



GEMTEC

www.gemtec.ca

**Hydrogeological Investigation &
Terrain Analysis
Proposed Lot Line Adjustment
106 & 122 Reis Road
Ottawa (Carp), Ontario**



January 30, 2024

File: 100165.024

1694027 Ontario Inc.
106 Reis Road
Carp, Ontario
K0A 1L0

Attention: Arthur Goveas

**Re: Hydrogeological Investigation and Terrain Analysis
Proposed I Lot Line Adjustment
106 and 122 Reis Road, Ottawa (Carp), Ontario**

This letter presents the results of a scoped hydrogeological investigation and terrain analysis carried out as part of a proposed commercial lot line adjustment at 106 and 122 Reis Road, Ottawa (Carp), Ontario.

1.0 INTRODUCTION

Based on pre-consultations with the City of Ottawa (email received by Tracy Zander on October 4, 2022) and technical consultations held on February 22 and June 22, 2023, a scoped hydrogeological investigation is required for the proposed lot-line adjustment of 106 and 122 Reis Road.

The property at 122 Reis Road is approximately 0.85 hectares in size, while the property at 106 Reis Road is approximately 0.99 hectares in size. The proposed lot line adjustment involves removing a 0.28-hectare parcel of the land from 122 Reis Road and adding it to the 106 Reis Road lot (refer to Figure 1 in Appendix A). The adjusted lot size after the proposed lot line adjustment would be approximately 0.57 hectares for 122 Reis Road, and 1.26 hectares for 106 Reis Road.

The "Site", referring to lots 106 and 122 Reis Road, is bounded to the south by Reis Road, Carp Road to the west, vacant rural commercial/industrial lots to the north and a commercial/industrial lot to the east (Figure 1).

The objective of the investigation presented herein is:

- To demonstrate that the quality of the well water meets the Ontario Drinking Water Standards and maximum treatable limits prescribed in Ontario Ministry of Environment, Conservation and Parks (MECP) Procedure D-5-5;
- To demonstrate that the quantity of water meets the MECP requirements; and,
- To demonstrate the septic impact assessment meets the City of Ottawa Carp Road Corridor Nitrate Impact Assessment Recommendations and MECP D-5-4 requirements.

2.0 BACKGROUND

2.1 Background Report Review

The Site is located within the Carp Road Corridor, which is an industrial business park that is located along a segment of Carp Road between March Road and Rothbourne Road in Ottawa (Carp), Ontario.

A number of background reports related to the Carp Road Corridor were reviewed as part of the investigation, including: “Carp Road Corridor – Nitrate Impact Assessment Recommendations” dated September 27, 2016. The document provides additional guidance for the application of MECP guideline D-5-4 within the Carp Road Corridor. Within the Carp Road Corridor, nitrogen reduction treatment systems can be incorporated into the nitrate impact assessment. Additionally, of the septic demand can be estimated by the number of users at 75 litres per day per user.

2.2 Technical Consultations

Technical consultations were held between GEMTEC and the City of Ottawa on February 22 and June 22, 2023. A summary of the meetings is found below:

- Water Quantity and Quantity Assessment
 - It is understood that a new well was drilled (June 2022) to supply the existing development at 122 Reis Road, and that the new well is connected to the development and is in use. Due to the site-specific situation, revised water quantity and quality testing requirements are as follows:
 - Report must include water quantity assessment based on driller’s pump test on MECP water well record, nearby technically representative well driller pump tests (if available), and a description of existing water use with statement and professional opinion that water quantity has been sufficient for the development.
 - Water quality testing is required, which includes subdivision package parameters, trace metals, and volatile organic compounds (VOCs).
 - The water quantity and quality assessment is dependent on the assertion that the current water demand is not going to increase following the property shift.
- Nitrate Impact Assessment
 - Both developments on 122 and 106 Reis Road have existing conventional septic systems. A septic impact assessment is required on both lots to confirm sufficient nitrate dilution and protection of the supply aquifer; issues may be expected due to the high percentage of impermeable surface.
 - Since the site lies within the Carp Road Corridor, the nitrate impact assessment calculation can be completed based on the City memo entitled: Carp Road Corridor -Nitrate Impact Assessment Recommendations, dated September 2016.

- Advanced treatment septic systems can be considered.
- The maximum allowable septic flow calculation can use the reasonable maximum number of employees as the septic flow in the nitrate dilution calculation, rather than the existing septic size. Each employee's assumed usage is 75 litres per day.
- The nitrate impact assessment assumes that the number of employees for each lot will not increase following the lot line adjustment.

3.0 TERRAIN ANALYSIS

3.1 Site Features, Topography, Drainage and Potential Sources of Contamination

The Site consists of industrial properties with two existing structures that are currently being operated as stone working business, both which have existing domestic wells and conventional septic beds. The majority of the Site consists of cleared lands and gravel parking/storage areas, with a drainage easement running along the northern portion of the Site.

