transitional. For coarse grained soils, it is used when the soil has between 5 and 12% fines (e.g., SP-SC, Sand to Silty Sand). For fine-grained soils it is used when the plasticity index and liquid limit values plot in the area shown in the plasticity chart on this page.

Borderline Symbol – Is used to indicate soils that are not clearly in one soil type but have similar behaviour and properties as similar materials (e.g., CL/CI or GM/SM).

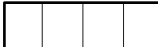
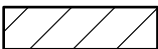
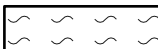
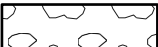
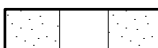
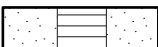
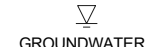
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

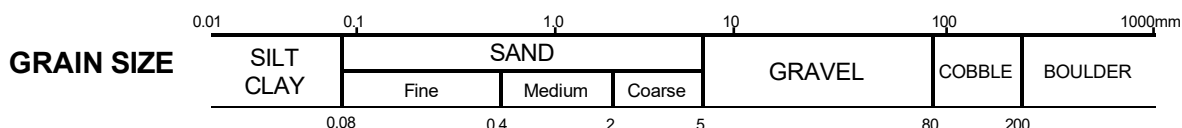
SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w _p	Plastic limit
LL, w _L	Liquid limit
C	Consolidation (oedometer) test
D _R	Relative density
DS	Direct shear test
G _s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	Cu, kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard

		
GRAVEL	SAND	SILT
		
CLAY	FILL	ORGANICS
		
BOULDER	BEDROCK	TILL
		
PIPE WITH BENTONITE	PIPE WITH BACKFILL	PIPE WITH SAND
		
SCREEN WITH SAND	GROUNDWATER LEVEL	



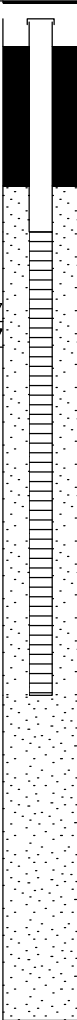
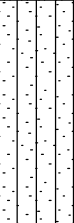
DESCRIPTIVE TERMINOLOGY

TRACE	SOME	ADJECTIVE	noun > 30% and main fraction
trace clay, etc	some gravel, etc.	silty, etc.	sand and gravel, etc.

RECORD OF BOREHOLE 25-01

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 18 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		80.90								
		FILL - (SM) silty sand; trace gravel, with organic matter; grey brown; non-cohesive, dry, very loose		80.14	1	SS	535	2	Metals & Inorganics, PHC/BTEX, PAH, OCP	HEX: 70; IBL: 2		 Bentonite seal Filter sand 50 mm diameter PVC well screen Filter sand
1		(SM) SILTY SAND; trace gravel; grey brown to brown; non-cohesive, dry to moist, very loose to loose		0.76	2	SS	455	3		HEX: 55; IBL: 0		
2					3	SS	560	5		HEX: 50; IBL: 3		
		(SM) SILTY SAND; trace gravel; grey; non-cohesive, wet, compact		78.61	4	SS	330	20	Metals, PHC/VOC, PAH	HEX: 220; IBL: 2		
3		(CH) CLAY; trace sand; grey; cohesive, w>PL		78.08	5	SS	405	WH		HEX: 70; IBL: 2		
4					6	SS	560	WH		HEX: 70; IBL: 6		
5					7	SS	560	WH		HEX: 60; IBL: 4		
6												
		End of Borehole		74.19								
				6.71								

GROUNDWATER OBSERVATIONS

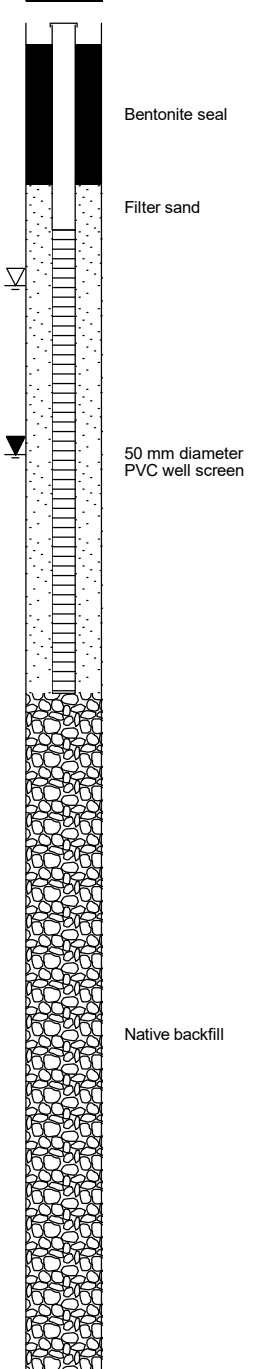
DATE	DEPTH (m)	ELEVATION (m)
Jun. 26/25	2.11	78.79
Aug. 08/25	2.28	78.62

RECORD OF BOREHOLE 25-02

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 4
 DATUM: CGVD28
 BORING DATE: Jun 16 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		80.64								
		ASPHALTIC CONCRETE		0.03	1	SS	255	43	Metals & Inorganics, OCP	HEX: 0; IBL: 9		
1		FILL - (SM) silty sand and gravel; with pieces of asphalt; grey; non-cohesive, dry, dense		79.73 0.91	2	SS	305	4		HEX: 0; IBL: 2		
2		(SM) SAND and SILT; trace gravel, with organic matter; grey brown; non-cohesive, moist, loose		78.51 2.13	3	SS	455	9		HEX: 0; IBL: 0		
3		(SM) SAND and SILT; trace gravel; grey; non-cohesive, wet, compact		77.44 3.20	4	SS	405	30		HEX: 1900; IBL: 0		
4		(CH) CLAY; trace sand; grey; cohesive, w>PL			5	SS	610	WH		HEX: 160; IBL: 0		
5		- sand seam at 4.6 m depth - sand seam at 4.9 m depth			6	SS	610	WH		HEX: 0; IBL: 0		
6					7	SS	610	WH		HEX: 0; IBL: 2		
7					8	SS	610	WH		HEX: 0; IBL: 3		
8												
9												



ENV - BOREHOLE LOG 100011.121, GINT, BOREHOLE LOGS-ENVIRO GPJ, GEMTEC 2018, GDT, 2/9/25

RECORD OF BOREHOLE 25-02

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 2 OF 4
 DATUM: CGVD28
 BORING DATE: Jun 16 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
10	Direct Push	(CH) CLAY; trace sand; grey; cohesive, w>PL		70.64	9	SS	610	WH	HEX: 0; IBL: 2			Native backfill
				10.00								
11					10	SS	610	WH	HEX: 0; IBL: 0			
12												
13	Dynamic Cone Penetration				11	SS	610	WH	HEX: 0; IBL: 0			Native backfill
14												
15					12	SS	610	WH	HEX: 0; IBL: 0			
16	Dynamic Cone Penetration			65.40								Native backfill
17				15.24								
18												
19												

RECORD OF BOREHOLE 25-02

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 3 OF 4
 DATUM: CGVD28
 BORING DATE: Jun 16 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
20	Direct Push Dynamic Cone Penetration			60.64 20.00								Native backfill
21												
22												
23												
24												
25												
26												
27												
28												
29												

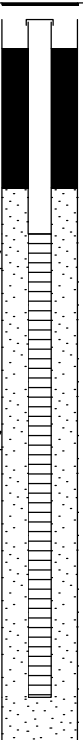
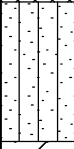
ENV - BOREHOLE LOG 100011.121 GINT - BOREHOLE LOGS-ENVIRO GPJ GEMTEC 2018.GDT 2/9/25

[illegible]

RECORD OF BOREHOLE 25-03

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 18 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0	Direct Push	Ground Surface		80.51								 Bentonite seal Filter sand 50 mm diameter PVC well screen Filter sand
		ASPHALTIC CONCRETE		0.03	1	ST	635		Metals & Inorganics, OCP	HEX: 0; IBL: 6		
1		FILL - (SM) silty sand and gravel; with pieces of concrete; grey to grey brown; non-cohesive, dry			2	ST	510			HEX: 20; IBL: 0		
2		(SM) SAND and SILT; trace gravel; grey brown; non-cohesive, moist to wet		78.99 1.52	3	ST	915		PHC/VOC, PAH + Duplicate	HEX: 20; IBL: 4		
3		(CH) CLAY; trace sand; grey; cohesive, w>PL		78.07 2.44	4	ST	610			HEX: 20; IBL: 4		
4		- sand seam at 3.7 m depth			5	ST	760			HEX: 25; IBL: 4		
					6	ST	760			HEX: 20; IBL: 1		
					7	ST	305			HEX: 15; IBL: 1		
		End of Borehole		75.63 4.88								

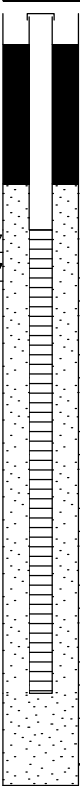
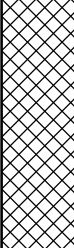
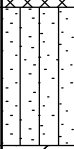
GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Jun. 26/25	1.75	78.76
Aug. 08/25	2.94	77.57