The Site is located within the Carp River Subwatershed of the Mississippi River Watershed.

Topographic mapping data indicates that elevations across the property is generally flat, and ranges from approximately 113 to 115 metres above sea level. The Site is expected to be graded to the southeast, towards Reis Road. Regional topography indicates a down sloping in elevation towards the northeast, in the direction of the Ottawa River. The Mississippi-Rideau Source Protection Area Report (MVRVCA, 2011), indicates groundwater table elevations decrease towards the Ottawa River to the northeast. Shallow groundwater flow directions are expected to follow local topography and grading, and therefore flow towards the southeast.

Potential sources of contamination include septic systems, agricultural land use, road salt and commercial/industrial activity.

3.2 Surficial Geology

Surficial geology maps of the Ottawa area (Ontario Geologic Survey, 2010) indicate that the Site is underlain by coarse-textured glaciomarine deposits consisting of sand, gravel, and minor silt and clay. Bedrock geology maps (Armstrong and Dodge, 2007) indicate that bedrock is comprised of interbedded limestone and shale of the Verulam Formation at depths ranging between 3 and 10 metres. Available karst mapping (Brunton and Dodge, 2008) indicate the presence of potential karst, located approximately 400 meters south of the Site, which is associated with limestones of the Bobcaygeon Formation.

3.3 Water Well Records Review

A search of the Ministry of Environment, Conservation and Parks (MECP) water well records database indicated that 66 well records were available within approximately 500 meters of the

Site. Of the records, 31 are domestic water supply wells, 11 are monitoring wells, 9 are not used, 8 are for commercial use, 6 are test holes, and the well use is not reported for 1 well. A summary for the well records within 500 meters of the site is included in Appendix B, and the locations of the water wells are displayed in Figure 1.

A review of the water well records within 500 meters was performed. Records indicated that water well depths range between 5.9 and 85.6 meters below ground surface (10th and 90th percentile, m bgs), with an average depth of 43 m bgs. The depth to bedrock ranges from 2.7 to 13.9 m bgs (10th and 90th percentile), with an average value of 8.9 m bgs. The casing lengths range from 3.0 to 16.5 m bgs (10th and 90th percentile), with an average value of 10.6 meters

Well records indicated that the surrounding overburden is composed mostly of sand, clay, and gravel with traces loam and silt. The bedrock encountered by the wells is primarily limestone and dolostone, with some shale.

4.0 GROUNDWATER SUPPLY

A groundwater supply investigation was carried out in general accordance with MECP Procedure D-5-5 Technical Guideline for Private Wells: Water Supply Assessment, and consultation meetings held with City of Ottawa hydrogeologists on February 22 and June 22, 2023, to determine the quantity and quality of groundwater available for commercial water supply. The results of the groundwater supply investigation are summarized in the following sections.

4.1 Groundwater Quantity

An existing water supply well, PW-122, located at 122 Reis Road lot was used to evaluate water quantity on the Site (MECP ID: A320528). The well construction details are summarized in Table 1 below, and the MECP water well record is found in Appendix C. The location of PW-122 is displayed in Figure 2. Information related to other existing water supply wells on the Site is displayed in Table 1, and the well locations are displayed in Figure 2.

Table 1: Water Well Construction Details

Well Construction Details	PW-122 (A320528)	PW-122 – Old Well (1532401)	PW 106 (A055265)
Depth to Bedrock	7.01 metres	7.16 metres	8.84 metres
Length of Well Casing Above Ground Surface	0.66 metres	-	0.48 metres

Well Construction Details	PW-122 (A320528)	PW-122 – Old Well (1532401)	PW 106 (A055265)
Length of Well Casing Below Ground Surface	7.62 metres	7.62 metres	10.67 metres
Depth Water Found (i.e. depth to major fractures observed, m bgs)	6.40, 11.6, 48.8 metres	7.62, 13.7 metres	69.16 metres
Total Well Depth	49.7 metres	15.24 metres	73.15 metres
Bedrock Description	Limestone	Limestone	Limestone

The groundwater quantity requirements for each property were estimated based on septic requirements, being 75 litres per day per employee. It is understood that 106 and 122 Reis Road currently have 12 and 5 employees respectively. Assuming the water demand is equal to two times the septic demand (no other reported water consumption for either property), the daily water quantity for 106 and 122 Reis Road is 1,800 and 750 litres per day respectively.

PW-106 is currently servicing the development at 106 Reis Road, and based on an interview with the property owner, the water quantity is sufficient to support the needs of the 12 employees at the property.