RECORD OF BOREHOLE 25-04

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

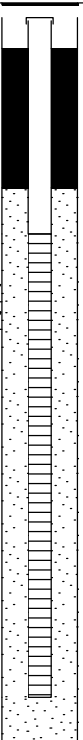
SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 17 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES																		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m					LABORATORY ANALYSES																	
0	Direct Push	Ground Surface		80.41								 Bentonite seal Filter sand 50 mm diameter PVC well screen Filter sand																		
		FILL - (SM) silty sand and gravel; grey to grey brown; non-cohesive, dry, compact			1	SS	230	25	Metals & Inorganics, OCP	HEX: 0; IBL: 0																				
1					2	SS	75	10		HEX: 5; IBL: 0																				
		(SM) SILTY SAND; trace gravel; brown; non-cohesive, moist to wet, loose		78.73 1.68	3	SS	485	9		HEX: 15; IBL: 1																				
2					4	SS	455	WH		HEX: 30; IBL: 3																				
		(CH) CLAY; trace sand; grey; cohesive, w>PL - sand seam at 2.9 m depth		77.82 2.59	5	SS	610	WH	Metals, PHC/VOC, PAH	HEX: 55; IBL: 3																				
3					6	SS	610	WH		HEX: 15; IBL: 2																				
4																														
5																														
		End of Borehole		75.23 5.18																										
<table><tr><th colspan="3">GROUNDWATER OBSERVATIONS</th></tr><tr><th>DATE</th><th>DEPTH (m)</th><th>ELEVATION (m)</th></tr><tr><td>Jun. 26/25</td><td>1.67 </td><td>78.74</td></tr><tr><td>Aug. 08/25</td><td>1.86 </td><td>78.55</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>													GROUNDWATER OBSERVATIONS			DATE	DEPTH (m)	ELEVATION (m)	Jun. 26/25	1.67 	78.74	Aug. 08/25	1.86 	78.55						
GROUNDWATER OBSERVATIONS																														
DATE	DEPTH (m)	ELEVATION (m)																												
Jun. 26/25	1.67 	78.74																												
Aug. 08/25	1.86 	78.55																												

RECORD OF BOREHOLE 25-05

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 18 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0	Direct Push	Ground Surface		80.68								 Bentonite seal Filter sand 50 mm diameter PVC well screen Filter sand
1		FILL - (SM) silty sand and gravel; with pieces of plastic; grey; non-cohesive, dry			1	ST	330		Metals & Inorganics	HEX: 0; IBL: 0		
				79.16								
2		(SM) SAND and SILT; trace gravel; grey brown; non-cohesive, moist		1.52	2	ST	355		Metals, PHC/VOC, PAH, OCP	HEX: 0; IBL: 5		
				78.70								
3		(SM) SAND and SILT; trace gravel; grey; non-cohesive, wet		1.98	3	ST	455			HEX: 0; IBL: 0		
				78.09								
4		(CH) CLAY; trace sand; grey; cohesive, w>PL		2.59	4	ST	455			HEX: 0; IBL: 2		
		- sand seam at 3.1 m depth			5	ST	760			HEX: 0; IBL: 5		
					6	ST	760			HEX: 0; IBL: 4		
					7	ST	305			HEX: 0; IBL: 2		
		End of Borehole		75.80								
				4.88								

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Jun. 26/25	1.97	78.71
Aug. 08/25	2.15	78.53

RECORD OF BOREHOLE 25-06

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 17 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0		Ground Surface		80.49								
		ASPHALTIC CONCRETE		0.03								
		FILL - (SM) silty sand and gravel; with pieces of wood; grey; non-cohesive, dry, dense			1	SS	305	33	Metals & Inorganics	HEX: 0; IBL: 2		
1		(SM) SAND and SILT; trace gravel; grey brown; non-cohesive, dry to wet, loose to compact		79.58 0.91	2	SS	230	6		HEX: 10; IBL: 0		
2					3	SS	430	23		HEX: 30; IBL: 0		
3	Direct Push	(CH) CLAY; trace sand; grey; cohesive, w>PL		78.05 2.44	4	SS	560	WH		HEX: 250; IBL: 2		
4		- sand seam at 4.0 m depth			5	SS	560	WH		HEX: 20; IBL: 2		
5		- sand seam at 4.4 m depth										
		End of Borehole		75.31 5.18								

Bentonite seal

Filter sand

50 mm diameter PVC well screen

Filter sand

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEVATION (m)
Jun. 26/25	1.73	78.76
Aug. 08/25	2.81	77.68

RECORD OF BOREHOLE 25-07

CLIENT: Noel's Ottawa Snow Inc.
 PROJECT: Phase Two Environmental Site Assessment, 4296 Anderson Road, Ottawa, Ontario
 JOB#: 100011.121
 LOCATION: See Site Plan and Study Area, Figure A.1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jun 18 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLE DATA				COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m				
0	Direct Push	Ground Surface		80.64								
		ASPHALTIC CONCRETE		0.03	1	ST	305		HEX: 15; IBL: 3			 Native backfill
		FILL - (SM) silty sand and gravel; grey to grey brown; non-cohesive, dry		80.03								
1		(SM) SILTY SAND; trace gravel; grey brown; non-cohesive, dry to wet		0.61	2	ST	485		HEX: 0; IBL: 5			
2					3	ST	865		HEX: 35; IBL: 1			
3		(CH) CLAY; trace sand; grey; cohesive, w>PL - sand seam at 3.0 m depth		78.05 2.59	4	ST	455		HEX: 5; IBL: 0			
					5	ST	735		HEX: 5; IBL: 2			
4					6	ST	735		HEX: 5; IBL: 0			
					7	ST	305		HEX: 5; IBL: 2			Groundwater observed within open borehole at 2.4 m depth upon completion of borehole
		End of Borehole		75.76 4.88								

ENV - BOREHOLE LOG 100011.121_GINT_BOREHOLE LOGS-ENVIRO GPJ GEMTEC 2018.GDT 2/9/25

TW25-01

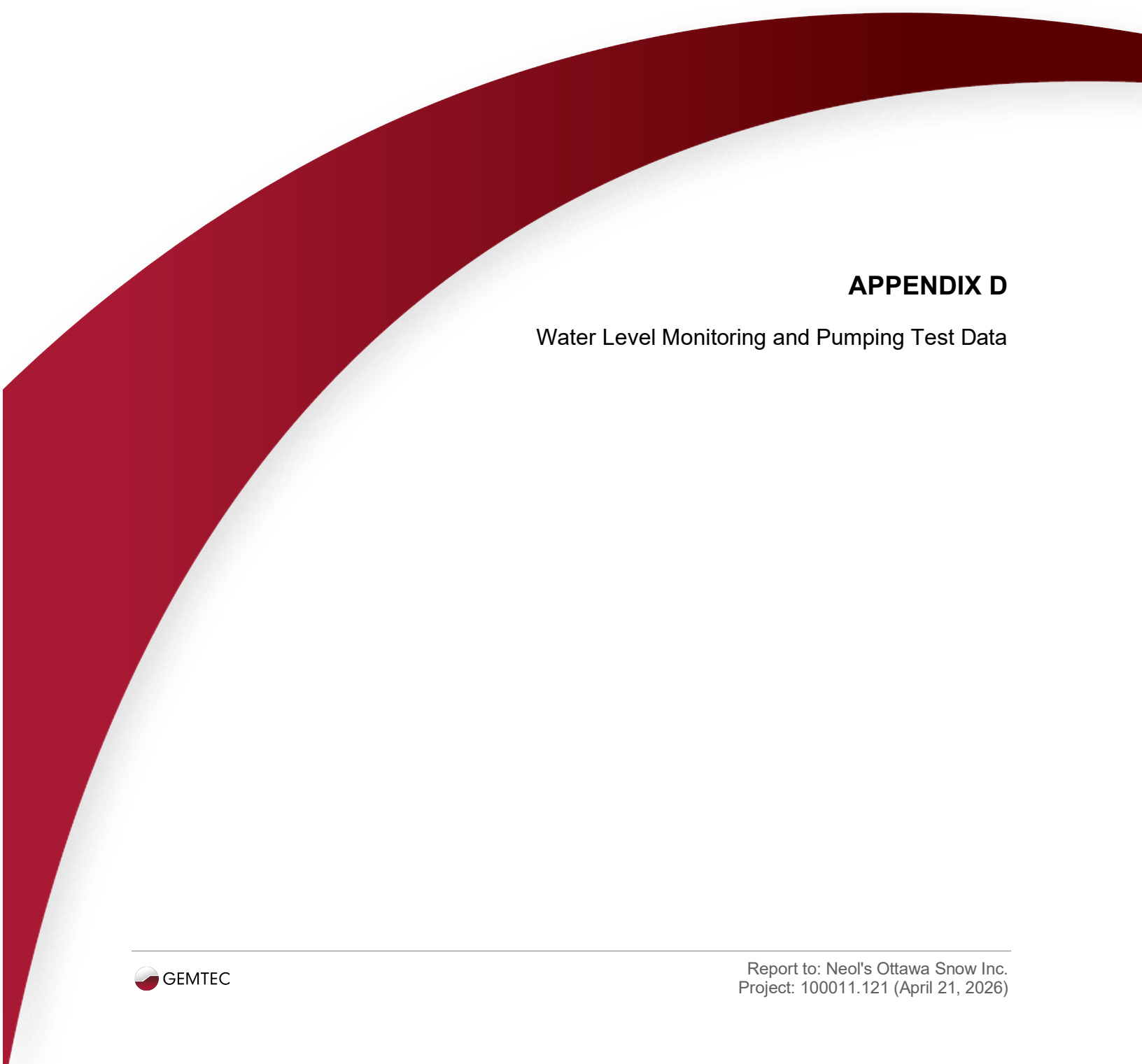


TW25-01



TW25-01





APPENDIX D

Water Level Monitoring and Pumping Test Data



GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

Pumping Test Compilation Report

Project: Hydrogeological Investigation

Project Number: 100011.121

Client: Noel's Ottawa Snow Inc.