It is understood that PW-122 is currently servicing the development at 122 Reis Road, and that the water quantity has been sufficient since connection in June 2022 (interview completed with owner). To further assess water quantity requirements for 122 Reis Road, the adjusted specific capacity and well yield were calculated for PW-122 (refer to Appendix D) based on the 1-hour well yield test from the well record. The methodology developed in Risser et al, 2010 was used to calculate these water quantity parameters. The adjusted specific capacity of PW-122 was calculated to be 1.16 L/min/m, and the well yield was calculated to be 68.25 L/min. Based on the well yield of 68.25 L/min, the maximum daily well production considering an 8-hour day would be 32,760 litres per day (68.25 L/min x 60 mins/hr x 8 hrs).

Following the lot-line adjustment, PW-122 (Old Well) will be located within the property boundaries of 106 Reis Road. Based on information provided by the client, the well will be used as a back-up, limited use well. It is recommended that the well is inspected and maintained in accordance with O.reg. 903.

Given the analyses presented above, it is our professional opinion that the water supply aquifer is capable of providing sufficient water quantity for typical commercial developments in the area (i.e., water demands two times the anticipated septic flows).

4.2 Groundwater Quality

Based on the technical consultations held between GEMTEC and the City of Ottawa on February 22 and June 22, 2023, it is understood that a water quality assessment of the new well connected to the development at 122 Reis Road (PW-122) is sufficient for this investigation. The water quality of the existing well servicing 106 Reis Road was not tested, but an interview with the property owner was conducted. The owner reported that the water quality of the well servicing 106 Reis Road is good, and that there is a sulfur smell in the water pre-treatment, but that the drinking water does not have a sulfur smell post-treatment.

The groundwater samples were collected from the pressure tank bypass at 122 Reis Road, after running the tap for a minimum of 10 minutes. Water quality samples were submitted for laboratory analysis of septic indicator parameters on November 23, 2023, and ‘subdivision package’ parameters, trace metals, and volatile organic compounds (VOCs) on June 28, 2023. The field and laboratory water quality results are provided in Appendix D.

Total chlorine tests were conducted in the field during all sampling events using a Hach DR 900 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 and are summarized in Appendix D. The field equipment used during the sampling is calibrated by GEMTEC and the details of field equipment are provided in Table 3.

Table 3: Field Equipment Overview

Field Parameters	Manufacturer	Model No.	Detection Limit
Total and Free Chlorine	Hach	DR 900	0.02 mg/L
pH, temperature, Conductivity	Hanna	HI 98129	-
Turbidity	Hanna	HI 98703	0.05 NTU
Colour	Hach	DR 900	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, 7.0 and 10.0 pH solutions (within 5%).
3. Hanna HI98703 calibration check using <0.10, 15.0, 100 NTU (within 5%).

The laboratory certificates of analysis and summary of laboratory results are provided in Appendix D. The following comments are provided regarding the drinking water quality and exceedances of the ODWQS:

4.2.1 Bacteriological Results

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

The results of the bacteriological analysis for PW-122 on June 23, 2023 indicated non-detectable concentrations of indicator species E.coli, fecal coliforms and total coliforms.

Based on the bacteriological testing, the water is suitable for consumption.

4.2.2 Chemical Results

The results of the chemical testing on the water samples indicate the operational guideline for hardness, and the aesthetic objectives for sulphide, iron, manganese, chloride, turbidity, total dissolved solids and colour, and the maximum acceptable concentration of barium were exceeded in the water samples.

The above noted exceedances of PW-122 from the samples collected on June 28, 2023 (and November 23, 2022, when mentioned) are discussed in the follow sections:

Hardness

The hardness concentration was reported to be 487 mg/L and 432 mg/L as CaCO₃ on November 23, 2022 and June 23, 2023 respectively, which exceeds the ODWQS operational guideline for hardness between 80-100 mg/L. Water having a hardness above 100 milligrams per litre as CaCO₃ is often softened for domestic use. Water softeners are widely used throughout rural areas to treat hardness and there is no upper treatable limit for hardness. The ODQWS indicates that hardness levels exceeding 200 mg/L as CaCO₃ is considered poor but tolerable and hardness levels exceeding 500 mg/L as CaCO₃ is considered to be unacceptable for most domestic purposes.

Water softening by conventional sodium ion exchange water softeners that use sodium chloride may introduce relatively high concentrations of sodium into the drinking water, which may be of concern to persons on a sodium restricted diet. The use of potassium chloride in the water softener (which adds potassium to the water instead of sodium) could be considered as a means of keeping sodium concentrations in softened water at the background level. Alternatively, consideration could be given to providing a cold-water bypass water line for drinking water purposes that is not treated by a water softener.

Sulfide

The sulphide concentration was reported to be 0.27 mg/L, which exceeds the ODQWQS odour-related aesthetic objective of 0.05 mg/L as hydrogen sulphide. Sulphide can be related to an unpleasant odour and taste, and can produce black stains on laundered items, pipes and fixtures. Although ingestion of large quantities of hydrogen sulphide can produce toxic effects on humans, it is not likely that an individual would ingest a harmful dose in drinking water because of the taste and odour.

Low levels of sulphide can be removed effectively using aeration (oxidation with filtration) or chlorinating the water followed by sand or multimedia filtration. According to the MECP Procedures D-5-5: Private Wells: Water Supply Assessment, there is no maximum treatable limit for sulphide.

Iron

The iron concentration was reported to be 1.2 mg/L, which exceeds the ODWQS aesthetic objective of 0.3 mg/L. Elevated levels of iron may cause staining to plumbing fixtures and laundry. However, the iron levels are below the maximum treatable limits of 10.0 mg/L provided in Table 3 of the MECP Guideline D-5-5. Water softeners and/or manganese greensand filters are recommended for iron treatment in Table 3 of the MECP Guideline for concentrations less than 5.0 mg/L.

Manganese

The manganese concentration was reported to be 0.134 mg/L, which exceeds the ODWQS aesthetic objective of 0.05 mg/L, and the Health Canada (2019) maximum acceptable concentration of 0.12 mg/L. Elevated concentrations of manganese may cause staining to plumbing fixtures and laundry, and at higher concentrations, may have neurological effects in children.

The manganese levels are within the maximum treatable limits of 10.0 mg/L provided in Table 3 of the MECP Guideline D-5-5. Water softeners and/or manganese greensand filters are recommended for manganese treatment in Table 3 of the MECP Guideline for concentrations less than 1.0 mg/L.

Chloride

The chloride concentration was reported to be 326 mg/L and 313 mg/L on November 23, 2022 and June 28, 2023 respectively, which exceeds the ODWQS aesthetic objective and maximum concentration considered to be reasonably treatable (MCCRT) of 250 mg/L. Chloride levels above 250 mg/L produces a detectable salty taste. The source of elevated chloride was not determined; chloride is naturally occurring, generally in the form of sodium, potassium and calcium salts and can also be the result of road salt or softener softs.

Turbidity

The turbidity was reported to be 11.5 NTU, which exceeds the ODWQS aesthetic guideline of 5 NTU. Turbidity is impacted by various factors that the sample is subjected to from the time of sampling to time of analysis (e.g precipitation of metals, change in temperature, exposure to oxygen). Field measurements for turbidity are therefore considered more representative of in-situ water conditions than laboratory analysis, in which turbidity was measured to be 4.04 NTU. Given the high iron concentrations of 1.2 mg/L, it is our professional opinion that the high laboratory turbidity was the result of iron precipitation.

Total Dissolved Solids

Total dissolved solids was reported to be 948 mg/L, which exceeds the ODWQS aesthetic objective of 500 mg/L. Total dissolved solids refer to inorganic substances such as chloride, sulphates, calcium, magnesium, and bicarbonates that are dissolved in water.

Elevated levels of TDS can lead to problems associated with encrustation and corrosion. To determine the corrosive nature of the groundwater, the Langelier Saturation Index (LSI) was calculated for the samples obtained from the well. These values are based on the TDS, field measured temperature, pH, alkalinity, and calcium observed in the sample. The LSI was calculated to be 0.44, indicating that the water is slightly scale forming but noncorrosive. The LSI calculations are displayed in Appendix E.

As per the “Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines”, TDS levels in excess of 500 mg/L may result in excessive hardness, taste, mineral deposition or corrosion. According to the “Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Total Dissolved Solids (TDS)”, published by Health Canada (1991), TDS levels between 600 and 900 mg/L are considered to be ‘fair’. At levels above 1,200 mg/L, the palatability of drinking water is ‘unacceptable’. The palatability of the drinking water is expected to be acceptable, although some water taste may occur as the palatability is classified as ‘fair’.

Colour

True colour (filtered) was reported to be 9 TCU, which exceeds the ODWQS aesthetic objective of 5 true colour units (TCU). Water can have a faint yellow/brown colour, which is often caused by iron and manganese compounds originating in natural sediments or aquifers.

The apparent colour (unfiltered) field measurements during sampling were reported to be 10 TCU, where as the lab reported apparent colour was reported to be 72, suggesting an increase in colour between the time of sampling and laboratory analysis. Samples are subjected to various factors between time of sampling and laboratory analysis (e.g. change in temperature, exposure to atmospheric oxygen partial pressure), which can cause metals such as iron and manganese to precipitate out of solution.

As such, in-situ water colour is expected to be much lower than reported by the laboratory analysis. In addition, iron and manganese treatment is expected to greatly reduce water colour. Water softeners and/or manganese greensand filters are recommended for iron and manganese treatment in Table 3 of the MECP Guideline.

Barium

The barium concentration was reported to be 1.07 mg/L on June 28, 2023, which exceeds the ODWQS maximum acceptable concentration of 1 mg/L. A substantial source of barium in groundwater can occur from leaching and eroding of barium from sedimentary rocks (i.e., the Limestone water supply aquifer).

As noted in the ODWQS most treatment methods used for water softening are effective for barium removal (MECP, 2006; Health Canada, 2018).