Location: 4296 Anderson Road, Ottawa, ON

Test Conducted by: ML

Pumping Well: TW25-1

P-Test Date: Oct 1, 2025

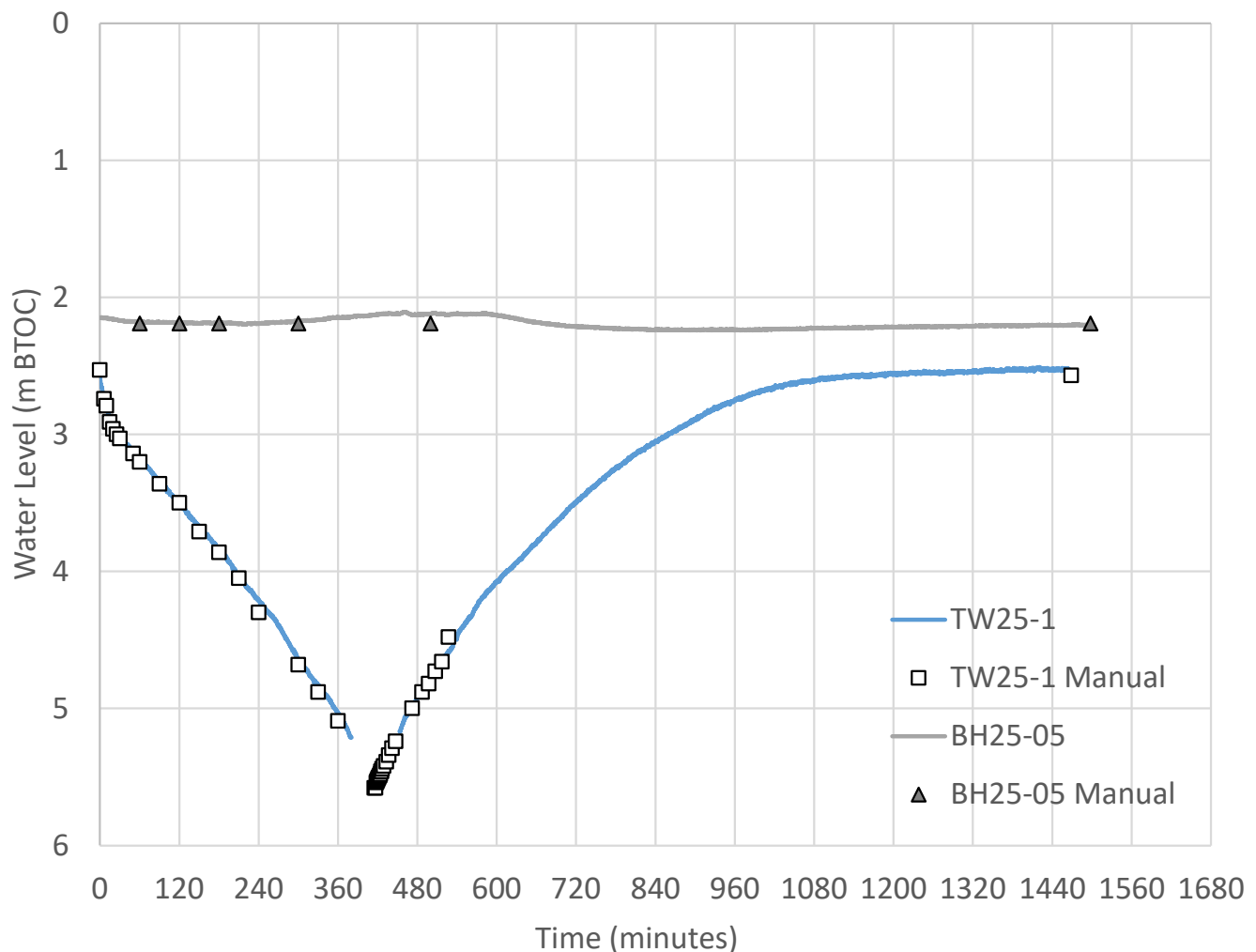
Analysis Performed by: AP

Method: -

Discharge: Constant ~15 L/min

Duration: ~7 hours

Pumping Test Data (TW25-1): Drawdown and Recovery



Water Levels TW25-1

Static : 2.53 m below TOC

TOC = -0.30 m (approx.) below floor slab

End of pump test (415 minutes): ~5.50 m below TOC

Following recovery (<24 hours): 2.53 m below TOC



GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

Pumping Test Compilation Report

Project: Hydrogeological Investigation

Project Number: 100011.121

Client: Noel's Ottawa Snow Inc.

Location: 4296 Anderson Road, Ottawa, ON

Test Conducted by: ML

Pumping Well: TW25-1

P-Test Date: Oct 1, 2025

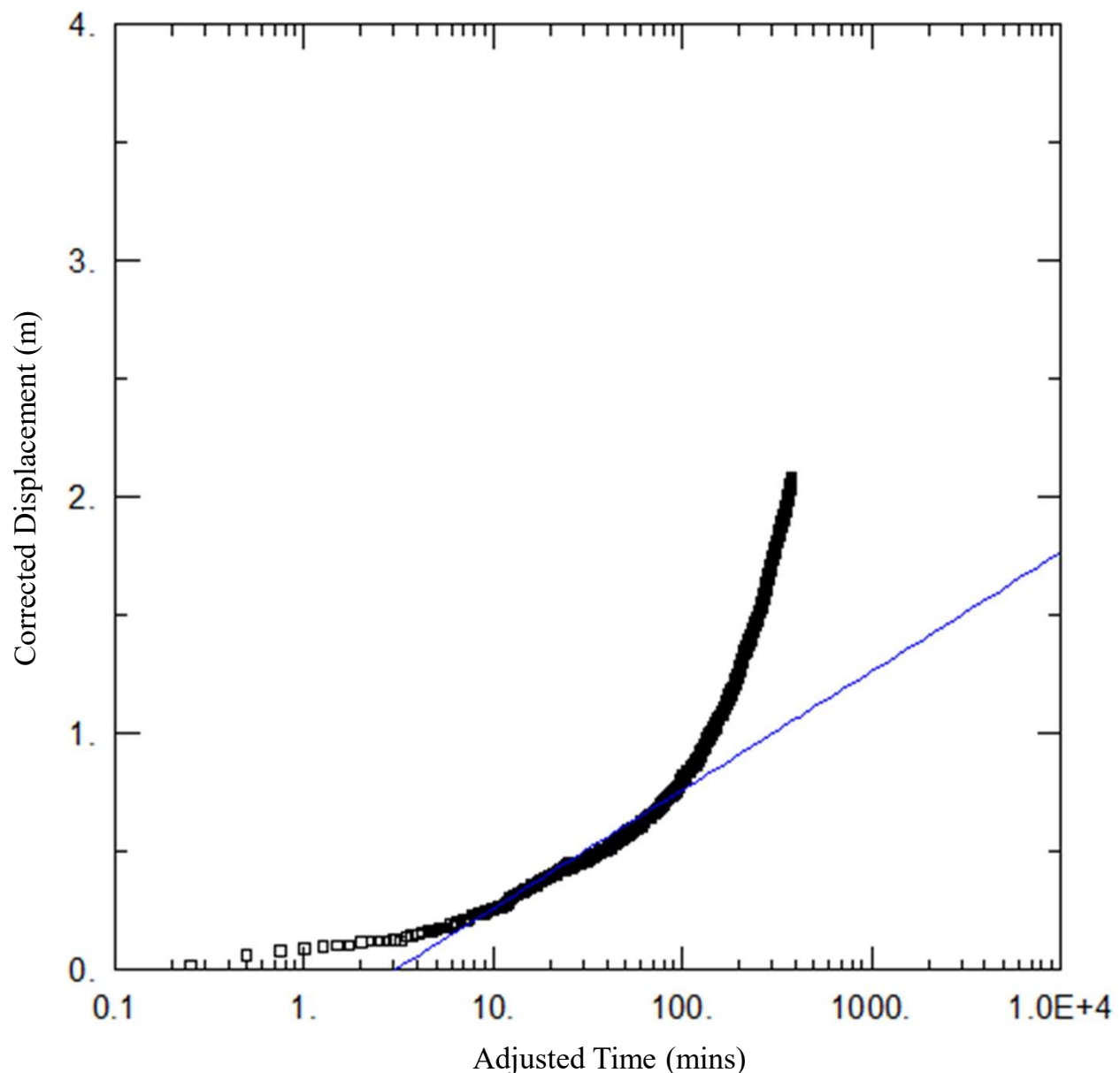
Analysis Performed by: AP

Method: Cooper-Jacob

Discharge: Constant ~15 L/min

Duration: ~7 hours

Pumping Test Data (TW25-1): Aqtesolv Analysis



Estimated Transmissivity: 8 m²/day

Estimated Storativity: -



APPENDIX E

Water Quality Summary, Certificates of Analysis, & Manganese Fact Sheets

Summary of Test Well Field Water Quality Measurements

Test Well ID	Date	Time Since Initiaion of Pump (hrs)	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Turbidity (NTU)	Colour (ACU ¹)	Colour (TCU ²)	Free Chlorine (mg/L)	Total Chlorine (mg/L)
TW25-01	01-Oct-26	1	15.8	6.55	>4000	>2000	5.68	-	-	-	-
		2	16.3	7.04	>4000	>2000	4.25	-	-	-	-
		3	16.8	6.9	>4000	>2000	3.5	-	-	-	-
		4	17.3	7.26	>4000	>2000	2.86	110	0	-	0
		5	17.3	6.83	>4000	>2000	2.29	-	-	-	-
		6	18.4	7.27	>4000	>2000	2.47	-	-	-	-
		7	-	-	-	-	-	-	-	-	-
		8	-	-	-	-	-	-	-	-	-

Notes:

1. ACU = Apparent Colour Units
2. TCU = True Colour Units (field filtered using 0.45 micron filter)

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Samuel Esenwa

Client PO:
Project: 100011.121
Custody: 20206

Report Date: 23-Apr-2025

Order Date: 15-Apr-2025

Order #: 2516149

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2516149-01	4296 Anderson

Approved By:



Mark Foto, M.Sc.
Laboratory Director

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	15-Apr-25	15-Apr-25
Ammonia, as N	EPA 351.2 - Auto Colour	16-Apr-25	16-Apr-25
Anions	EPA 300.1 - IC	15-Apr-25	15-Apr-25
Colour	SM2120 - Spectrophotometric	16-Apr-25	16-Apr-25
Colour, apparent	SM2120 - Spectrophotometric	16-Apr-25	16-Apr-25
Conductivity	EPA 9050A- probe @25 °C	15-Apr-25	15-Apr-25
Dissolved Organic Carbon	MOE 3247B - Combustion IR	22-Apr-25	23-Apr-25
E. coli	MOE E3407	15-Apr-25	15-Apr-25
Fecal Coliform	SM 9222D	15-Apr-25	15-Apr-25
Heterotrophic Plate Count	SM 9215C	15-Apr-25	15-Apr-25
Metals, ICP-MS	EPA 200.8 - ICP-MS	16-Apr-25	17-Apr-25
pH	EPA 150.1 - pH probe @25 °C	15-Apr-25	15-Apr-25
Phenolics	EPA 420.2 - Auto Colour, 4AAP	16-Apr-25	16-Apr-25
Hardness	Hardness as CaCO ₃	16-Apr-25	17-Apr-25
Sulphide	SM 4500SE - Colourimetric	17-Apr-25	17-Apr-25
Tannin/Lignin	SM 5550B - Colourimetric	16-Apr-25	17-Apr-25
Total Coliform	MOE E3407	15-Apr-25	15-Apr-25
Total Dissolved Solids	SM 2540C - gravimetric, filtration	16-Apr-25	17-Apr-25
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	16-Apr-25	17-Apr-25
Turbidity	SM 2130B - Turbidity meter	16-Apr-25	16-Apr-25