5.0 GROUNDWATER IMPACTS

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

5.1 Hydrogeological Sensitivity

Areas of thin soils cover, highly permeable soils, and fractured bedrock exposed at ground surface can contribute to hydrogeological sensitivity, which may not allow for sufficient attenuative processes for on-site septic systems and negatively impact the receiving aquifer. Areas of thin soil cover, generally taken to be less than two metres, or highly permeable soils were not encountered at the Site.

Based on the three Site water well records, the overburden thickness ranges from approximately 7.01 to 8.84 metres. The water well records indicate the site is underlain by coarse grained soils consisting of sands and gravels, which is consistent with geologic mapping indicating coarse-textured glaciomarine deposits consisting of sand, gravel, and minor silt and clay. Given the potential for highly permeable soils, the Site may be hydrogeologically sensitive and protective measures should be considered if a new well is drilled on the Site, or a change to the existing septic system is required. It is recommended that the storage of potentially contaminating items such as fuel tanks or fill be placed a minimum of 15 meters from water supply wells on the Site.

5.2 D-5-4 Three-Step Assessment

The potential risk to groundwater resources on and off the Site was assessed in accordance with Ministry of Environment Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment. To evaluate the groundwater impacts, Step Three of the Three-Step Assessment Process outlined in MECP Procedure D-5-4 was followed.

5.2.1 Nitrate Dilution Calculations for Commercial / Industrial Developments

Where it cannot be demonstrated that the effluent is hydrogeologically isolated from the water supply aquifer, the risk of individual on-site septic systems will be assessed using nitrate-nitrogen contaminant loading for commercial/industrial properties. The maximum allowable concentration of nitrate in the groundwater at the boundaries of the subject property is 10 milligrams per litre as per the Ministry of the Environment, Conservation and Parks guideline D-5-4, dated August 1996.

The nitrate concentration at the Site was calculated using the following information:

- Lot area:
 - 106 Reis Road (proposed – lot addition): 12,736 m²;
 - 122 Reis Road (proposed – lot removal): 5,673 m²;
- Infiltration factors and water holding capacity of soils (WHC) based on information obtained from Table 3.1 of the Ministry of Environment Stormwater Management Planning and Design Manual, dated March 2003;
- Hard surface coverage of the Site was established based on a detailed survey completed.
- Soil Factor of 0.4, which represents open sandy loam;
- Cover Factor of 0.1 for cultivated land;
- Topography Factor of 0.2, representative of rolling land with an average slope of 2.8 to 3.8 m/km;
- Non-detectable background nitrate concentrations;
- Water holding capacity: 75 mm for urban lawns / shallow rooted crops, fine sandy loam soil;
- An annual water surplus of 0.383 metres/year for soils with a water holding capacity of 75 mm;
 - Carleton + Appleton Weather Station (1939-2020). Water surplus datasheet provided in Appendix F;
- The use of advanced treatment systems in the construction of the septic systems at the industrial lot, capable of reducing the concentration of nitrate in the effluent exiting the treatment unit to a maximum of 20 mg/L (this concentration value was utilized when re-simplifying the formula provided in D-5-4 for the purpose of determining the factor used to determine the maximum allowable flow for each lot from the determined available infiltration volume. The factor becomes 1 versus 3 as is the case without advanced treatment).

The available infiltration will be dependant upon the hard surface areas, and as a result, will determine the maximum allowable septic flows. A series of maximum allowable septic flows calculations are presented based on the the proposed hard surface areas (Table 4).

Table 4: Calculated Maximum Septic Flows – Proposed Lot Addition

Hard Surface Area (%) ¹	Maximum allowable septic flow		Maximum Number of Users ²	
	Conventional Septic	Advanced Septic ¹ (50% nitrate reduction)	Conventional Septic	Advanced Septic ¹ (50% nitrate reduction)
106 Reis (62%)	1,175	3,524	16	47
122 Reis (74%)	363	1,089	5	15

Notes

1. Existing hard surface coverage provided by McIntosh Perry in CAD format.
2. Maximum number of users calculated based on a septic usage of 75 L/day per person.

After the lot-line adjustment, 122 Reis Road would have a hard surface area coverage of 74%, based on the Site survey completed (refer to Figure 3). The proposed parcel can support 363 L/day and 5 employees using a conventional septic, which is sufficient to support the current property demands of 375 L/day and 5 employees.

After the addition of the proposed land parcel, 106 Reis Road would have a hard surface area coverage of 62%, based on the Site survey completed. The proposed parcel can support 1175 L/day and 16 employees using a conventional septic, which is sufficient to support the current property demands of 875 L/day and 12 employees.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

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

- The soils on the Site are mapped as sand and gravel with some clay and silt. The overburden thickness is expected to range from approximately 7.01 to 8.84 metres, according to the MECP water well records for the Site wells. No thin soils, or exposed bedrock were observed on the Site. Given the presence of highly permeable soils (coarse-grained sand and gravel), the Site may be hydrogeologically sensitive and protective measures should be considered.
- The water supply aquifer can be characterized as limestone bedrock of the Verulam Formation based on available mapping resources and MECP water well records within 500 meters of the Site. The three on site wells (Appendix A, Figure 2) were reported to be completed in limestone on the corresponding water well records (interpreted to be the Verulam Formation).

- The water supply aquifer has sufficient groundwater quantity for commercial use.
 - 122 Reis: Well yield was calculated to be 68.25 L/min, or 32,760 L/day, which is expected to be sufficient for proposed commercial use, with estimated water demands of two times the maximum septic flow of 1350 L/day.
 - 122 Reis: Further, based on interview completed with the test well user (tenant at 122 Reis Road), no water quantity issues were reported.
 - 106 Reis: No groundwater quantity issues reported by the Site owner.

- Following the lot-line adjustment, the septic impact assessment meets the MECP Procedure D-5-4 predictive assessment for commercial/industrial properties, using the existing septic system and 12 employees. If advanced septic systems are utilized, they must be BNQ certified (or equivalent certification) for 50% nitrate reduction.
 - 106 Reis Road – no change to existing 62% hard surface (hard surface area calculated after lot addition):
 - Maximum septic flow of 1,175 litres per day.
 - Conventional septic system.
 - Maximum of 16 employees, which is sufficient to support the current 12 employees at the Site.

- Following the lot line adjustment, the septic impact assessment meets the MECP Procedure D-5-4 predictive assessment for commercial/industrial properties , using the existing septic system and 5 employees. If advanced septic systems are utilized, they must be BNQ certified (or equivalent certification) for 50% nitrate reduction.
 - 122 Reis Road - no change to existing 74% hard surface, limiting number of employees to 5.
 - Maximum septic flow of 363 litres per day.
 - Conventional septic system.
 - Maximum of 5 employees.

- The septic impact assessment and water quantity and quality assessment were completed with the assertion that the number of employees and water demand will not increase following the lot-line adjustment.

- The results of the physical, chemical and bacteriological groundwater analyses (subdivision package, trace metals and VOCs) indicate that the water quality in the supply aquifer, as testing in PW-122 meets the ODWQS MAC and is considered to be safe for consumption. Groundwater treatment to recommended to treat the numerous aesthetic objective and operational guideline exceedances. It is noted that the chloride concentration exceeds the maximum concentration considered to be reasonably treatable and significant treatment costs may be incurred.

- Based on the absence of the non-detectable concentrations of nitrates/nitrites and VOCs, the water supply aquifer is not affected by potentially contaminating activities mentioned in Section 3.1, on, or within 500 meters of the Site (i.e., septic systems, historical agricultural activity, industrial/commercial activity).

6.2 Water Supply Recommendations

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

- Given the numerous aesthetic and operational guideline exceedances, if treatment systems are utilized, it is recommended that a water quality treatment specialist be retained to appropriately size and install treatment systems. Possible treatment systems are referenced below for each exceedance reported, with reference to applicable MECP D-5-5 Guidelines and City of Ottawa Hydrogeological Guidelines, when possible. Treatment systems include a water softener, aeration and filtration (e.g., manganese green sand filter), and a reverse osmosis (RO) system.
 - Reported hardness concentrations of 432 mg/L to 487 mg/L exceed the ODWQS operational objective of 80-100 mg/L. Water having elevated hardness of up to 500 mg/L can be treated by conventional water softeners, as per Table 3 in MECP Guideline D-5-5.
 - Reported manganese concentrations of 0.134 mg/L exceed the Health Canada (2019) MAC concentration of 0.12 mg/L, but are within the MECP Guideline D-5-5 treatable limits of 1.0 mg/L. The ODWQS does not have an MAC for manganese. Manganese is effectively removed from well water using water softeners or manganese greensand filters as per Table 3 in MECP Guideline D-5-5.
 - Reported iron concentrations of 1.2 mg/L exceed the ODWQS aesthetic objective of 0.3 mg/L, but are within the MECP Guideline D-5-5 treatable limits of 5.0 mg/L. Water softeners and/or manganese greensand filters are recommended for iron treatment in Table 3 of the MECP Guideline D-5-5.
 - Reported true colour levels of 9 TCU exceed the ODWQS aesthetic objective of 5 TCU. Laboratory analyzed colour is expected to be elevated due to various factors that the samples are subjected to between time of sampling and laboratory analysis (e.g. change in temperature, exposure to atmospheric oxygen partial pressure), resulting in precipitation of metals such as iron and manganese. Water softeners and/or manganese greensand filters are recommended for iron and manganese treatment in Table 3 of MECP Guideline D-5-5, which is expected to greatly reduce colour in the well water.