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Client ID:	4296 Anderson	-	-	-	-
Sample Date:	15-Apr-25 12:00	-	-	-	-
Sample ID:	2516149-01	-	-	-	-
Matrix:	Drinking Water	-	-	-	-
MDL/Units					

Microbiological Parameters

E. coli	1 CFU/100mL	ND	-	-	-	-
Total Coliforms	1 CFU/100mL	ND	-	-	-	-
Fecal Coliforms	1 CFU/100mL	ND	-	-	-	-
Heterotrophic Plate Count	10 CFU/mL	120	-	-	-	-

General Inorganics

Alkalinity, total	5 mg/L	406	-	-	-	-
Ammonia as N	0.01 mg/L	0.62	-	-	-	-
Dissolved Organic Carbon	0.5 mg/L	17.6 [4]	-	-	-	-
Colour, apparent	2 ACU	676	-	-	-	-
Colour	2 TCU	53	-	-	-	-
Conductivity	5 uS/cm	11400	-	-	-	-
Hardness	1 mg/L	2040	-	-	-	-
pH	0.1 pH Units	6.7	-	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-	-
Total Dissolved Solids	10 mg/L	7540	-	-	-	-
Sulphide	0.02 mg/L	0.17	-	-	-	-
Tannin & Lignin	0.1 mg/L	0.5	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	1.0	-	-	-	-
Turbidity	0.1 NTU	139	-	-	-	-

Anions

Chloride	1 mg/L	3670	-	-	-	-
Fluoride	0.1 mg/L	<0.5 [1]	-	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-	-
Nitrite as N	0.05 mg/L	<0.25 [2]	-	-	-	-
Sulphate	1 mg/L	567	-	-	-	-

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Client ID:	4296 Anderson	-	-	-	
Sample Date:	15-Apr-25 12:00	-	-	-	-
Sample ID:	2516149-01	-	-	-	
Matrix:	Drinking Water	-	-	-	
MDL/Units					

Metals

Calcium	0.1 mg/L	553	-	-	-	-
Iron	0.1 mg/L	10.4	-	-	-	-
Magnesium	0.2 mg/L	160	-	-	-	-
Manganese	0.005 mg/L	7.50	-	-	-	-
Potassium	0.1 mg/L	10.0	-	-	-	-
Sodium	0.2 mg/L	1540	-	-	-	-

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Fluoride	ND	0.1	mg/L					
Nitrate as N	ND	0.1	mg/L					
Nitrite as N	ND	0.05	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Alkalinity, total	ND	5	mg/L					
Ammonia as N	ND	0.01	mg/L					
Colour	ND	2	TCU					
Colour, apparent	ND	2	ACU					
Conductivity	ND	5	uS/cm					
Phenolics	ND	0.001	mg/L					
Total Dissolved Solids	ND	10	mg/L					
Sulphide	ND	0.02	mg/L					
Tannin & Lignin	ND	0.1	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Turbidity	ND	0.1	NTU					
Metals								
Calcium	ND	0.1	mg/L					
Iron	ND	0.1	mg/L					
Magnesium	ND	0.2	mg/L					
Manganese	ND	0.005	mg/L					
Potassium	ND	0.1	mg/L					
Sodium	ND	0.2	mg/L					
Microbiological Parameters								
E. coli	ND	1	CFU/100mL					
Total Coliforms	ND	1	CFU/100mL					
Fecal Coliforms	ND	1	CFU/100mL					
Heterotrophic Plate Count	ND	10	CFU/mL					

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	53.4	1	mg/L	53.1			0.6	20	
Fluoride	0.74	0.1	mg/L	0.73			0.5	20	
Nitrate as N	ND	0.1	mg/L	ND			NC	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
Sulphate	38.7	1	mg/L	38.4			0.7	20	
General Inorganics									
Alkalinity, total	40.6	5	mg/L	38.5			5.3	10	
Ammonia as N	0.615	0.01	mg/L	0.620			0.8	18	
Colour	52	2	TCU	53			1.9	20	
Colour, apparent	674	4	ACU	676			0.3	20	
Conductivity	175	5	uS/cm	180			2.6	5	
pH	8.8	0.1	pH Units	8.8			0.1	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	688	10	mg/L	688			0.0	10	
Sulphide	0.18	0.02	mg/L	0.17			4.6	10	
Tannin & Lignin	0.5	0.1	mg/L	0.5			2.6	15	
Total Kjeldahl Nitrogen	0.98	0.1	mg/L	1.01			3.0	20	
Turbidity	3.0	0.1	NTU	3.1			0.7	10	
Metals									
Calcium	560	1.0	mg/L	553			1.3	20	
Iron	10.3	0.1	mg/L	10.4			1.1	20	
Magnesium	159	0.2	mg/L	160			0.4	20	
Manganese	7.44	0.050	mg/L	7.50			0.8	20	
Potassium	10.7	0.1	mg/L	10.0			6.5	20	
Sodium	1450	2.0	mg/L	1540			6.0	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	
Heterotrophic Plate Count	110	10	CFU/mL	120			9.0	30	

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	62.1	1	mg/L	53.1	90.7	70-124			
Fluoride	1.71	0.1	mg/L	0.73	97.6	70-130			
Nitrate as N	0.96	0.1	mg/L	ND	96.0	77-126			
Nitrite as N	1.02	0.05	mg/L	ND	102	82-115			
Sulphate	47.6	1	mg/L	38.4	92.0	70-130			
General Inorganics									
Ammonia as N	1.65	0.01	mg/L	0.620	103	85-115			
Phenolics	0.026	0.001	mg/L	ND	102	67-133			
Total Dissolved Solids	96.0	10	mg/L	ND	96.0	75-125			
Sulphide	0.65	0.02	mg/L	0.17	96.4	82-118			
Tannin & Lignin	1.4	0.1	mg/L	0.5	93.9	75-125			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	1.01	98.7	75-125			
Metals									
Calcium	10500	0.1	mg/L	ND	105	80-120			
Iron	2410	0.1	mg/L	ND	96.2	80-120			
Magnesium	9900	0.2	mg/L	ND	99.0	80-120			
Manganese	55.1	0.005	mg/L	ND	110	80-120			
Potassium	9600	0.1	mg/L	ND	96.0	80-120			
Sodium	9790	0.2	mg/L	ND	97.9	80-120			

Certificate of Analysis

Report Date: 23-Apr-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 15-Apr-2025

Client PO:

Project Description: 100011.121

Qualifier Notes:**Login Qualifiers :**

Sample - DOC submitted unfiltered in a preserved container. Analysis was conducted on a filtered subsample from an unpreserved container.

Applies to Samples: 4296 Anderson

Sample Qualifiers :

- 1: Elevated Reporting Limit due to matrix interference.
Applies to Samples: 4296 Anderson
- 2: Elevated reporting limit due to dilution required because of high target analyte concentration.
Applies to Samples: 4296 Anderson
- 4: Subcontracted analysis - Eurofins Environment Testing
Applies to Samples: 4296 Anderson

Sample Data Revisions:

None

Work Order Revisions / Comments:**Other Report Notes:**

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

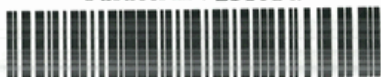
RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

PARACE

Parcel ID: 2516149



Parcel Order Number

Chain of Custody
Ontario Drinking Water Supplies

No 20206

Client Name: GEMTEC	Project Ref: 100011/21	Waterworks Name:	Samples Taken By:
Contact Name: Samuel Ejenwa	Quote #:	Waterworks Number:	Name: Jeffrey Gantner
Address: 3rd Steacie Drive	PO #:	Address:	Signature: [Signature]
After Hours Contact:	E-mail: samuel.ejenwa@gemtec.ca	Public Health Unit:	Page 1 of 1
Telephone: 873 688 7770	Fax:		Turn Around Time Required: ☐ 1 day ☐ 2 day ☐ 3 day ☒ 4 day

Samples Submitted Under: (Indicate ONLY one) ☐ ON REG 170/03 ☐ ON REG 319/08 ☒ Private Well ☐ ON REG 243/07 ☐ Other		Sample Type: R = Raw; T = Treated; D = Distribution; P = Plumbing Source Type: G = Ground Water; S = Surface Water Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No		Required Analysis										
Have LSN forms been submitted to MOE/MOHLTC?: ☐ Yes ☐ No ☒ N/A Are these samples for human consumption?: ☒ Yes ☐ No		All information must be completed before samples will be processed.		Subdivision Package										
LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y/N	Resample	DATE	TIME	# of Containers	Free Combined Chlorine Residual mg/L	Standing / Flushed: S / F (REG 243)	Total Coliform/E. Coli	HPC	Lead	THM
1 4296 Anderson	4296 Anderson	R	G	N		April 15/25	12:00	9						
2														
3														
4														
5														
6														
7														
8														
9														
10														

Comments:		Method of Delivery:	
Relinquished By (Sign): [Signature]	Received at Depot:	Received at Lab: [Signature]	Verified By: [Signature]
Relinquished By (Print): Jeffrey Gantner	Date/Time: 12:25	Date/Time: APR 15/25 12:25	Date/Time: APR 15/25
Date/Time: 12:25	Temperature: °C	Temperature: 10.5 °C	pH Verified: [Signature]