- Reported sulfide concentrations of 0.27 mg/L exceed the ODWQS aesthetic objective of 0.05 mg/L. Sulphide can be effectively removed from well water using aeration treatment and filtration at lower levels, according to the Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines (June 2023).
- Reported total dissolved solids levels of 948 mg/L exceed the ODWQS aesthetic objective of 500 mg/L. LSI was calculated to be 0.44, which indicates the water is slightly scale forming, but noncorrosive. Total dissolved solids can be treated using a reverse osmosis (RO) treatment system, but a water treatment specialist should be consulted. To confirm treatment requirements.
- Reported chloride levels of 313 mg/L to 326 mg/L exceed the ODWQS aesthetic objective of 250 mg/L. Chloride can be removed using RO systems. Point-of-use RO systems are available, which can be connected to a single fixture (e.g. kitchen sink) that supplies drinking water. A water treatment specialist should be consulted to confirm treatment requirements.
- Reported barium levels of 1.07 mg/L exceed the ODWQS MAC of 1 mg/L. Most treatment methods for water softening are effective for barium removal according to the Technical Support Document for Ontario Drinking Water Standards, Objectives, and Guidelines (June 2023). Barium can also be removed using RO systems. A water treatment specialist should be consulted to confirm treatment requirements.
- Based on the health-related MAC exceedance for barium, the raw water is not considered to be potable. Groundwater should be treated for barium prior to consumption. Alternatively, potable water can be provided to employees for drinking purposes.
- It is recommended that the storage of potentially contaminating items such as fuel tanks or fill be placed a minimum of 15 meters from water supply wells on the Site.
- It is recommended that the property owners construct, maintain and test their drinking water well in accordance with the Ministry of the Environment and Climate Change document “Water Supply Wells - Requirements and Best Management Practices, Revised April 2015”.
 - The old water supply well at 122 Reis Road (PW-122- Old Well) will be used as a back-up, limited use well for 106 Reis Road after the proposed lot line adjustment. The well should be inspected by a licensed well technician to ensure it is compliant with O.Reg 903 and if not, repaired or abandoned.

6.3 Septic System Recommendations

Following the MECP D-5-4 guidelines, the Site meets the considerations for onsite sewage disposal systems. 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 BQN certified (or equivalent certification) for a minimum nitrate reduction of 50%.
- It is required that the property owners enter a maintenance agreement with authorized agents of the advanced treatment septic system manufacturer for the service life of the system.

7.0 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.



Brent Redmond, M.A.Sc., P.Geo.
Hydrogeologist



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



8.0 REFERENCES

- Armstrong, D.K. and Dodge, J.E.P. 2007. Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219
- Brunton, F.R. and Dodge, J.E.P. 2008. Karst of southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5.
- Mississippi Valley Conservation, Rideau Valley Conservation Authority, 2011. Assessment Report, Mississippi Valley Source Protection Area. August 4, 2011.
- Ontario Geological Survey. 2010. Surficial geology of Southern Ontario. Ontario Geological Survey, Miscellaneous Release-Data 128-Revision 1.
- Ontario Geological Survey. 2011. 1:250 000 scale bedrock geology of Ontario. Ontario Geological Survey, Miscellaneous Release-Data 126-Revision 1.
- Ontario Ministry of the Environment and Climate Change. 1996. Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment. August 1996.
- Ontario Ministry of the Environment and Climate Change. 1996. Procedure D-5-4, Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment. August 1996.
- Risser, D.W., 2010. U.S. Geological Survey. Factors Affecting Specific – Capacity Tests and their Application – A Study of Six Low-Yielding Wells in Fractured – Bedrock Aquifers in Pennsylvania.

CONDITIONS AND LIMITATIONS OF THIS REPORT

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.