Chain of Custody (Drinking Water) xlsx

Revision 8.0

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Samuel Esenwa

Client PO:
Project: 100011.121
Custody:

Report Date: 9-Jul-2025

Order Date: 3-Jul-2025

Order #: 2527227

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2527227-01	MW25-02

Approved By:

A. Tirca

Adriana Tirca, B.Eng (Chem)

Supervisor

Certificate of Analysis

Report Date: 09-Jul-2025

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 3-Jul-2025

Client PO:

Project Description: 100011.121

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	7-Jul-25	7-Jul-25

Certificate of Analysis

Report Date: 09-Jul-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Jul-2025

Client PO:

Project Description: 100011.121

Client ID:	MW25-02	-	-	-	
Sample Date:	02-Jul-25 09:00	-	-	-	- -
Sample ID:	2527227-01	-	-	-	
Matrix:	Ground Water	-	-	-	
MDL/Units					

Anions

Chloride	1 mg/L	3970	-	-	-	- -
Nitrate as N	0.1 mg/L	<0.1	-	-	-	- -

Certificate of Analysis

Report Date: 09-Jul-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Jul-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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Anions

Chloride	ND	1	mg/L					
Nitrate as N	ND	0.1	mg/L					

Certificate of Analysis

Report Date: 09-Jul-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Jul-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L	ND			NC	20	
Nitrate as N	ND	0.1	mg/L	ND			NC	20	

Certificate of Analysis

Report Date: 09-Jul-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 3-Jul-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.48	1	mg/L	ND	94.8	70-124			
Nitrate as N	0.99	0.1	mg/L	ND	99.5	77-126			

Certificate of Analysis

Client: GEMTEC Consulting Engineers and Scientists Limited

Client PO:

Report Date: 09-Jul-2025

Order Date: 3-Jul-2025

Project Description: 100011.121

Qualifier Notes:**Sample Qualifiers :**

- 1: Sample collection date on the bottle is July 2, 2025; report as per the bottle as directed by the client.
Applies to Samples: MW25-02

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Andrius Paznekas

Client PO:
Project: 100011.121
Custody: 19251

Report Date: 8-Oct-2025

Order Date: 2-Oct-2025

Order #: 2540374

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2540374-02	GW4296 6.5 hr
2540374-03	GW4296 6.5 hr (Filtered)

Approved By:

A. Tirca

Adriana Tirca, B.Eng (Chem)

Supervisor

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	3-Oct-25	3-Oct-25
Ammonia, as N	EPA 351.2 - Auto Colour	6-Oct-25	6-Oct-25
Anions	EPA 300.1 - IC	7-Oct-25	7-Oct-25
Colour	SM2120 - Spectrophotometric	3-Oct-25	3-Oct-25
Colour, apparent	SM2120 - Spectrophotometric	3-Oct-25	3-Oct-25
Conductivity	EPA 9050A- probe @25 °C	3-Oct-25	3-Oct-25
Dissolved Organic Carbon	MOE 3247B - Combustion IR	3-Oct-25	3-Oct-25
E. coli	MOE E3407	3-Oct-25	3-Oct-25
Fecal Coliform	SM 9222D	3-Oct-25	3-Oct-25
Metals, ICP-MS	EPA 200.8 - ICP-MS	3-Oct-25	6-Oct-25
pH	SM 4500-H+	3-Oct-25	3-Oct-25
Phenolics	EPA 420.2 - Auto Colour, 4AAP	3-Oct-25	3-Oct-25
Hardness	Hardness as CaCO ₃	3-Oct-25	6-Oct-25
Sulphide	SM 4500SE - Colourimetric	3-Oct-25	3-Oct-25
Tannin/Lignin	SM 5550B - Colourimetric	6-Oct-25	6-Oct-25
Total Coliform	MOE E3407	3-Oct-25	3-Oct-25
Total Dissolved Solids	SM 2540C - gravimetric, filtration	3-Oct-25	6-Oct-25
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	7-Oct-25	7-Oct-25
Turbidity	SM 2130B - Turbidity meter	3-Oct-25	3-Oct-25
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	4-Oct-25	4-Oct-25

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Client ID:	GW4296 6.5 hr	GW4296 6.5 hr (Filtered)	-	-	
Sample Date:	01-Oct-25 15:10	01-Oct-25 15:10	-	-	-
Sample ID:	2540374-02	2540374-03	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Microbiological Parameters

E. coli	1 CFU/100mL	ND	-	-	-	-
Total Coliforms	1 CFU/100mL	ND	-	-	-	-
Fecal Coliforms	1 CFU/100mL	ND	-	-	-	-

General Inorganics

Alkalinity, total	5 mg/L	439	-	-	-	-
Ammonia as N	0.01 mg/L	0.86	-	-	-	-
Dissolved Organic Carbon	0.5 mg/L	10.0	-	-	-	-
Colour, apparent	2 ACU	303	-	-	-	-
Colour	2 TCU	9	-	-	-	-
Conductivity	5 uS/cm	7580	-	-	-	-
Hardness	1 mg/L	1370	-	-	-	-
pH	0.1 pH Units	7.2	-	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-	-
Total Dissolved Solids	10 mg/L	4960	-	-	-	-
Sulphide	0.02 mg/L	<0.02	-	-	-	-
Tannin & Lignin	0.1 mg/L	0.7	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	1.2	-	-	-	-
Turbidity	0.1 NTU	40.6	-	-	-	-

Anions

Chloride	1 mg/L	2150 [5]	-	-	-	-
Fluoride	0.1 mg/L	<0.1 [5]	-	-	-	-
Nitrate as N	0.1 mg/L	<0.1 [5]	-	-	-	-
Nitrite as N	0.05 mg/L	<0.05 [5]	-	-	-	-
Sulphate	1 mg/L	517 [5]	-	-	-	-

Metals

Certificate of Analysis

Report Date: 08-Oct-2025

Client: **GEMTEC Consulting Engineers and Scientists Limited**

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Client ID:	GW4296 6.5 hr	GW4296 6.5 hr (Filtered)	-	-	
Sample Date:	01-Oct-25 15:10	01-Oct-25 15:10	-	-	-
Sample ID:	2540374-02	2540374-03	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Metals

Aluminum	0.001 mg/L	0.011	0.002	-	-	-
Antimony	0.0005 mg/L	<0.0005	<0.0005	-	-	-
Arsenic	0.001 mg/L	0.001	0.001	-	-	-
Barium	0.001 mg/L	0.149	0.151	-	-	-
Beryllium	0.0005 mg/L	<0.0005	<0.0005	-	-	-
Boron	0.01 mg/L	0.04	0.05	-	-	-
Cadmium	0.0001 mg/L	0.0002	0.0002	-	-	-
Calcium	0.1 mg/L	364	268	-	-	-
Chromium	0.001 mg/L	<0.001	<0.001	-	-	-
Cobalt	0.0005 mg/L	0.0152	0.0149	-	-	-
Copper	0.0005 mg/L	0.0060	0.0019	-	-	-
Iron	0.1 mg/L	3.8	3.9	-	-	-
Lead	0.0001 mg/L	0.0003	0.0001	-	-	-
Magnesium	0.2 mg/L	112	116	-	-	-
Manganese	0.005 mg/L	6.19	3.95	-	-	-
Molybdenum	0.0005 mg/L	0.0008	0.0009	-	-	-
Nickel	0.001 mg/L	0.021	0.020	-	-	-
Potassium	0.1 mg/L	12.0	12.7	-	-	-
Selenium	0.001 mg/L	<0.001	<0.001	-	-	-
Silver	0.0001 mg/L	<0.0001	<0.0001	-	-	-
Sodium	0.2 mg/L	830	728	-	-	-
Strontium	0.01 mg/L	1.89	1.58	-	-	-
Thallium	0.001 mg/L	<0.001	<0.001	-	-	-
Uranium	0.0001 mg/L	0.0025	0.0022	-	-	-

Certificate of Analysis

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Client ID:	GW4296 6.5 hr	GW4296 6.5 hr (Filtered)	-	-	
Sample Date:	01-Oct-25 15:10	01-Oct-25 15:10	-	-	-
Sample ID:	2540374-02	2540374-03	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Metals

Vanadium	0.0005 mg/L	0.0009	0.0008	-	-	-
Zinc	0.005 mg/L	0.006	0.007	-	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	-	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-

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Client PO:

Project Description: 100011.121

Client ID:	GW4296 6.5 hr	GW4296 6.5 hr (Filtered)	-	-	
Sample Date:	01-Oct-25 15:10	01-Oct-25 15:10	-	-	-
Sample ID:	2540374-02	2540374-03	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Volatiles

1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	-	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-	-

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Sample Date:	01-Oct-25 15:10	01-Oct-25 15:10	-	-	-
Sample ID:	2540374-02	2540374-03	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Volatiles

o-Xylene	0.5 ug/L	<0.5	-	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-	-
Dibromofluoromethane	Surrogate	100%	-	-	-	-
Toluene-d8	Surrogate	88.4%	-	-	-	-
4-Bromofluorobenzene	Surrogate	87.3%	-	-	-	-

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Alkalinity, total	ND	5	mg/L					
Ammonia as N	ND	0.01	mg/L					
Dissolved Organic Carbon	ND	0.5	mg/L					
Colour	ND	2	TCU					
Colour, apparent	ND	2	ACU					
Conductivity	ND	5	uS/cm					
Phenolics	ND	0.001	mg/L					
Total Dissolved Solids	ND	10	mg/L					
Sulphide	ND	0.02	mg/L					
Tannin & Lignin	ND	0.1	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Turbidity	ND	0.1	NTU					
Metals								
Aluminum	ND	0.001	mg/L					
Antimony	ND	0.0005	mg/L					
Arsenic	ND	0.001	mg/L					
Barium	ND	0.001	mg/L					
Beryllium	ND	0.0005	mg/L					
Boron	ND	0.01	mg/L					
Cadmium	ND	0.0001	mg/L					
Calcium	ND	0.1	mg/L					
Chromium	ND	0.001	mg/L					
Cobalt	ND	0.0005	mg/L					
Copper	ND	0.0005	mg/L					
Iron	ND	0.1	mg/L					
Lead	ND	0.0001	mg/L					
Magnesium	ND	0.2	mg/L					
Manganese	ND	0.005	mg/L					
Molybdenum	ND	0.0005	mg/L					
Nickel	ND	0.001	mg/L					
Potassium	ND	0.1	mg/L					
Selenium	ND	0.001	mg/L					

Certificate of Analysis

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Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Silver	ND	0.0001	mg/L					
Sodium	ND	0.2	mg/L					
Strontium	ND	0.01	mg/L					
Thallium	ND	0.001	mg/L					
Uranium	ND	0.0001	mg/L					
Vanadium	ND	0.0005	mg/L					
Zinc	ND	0.005	mg/L					
Microbiological Parameters								
E. coli	ND	1	CFU/100mL					
Fecal Coliforms	ND	1	CFU/100mL					
Total Coliforms	ND	1	CFU/100mL					
Volatiles								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					
Bromomethane	ND	0.5	ug/L					
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					
Chloroethane	ND	1.0	ug/L					
Chloroform	ND	0.5	ug/L					
Chloromethane	ND	3.0	ug/L					
Dibromochloromethane	ND	0.5	ug/L					
Dichlorodifluoromethane	ND	1.0	ug/L					
1,2-Dibromoethane	ND	0.2	ug/L					
1,2-Dichlorobenzene	ND	0.5	ug/L					
1,3-Dichlorobenzene	ND	0.5	ug/L					
1,4-Dichlorobenzene	ND	0.5	ug/L					
1,1-Dichloroethane	ND	0.5	ug/L					
1,2-Dichloroethane	ND	0.5	ug/L					
1,1-Dichloroethylene	ND	0.5	ug/L					
cis-1,2-Dichloroethylene	ND	0.5	ug/L					
trans-1,2-Dichloroethylene	ND	0.5	ug/L					

Certificate of Analysis

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Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethylene, total	ND	0.5	ug/L					
1,2-Dichloropropane	ND	0.5	ug/L					
cis-1,3-Dichloropropylene	ND	0.5	ug/L					
trans-1,3-Dichloropropylene	ND	0.5	ug/L					
1,3-Dichloropropene, total	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Hexane	ND	1.0	ug/L					
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L					
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L					
Methyl Isobutyl Ketone	ND	5.0	ug/L					
Methyl tert-butyl ether	ND	2.0	ug/L					
Methylene Chloride	ND	5.0	ug/L					
Styrene	ND	0.5	ug/L					
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L					
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L					
Tetrachloroethylene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
1,1,1-Trichloroethane	ND	0.5	ug/L					
1,1,2-Trichloroethane	ND	0.5	ug/L					
Trichloroethylene	ND	0.5	ug/L					
Trichlorofluoromethane	ND	1.0	ug/L					
1,3,5-Trimethylbenzene	ND	0.5	ug/L					
Vinyl chloride	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: 4-Bromofluorobenzene	71.2		%	89.0	50-140			
Surrogate: Dibromofluoromethane	70.9		%	88.6	50-140			
Surrogate: Toluene-d8	76.1		%	95.1	50-140			

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Alkalinity, total	376	5	mg/L	379			1.0	10	
Ammonia as N	0.860	0.01	mg/L	0.855			0.5	18	
Dissolved Organic Carbon	10.1	0.5	mg/L	10.0			1.0	38	
Colour	9	2	TCU	9			0.0	20	
Colour, apparent	304	2	ACU	303			0.3	20	
Conductivity	1070	5	uS/cm	1100			3.1	5	
pH	7.4	0.1	pH Units	7.4			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	84.0	10	mg/L	74.0			NC	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	15	
Total Kjeldahl Nitrogen	0.45	0.1	mg/L	0.47			4.8	20	
Turbidity	40.5	0.1	NTU	40.6			0.2	10	
Metals									
Aluminum	0.011	0.001	mg/L	0.011			6.5	20	
Antimony	ND	0.0005	mg/L	ND			NC	20	
Arsenic	0.001	0.001	mg/L	0.001			1.6	20	
Barium	0.140	0.001	mg/L	0.149			6.1	20	
Beryllium	ND	0.0005	mg/L	ND			NC	20	
Boron	0.05	0.01	mg/L	0.04			1.7	20	
Cadmium	0.0002	0.0001	mg/L	0.0002			19.0	20	
Calcium	322	1.0	mg/L	364			12.2	20	
Chromium	ND	0.001	mg/L	ND			NC	20	
Cobalt	0.0153	0.0005	mg/L	0.0152			0.4	20	
Copper	0.0060	0.0005	mg/L	0.0060			1.1	20	
Iron	3.8	0.1	mg/L	3.8			0.5	20	
Lead	0.0003	0.0001	mg/L	0.0003			15.1	20	
Magnesium	112	0.2	mg/L	112			0.3	20	
Manganese	4.93	0.052	mg/L	6.19			22.7	20	QR-05
Molybdenum	0.0008	0.0005	mg/L	0.0008			0.5	20	

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Client PO:

Project Description: 100011.121

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Nickel	0.021	0.001	mg/L	0.021			0.3	20	
Potassium	11.9	0.1	mg/L	12.0			1.0	20	
Selenium	ND	0.001	mg/L	ND			NC	20	
Silver	ND	0.0001	mg/L	ND			NC	20	
Sodium	900	2.1	mg/L	830			8.1	20	
Thallium	ND	0.001	mg/L	ND			NC	20	
Uranium	0.0024	0.0001	mg/L	0.0025			0.9	20	
Vanadium	0.0009	0.0005	mg/L	0.0009			1.1	20	
Zinc	0.005	0.005	mg/L	0.006			1.5	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroethane	ND	1.0	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Chloromethane	ND	3.0	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dibromoethane	ND	0.2	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	0.51	0.5	ug/L	0.50			2.0	30	

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	71.5		%		89.4	50-140			
Surrogate: Dibromofluoromethane	77.0		%		96.2	50-140			
Surrogate: Toluene-d8	71.9		%		89.8	50-140			

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Ammonia as N	1.89	0.01	mg/L	0.855	103	85-115			
Dissolved Organic Carbon	19.4	0.5	mg/L	10.0	93.5	73-127			
Phenolics	0.025	0.001	mg/L	ND	99.1	80-120			
Total Dissolved Solids	106	10	mg/L	ND	106	78-115			
Sulphide	0.41	0.02	mg/L	ND	82.2	82-118			
Tannin & Lignin	0.8	0.1	mg/L	ND	77.3	75-125			
Total Kjeldahl Nitrogen	1.46	0.1	mg/L	0.47	98.3	75-125			
Metals									
Aluminum	52.4	0.001	mg/L	11.4	82.1	80-120			
Antimony	39.0	0.0005	mg/L	0.144	77.7	80-120			QM-07
Arsenic	46.3	0.001	mg/L	1.20	90.2	80-120			
Barium	186	0.001	mg/L	151	70.2	80-120			QM-07
Beryllium	33.7	0.0005	mg/L	0.0204	67.3	80-120			QM-07
Boron	42.0	0.01	mg/L	ND	84.1	80-120			
Cadmium	35.8	0.0001	mg/L	0.193	71.3	80-120			QM-07
Calcium	8100	0.1	mg/L	ND	81.0	80-120			
Chromium	60.9	0.001	mg/L	0.370	121	80-120			QM-07
Cobalt	67.5	0.0005	mg/L	15.2	105	80-120			
Copper	50.4	0.0005	mg/L	5.97	88.8	80-120			
Iron	5940	0.1	mg/L	3800	85.8	80-120			
Lead	34.6	0.0001	mg/L	0.348	68.5	80-120			QM-07
Magnesium	8400	0.2	mg/L	ND	84.0	80-120			
Manganese	45.5	0.005	mg/L	ND	91.0	80-120			
Molybdenum	49.2	0.0005	mg/L	0.821	96.7	80-120			
Nickel	67.9	0.001	mg/L	20.6	94.7	80-120			
Potassium	22100	0.1	mg/L	12000	101	80-120			
Selenium	36.3	0.001	mg/L	0.129	72.4	80-120			QM-07
Silver	28.1	0.0001	mg/L	0.0164	56.2	80-120			QM-07
Sodium	8740	0.2	mg/L	ND	87.4	80-120			
Thallium	38.6	0.001	mg/L	0.133	76.9	80-120			QM-07

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Uranium	41.8	0.0001	mg/L	2.47	78.7	80-120			QM-07
Vanadium	67.0	0.0005	mg/L	0.917	132	80-120			QM-07
Zinc	39.2	0.005	mg/L	5.58	67.2	80-120			QM-07
Volatiles									
Acetone	67.3	5.0	ug/L	ND	67.3	50-140			
Benzene	44.4	0.5	ug/L	ND	111	60-130			
Bromodichloromethane	31.3	0.5	ug/L	ND	78.2	60-130			
Bromoform	39.0	0.5	ug/L	ND	97.5	60-130			
Bromomethane	34.9	0.5	ug/L	ND	87.2	50-140			
Carbon Tetrachloride	35.9	0.2	ug/L	ND	89.8	60-130			
Chlorobenzene	35.3	0.5	ug/L	ND	88.2	60-130			
Chloroethane	35.5	1.0	ug/L	ND	88.7	50-140			
Chloroform	34.4	0.5	ug/L	ND	85.9	60-130			
Chloromethane	37.1	3.0	ug/L	ND	92.7	50-140			
Dibromochloromethane	32.3	0.5	ug/L	ND	80.8	60-130			
Dichlorodifluoromethane	39.5	1.0	ug/L	ND	98.8	50-140			
1,2-Dibromoethane	29.3	0.2	ug/L	ND	73.2	60-130			
1,2-Dichlorobenzene	32.3	0.5	ug/L	ND	80.8	60-130			
1,3-Dichlorobenzene	33.7	0.5	ug/L	ND	84.2	60-130			
1,4-Dichlorobenzene	32.1	0.5	ug/L	ND	80.2	60-130			
1,1-Dichloroethane	30.3	0.5	ug/L	ND	75.7	60-130			
1,2-Dichloroethane	34.1	0.5	ug/L	ND	85.2	60-130			
1,1-Dichloroethylene	35.5	0.5	ug/L	ND	88.8	60-130			
cis-1,2-Dichloroethylene	40.6	0.5	ug/L	ND	102	60-130			
trans-1,2-Dichloroethylene	30.4	0.5	ug/L	ND	76.0	60-130			
1,2-Dichloropropane	37.0	0.5	ug/L	ND	92.6	60-130			
cis-1,3-Dichloropropylene	37.9	0.5	ug/L	ND	94.7	60-130			
trans-1,3-Dichloropropylene	36.3	0.5	ug/L	ND	90.7	60-130			
Ethylbenzene	38.6	0.5	ug/L	ND	96.6	60-130			
Hexane	49.9	1.0	ug/L	ND	125	60-130			
Methyl Ethyl Ketone (2-Butanone)	95.8	5.0	ug/L	ND	95.8	50-140			

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Butyl Ketone (2-Hexanone)	74.9	10.0	ug/L	ND	74.9	50-140			
Methyl Isobutyl Ketone	84.3	5.0	ug/L	ND	84.3	50-140			
Methyl tert-butyl ether	81.6	2.0	ug/L	ND	81.6	50-140			
Methylene Chloride	36.1	5.0	ug/L	ND	90.4	60-130			
Styrene	37.8	0.5	ug/L	ND	94.4	60-130			
1,1,1,2-Tetrachloroethane	26.8	0.5	ug/L	ND	67.1	60-130			
1,1,2,2-Tetrachloroethane	30.9	0.5	ug/L	ND	77.2	60-130			
Tetrachloroethylene	36.4	0.5	ug/L	ND	91.1	60-130			
Toluene	38.3	0.5	ug/L	ND	95.8	60-130			
1,1,1-Trichloroethane	33.9	0.5	ug/L	ND	84.7	60-130			
1,1,2-Trichloroethane	31.3	0.5	ug/L	ND	78.2	60-130			
Trichloroethylene	34.7	0.5	ug/L	ND	86.7	60-130			
Trichlorofluoromethane	31.6	1.0	ug/L	ND	79.1	60-130			
1,3,5-Trimethylbenzene	41.4	0.5	ug/L	ND	104	60-130			
Vinyl chloride	36.7	0.5	ug/L	ND	91.7	50-140			
m,p-Xylenes	75.5	0.5	ug/L	ND	94.3	60-130			
o-Xylene	37.1	0.5	ug/L	ND	92.6	60-130			
Surrogate: 4-Bromofluorobenzene	63.4		%		79.3	50-140			
Surrogate: Dibromofluoromethane	75.1		%		93.9	50-140			
Surrogate: Toluene-d8	74.8		%		93.5	50-140			

Certificate of Analysis

Report Date: 08-Oct-2025

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Oct-2025

Client PO:

Project Description: 100011.121

Qualifier Notes:**Login Qualifiers :**

Sample - DOC not field filtered. The sample was filtered at the lab.

Applies to Samples: GW4296 6.5 hr

Sample Qualifiers :

5: Subcontracted analysis - Caduceon

QC Qualifiers:

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-05 Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



Client Name:	Gemtree	Project Ref:	1000 11.121	Waterworks Name:		Samples Taken By:	
Contact Name:	Andrus Paraskas	Quote #:		Waterworks Number:		Name:	Mich L.
Address:		PO #:		Address:		Signature:	[Signature]
After Hours Contact:		E-mail:	andrus.paraskas@gemtree.ca			Page	1 of 1
Telephone:	613 295 8425	Fax:		Public Health Unit:		Turn Around Time Required:	☒ 1 day ☐ 2 day ☐ 3 day ☐ 4 day

Samples Submitted Under: (Indicate ONLY one) ☐ ON REG 170/03 ☐ ON REG 319/08 ☐ Private Well ☐ ON REG 243/07 ☒ Other O REG 169/03				Sample Type: R = Raw ; T = Treated ; D = Distribution; P = Plumbing Source Type: G = Ground Water; S = Surface Water Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No				Required Analyses									
Have LSN forms been submitted to MOE/MOHLTC?: ☐ Yes ☐ No ☒ N/A Are these samples for human consumption?: ☒ Yes ☐ No All information must be completed before samples will be processed.				SAMPLE COLLECTED				Substances in Package have metals VOC's									
LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y/N	Resample	DATE	TIME	# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S/F (REG 243)	Total Coliform/E. Coli	HPC	Lead	THM			
(HOLD) → GW 4296 4hr	R G N N					2023-10-01	12:40 pm	12									
GW 4296 6.5hr	R G N N					2023-10-01	3:10 pm	12									
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments: Hold GW 4296 4hr Colour in ACU and TCU. Total and dissolved metals				Method of Delivery: WALK IN			
Relinquished By (Sign): [Signature]		Received By Driver/Depot: SO		Verified By: [Signature]		Date/Time: Oct 3 8:10	
Relinquished By (Print): Mich L.		Date/Time: Oct 2 8:46 am		Date/Time: Oct 3 8:10		pH Verified: ☐ By: [Signature]	
Date/Time: 8:46 am / Oct 2 2025		Temperature: °C		Temperature: 21.0 °C		pH Verified: ☐ By: [Signature]	



Manganese in Drinking Water Fact Sheet

WHAT IS MANGANESE?

Manganese is a naturally occurring element that is an essential nutrient for humans and animals. It is found in many foods, as well as in air, water, soil, and rocks.¹ Manganese makes up 0.1% of the Earth's crust, and can be found as a component of other minerals like sulfides, oxides, carbonates, and silicates.² Manganese is used in the manufacture of various products including iron and steel alloys, batteries, glass, fireworks, fertilizers, cosmetics, paints, and cleaning and disinfection products.^{1,2} Manganese can also be purchased as a nutritional supplement.²

HOW DOES MANGANESE GET INTO DRINKING WATER?

Manganese is naturally occurring in many surface and ground waters. Manganese can also be dissolved from soils, sand and rocks to enter surface and ground waters.¹ Human activities like mining, industrial discharges, or landfills may also contribute to manganese in surface and ground waters.^{1,2} In general, manganese can be found at higher concentrations in groundwater compared to surface water.² Some lakes and reservoirs can also have higher levels of manganese due to natural water chemistry.²

Permanganate, a compound that contains manganese, may also be added to water during the treatment of drinking water to remove other chemicals (e.g., for the removal of iron).^{2,3}

HOW DOES MANGANESE INTAKE AFFECT MY HEALTH?

Too much or too little manganese in your body can lead to health problems.

Manganese deficiency: Manganese deficiency is rare and symptoms are not well defined. Health effects observed in individuals with diets very low in manganese include skin rashes, slow nail growth, reduced bone density, loss of pigmentation in hair, and low cholesterol levels.²

Manganese excess: There are few reports of adverse health effects from people who ingest too much manganese from food and water.¹ Recent evidence reviewed by Health Canada indicates that high levels of manganese in drinking water may impact memory and learning, behaviour, and fine motor control in infants and young children.^{2,4} Formula-fed infants may be more susceptible to health risks if water with high concentrations of manganese is used to prepare formula. This is because infant brains are rapidly developing, they drink more water in proportion to their body weight, and they absorb more manganese and are less able to remove it from their bodies compared to other age groups.³ For adults

and older children, short term exposure to manganese in drinking water at levels slightly above the guideline is unlikely to cause negative health effects.³

Health Canada notes that exposure to manganese while showering (either through breathing in water vapour or absorption through skin) is likely to be negligible.²

WHAT ARE THE LEVELS OF MANGANESE FOUND IN CANADIANS?

For most Canadians, diet is the main source of manganese. The Canadian Health Measures Survey (CHMS) is a national survey that collects information about the general health of Canadians and includes measurements of chemicals in blood and urine samples.⁵ The objective of the chemical measurements in the CHMS survey is to establish baseline levels in the Canadian population. Given that manganese is an essential trace element, its presence in the blood and urine of Canadians is expected. Manganese in blood and urine can be interpreted as an indicator of exposure, but does not necessarily mean that health effects will occur.⁵ Data collected from 2007 to 2011 for the CHMS found that the average levels of manganese measured in the blood of people in the Canadian population (aged 3 to 79) ranged from 8.8 – 11 µg/L.⁶ More information on the CHMS and the levels of manganese in Canadians can be obtained by visiting the Canadian Biomonitoring Dashboard.⁶

ARE THERE STANDARDS FOR MANGANESE IN DRINKING WATER?

The Ontario Drinking Water Standard (ODWS) published in 2006 sets an aesthetic objective for manganese in drinking water at 0.05 mg/L.⁷ The aesthetic objective is not intended to prevent health effects (e.g., not a health-based standard), but instead is intended to prevent the discolouration and staining of fixtures, and the undesirable taste caused by higher levels of manganese in water.

The Canadian Drinking Water Guideline for manganese developed by Health Canada stipulates a maximum acceptable concentration (MAC) in drinking water of 0.12 mg/L and an aesthetic objective of 0.02 mg/L.² The MAC is a health-based value intended to be protective of neurological effects in infants, the most sensitive population, and therefore it is also protective for chronic exposure in children and adults.²

ARE THERE OTHER STANDARDS OR GUIDELINE VALUES FOR MANGANESE?

The main source of exposure to manganese is via food, with grains, nuts and vegetables contributing the most to a person's daily intake of manganese. The average dietary intakes of manganese across all age groups according to the Canadian Total Diet Study (TDS) were estimated to range between 44.0 to 61.3 µg/kg of bodyweight per day (based on data gathered from different Canadian cities for the TDS).² Health Canada has also established Adequate Intake Levels for manganese ranging with age or lifestage from 0.003 to 2.6 mg/day and Tolerable Upper Intake Levels ranging from 2 to 11 mg/day.⁸

Infant formula sold in Canada is regulated to contain a minimum of 5 µg of manganese per 100 available kilocalories (equivalent to 3.33 µg per 100 mL of ready-to-feed formula); a maximum amount of manganese has not been set for infant formula.⁹

HOW CAN I TELL IF MY DRINKING WATER HAS HIGH MANGANESE LEVELS?

Water testing is the only way to know if manganese is present. Although water with elevated levels of manganese may impart a bitter metallic taste, tint water purplish brown or black (water discolouration may occur at concentrations as low as 0.005 to 0.02 mg/L), and stain laundry and plumbing fixtures;^{2,10,11} but these issues can also be caused by other chemicals.

WHAT SHOULD I DO IF A HIGH LEVEL OF MANGANESE IS FOUND IN MY WELL WATER?

For households who do not obtain their drinking water from a municipal source, a residential drinking water treatment device may be an option to reduce manganese concentrations in drinking water. Options can be explored with professionals specialized in water treatment, but examples of treatment processes effective at removing manganese include reverse osmosis, ion exchange (including water softeners and other cation exchange systems) and oxidizing filters.² As with any water treatment system, it is important to follow the manufacturer's recommendations for operation and maintenance (e.g., replacement of filter media).

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Please note: This fact sheet was created by Ottawa Public Health in consultation with Public Health Ontario.

Manganese in Drinking Water Fact Sheet [Last updated: September 12, 2024]



Fiche de renseignements sur le manganèse dans l'eau potable

QU'EST-CE QUE LE MANGANÈSE?

Le manganèse est un élément naturel qui constitue un nutriment essentiel pour les humains et les animaux. On le trouve dans de nombreux aliments, ainsi que dans l'air, l'eau, le sol et les roches.¹ Le manganèse représente 0,1 % de la croûte terrestre et peut être présent dans d'autres minéraux tels que les sulfures, les oxydes, les carbonates et les silicates.² Le manganèse est utilisé dans la fabrication de divers produits, notamment les alliages de fer et d'acier, les batteries, le verre, les feux d'artifice, les engrais, les cosmétiques, les peintures et les produits de nettoyage et de désinfection.^{1,2} Le manganèse peut également être acheté sous forme de supplément alimentaire.²

COMMENT LE MANGANÈSE SE RETROUVE-T-IL DANS L'EAU POTABLE?

Le manganèse est naturellement présent dans de nombreuses eaux de surface et souterraines. Le manganèse peut également être dissous à partir des sols, du sable et des roches et pénétrer dans les eaux de surface et souterraines.¹ Les activités humaines telles que l'exploitation minière, les rejets industriels ou les décharges peuvent également contribuer à la présence de manganèse dans les eaux de surface et les eaux souterraines.^{1,2} En général, les concentrations de manganèse sont plus élevées dans les eaux souterraines que dans les eaux de surface.² Certains lacs et bassins peuvent également présenter des niveaux plus élevés de manganèse en raison de la chimie naturelle de l'eau.²

Le permanganate, un composé qui contient du manganèse, peut également être ajouté à l'eau pendant le traitement de l'eau potable pour éliminer d'autres produits chimiques (par exemple, pour éliminer le fer).^{2,3}

COMMENT LA CONSOMMATION DE MANGANÈSE AFFECTE-T-ELLE MA SANTÉ?

Un excès ou un manque de manganèse dans l'organisme peut entraîner des problèmes de santé.

Carence en manganèse : La carence en manganèse est rare et les symptômes ne sont pas bien définis. Les effets sur la santé observés chez les personnes ayant une alimentation très pauvre en manganèse comprennent des éruptions cutanées, une croissance lente des ongles, une densité osseuse réduite, une perte de pigmentation des cheveux et un faible taux de cholestérol.²

Excès de manganèse : Peu de rapports font état d'effets néfastes sur la santé des personnes qui consomment trop de manganèse provenant des aliments et de l'eau.¹ Des éléments de preuves récents

examinés par Santé Canada indiquent que des niveaux élevés de manganèse dans l'eau potable peuvent avoir des répercussions sur la mémoire et l'apprentissage, le comportement et le contrôle de la motricité fine chez les nourrissons et les jeunes enfants.^{2,4} Les bébés nourris à l'aide de préparations pour nourrissons peuvent être davantage exposés à des risques pour la santé si de l'eau contenant de fortes concentrations de manganèse est utilisée pour préparer les biberons. En effet, le cerveau des nourrissons se développe rapidement, ils boivent plus d'eau par rapport à leur poids corporel, ils absorbent plus de manganèse et sont moins aptes à l'éliminer de leur corps que les autres groupes d'âge.³ Pour les adultes et les enfants plus âgés, une exposition à court terme au manganèse dans l'eau potable à des niveaux légèrement supérieurs à ceux des directives ne devrait pas avoir d'effets négatifs sur la santé.³

Santé Canada note que l'exposition au manganèse sous la douche (soit par l'inhalation de vapeur d'eau ou par l'absorption par la peau) est probablement négligeable.²

QUELS SONT LES NIVEAUX DE MANGANÈSE CHEZ LES CANADIENS?

Pour la plupart des Canadiens, l'alimentation est la principale source de manganèse. L'Enquête canadienne sur les mesures de la santé (ECMS) est une enquête nationale qui recueille des renseignements sur la santé générale des Canadiens et comprend la mesure des substances chimiques dans des échantillons de sang et d'urine.⁵ L'objectif de la mesure des substances chimiques effectuée dans le cadre de l'ECMS est d'établir des niveaux de référence dans la population canadienne. Le manganèse étant un oligo-élément essentiel, sa présence dans le sang et l'urine des Canadiens est attendue. La présence de manganèse dans le sang et l'urine peut être interprétée comme un indicateur d'exposition, mais ne signifie pas nécessairement qu'il y aura des effets sur la santé.⁵ Les données recueillies de 2007 à 2011 dans le cadre de l'ECMS ont révélé que les taux moyens de manganèse sanguin de la population canadienne (personnes âgées de 3 à 79 ans) allaient de 8,8 à 11 µg/L.⁶ De plus amples renseignements sur l'ECMS et les niveaux de manganèse chez les Canadiens peuvent être obtenus en consultant le Tableau de bord sur la biosurveillance canadienne.⁶

Y A-T-IL DES NORMES POUR LE MANGANÈSE DANS L'EAU POTABLE?

Les Normes de qualité de l'eau potable de l'Ontario publiées en 2006 fixent un objectif d'ordre esthétique pour le manganèse dans l'eau potable à 0,05 mg/l.⁷ Cet objectif n'est pas destiné à prévenir les effets sur la santé (il ne s'agit pas d'une norme liée à la santé), mais plutôt à prévenir la décoloration et la coloration des appareils sanitaires, ainsi que le goût indésirable causé par des niveaux élevés de manganèse dans l'eau.

Les Recommandations pour la qualité de l'eau potable au Canada établissent une concentration maximale acceptable (CMA) de 0,12 mg/L pour le manganèse dans l'eau potable et un objectif d'ordre esthétique de 0,02 mg/L.² La CMA est une valeur basée sur la santé qui vise à protéger les effets neurologiques chez les nourrissons, la population la plus sensible. De ce fait, elle vise également à protéger les enfants et les adultes en cas d'exposition chronique.²

EXISTE-T-IL D'AUTRES NORMES OU DIRECTIVES POUR LE MANGANÈSE?

La principale source d'exposition au manganèse est l'alimentation, les céréales, les noix et les légumes. Ces aliments contribuent le plus à l'apport quotidien en manganèse. Selon l'étude canadienne sur l'alimentation totale (EAT), les apports alimentaires moyens en manganèse pour tous les groupes d'âge ont été estimés entre 44,0 et 61,3 µg/kg de poids corporel par jour (d'après les données recueillies dans différentes villes canadiennes dans le cadre de l'EAT).² Santé Canada a également établi des apports suffisants en manganèse allant de 0,003 à 2,6 mg/jour en fonction de l'âge ou de l'étape de la vie et l'apport maximal tolérable (AMT) allant de 2 à 11 mg/jour.⁸

Les préparations pour nourrissons vendues au Canada sont réglementées et doivent contenir au minimum 5 µg de manganèse pour 100 kilocalories utilisables (ce qui équivaut à 3,33 µg pour 100 ml de préparations prêtes à servir); aucune quantité maximale de manganèse dans les préparations pour nourrissons n'a été établie.⁹

COMMENT PUIS-JE SAVOIR SI MON EAU POTABLE PRÉSENTE DES NIVEAUX ÉLEVÉS DE MANGANÈSE?

L'analyse de l'eau est le seul moyen de savoir si elle contient du manganèse. Cependant, l'eau contenant des niveaux élevés de manganèse peut avoir un goût métallique amer, une couleur pourpre, brune ou noire (la décoloration de l'eau peut se produire à des concentrations aussi faibles que 0,005 à 0,02 mg/L), et peut tacher la lessive et les appareils sanitaires.^{2,10,11} Ces problèmes peuvent également être causés par d'autres produits chimiques.

QUE DOIS-JE FAIRE SI UN NIVEAU ÉLEVÉ DE MANGANÈSE EST DÉTECTÉ DANS L'EAU DE MON PUIS?

Pour les ménages qui ne s'approvisionnent pas en eau potable auprès d'une source municipale, un dispositif résidentiel de traitement de l'eau potable peut être une option pour réduire les concentrations de manganèse dans l'eau potable. Les options peuvent être étudiées avec des professionnels spécialisés dans le traitement de l'eau, mais des exemples de procédés de traitement efficaces pour éliminer le manganèse comprennent l'osmose inversée, l'échange d'ions (y compris les adoucisseurs d'eau et d'autres systèmes d'échange de cations) et les filtres oxydants.² Comme pour tout système de traitement de l'eau, il est important de suivre les recommandations du fabricant en matière de fonctionnement et d'entretien (par exemple, le remplacement du matériau filtrant).

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Remarque : le contenu de cette fiche de renseignements a été fourni par Santé publique Ontario et adopté par Santé publique Ottawa aux fins d'utilisation dans les documents de communication sur les risques du bureau de santé publique.

Fiche de renseignements sur le manganèse dans l'eau potable [Dernière mise à jour : le 12 septembre 2024]

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité