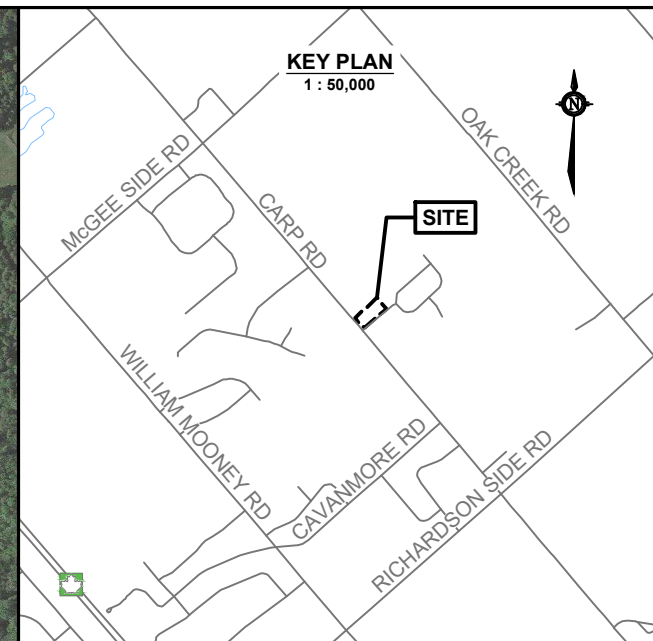
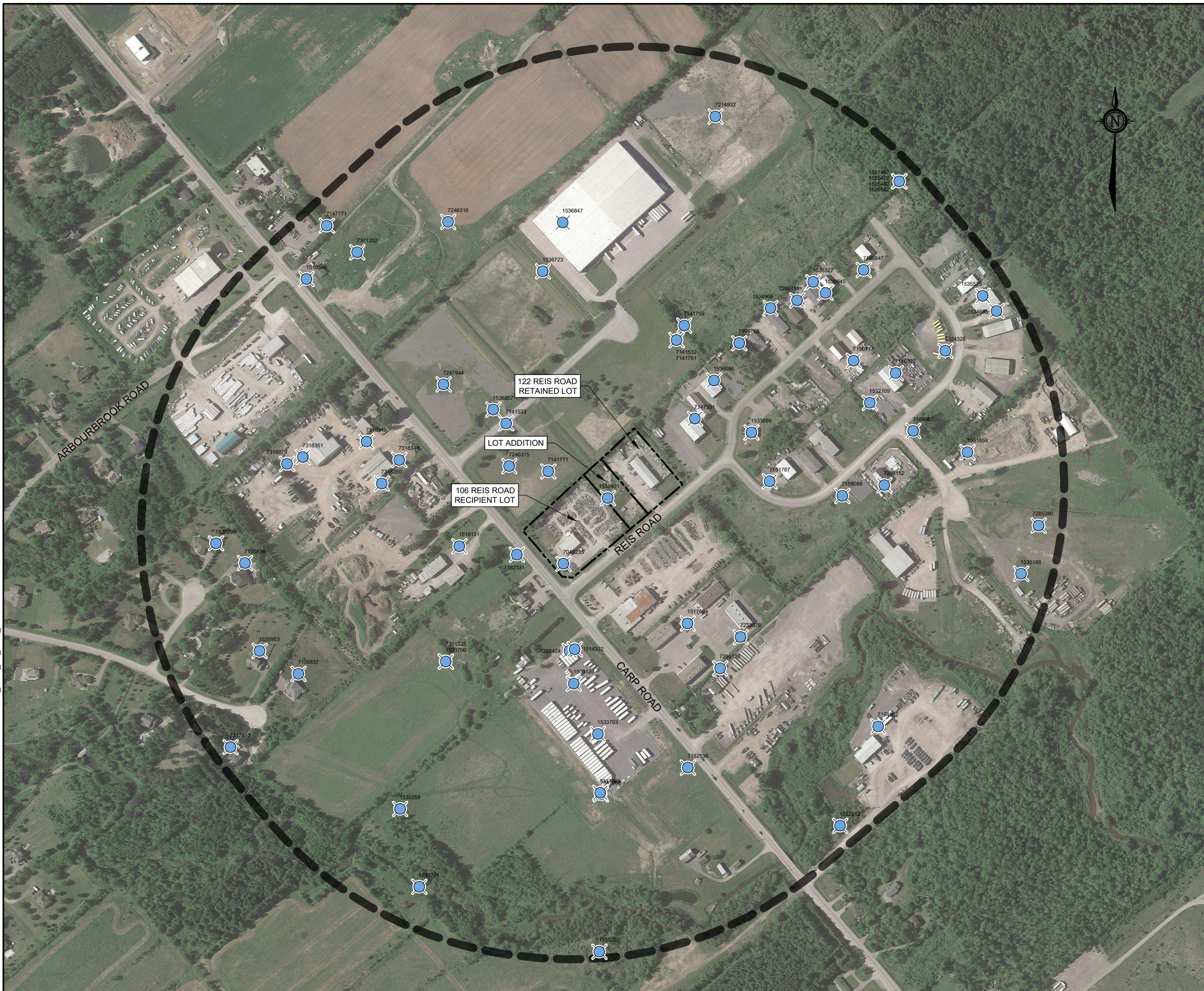
- 11. Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fill materials 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

Figures

N:\PROJECTS\100100100165.024\DRAWING\1. DRAWINGS\HITA R0100165.024_HITA_R0_2023_09.DWG



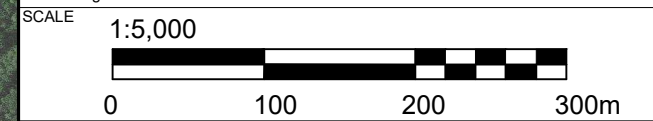
KEY PLAN
1 : 50,000

LEGEND

- MECP WATER WELL RECORD
- APPROXIMATE SITE BOUNDARY
- STUDY AREA (500 m RADIUS AROUND THE SITE BOUNDARY)

GENERAL NOTE(S)

1. Coordinate system: NAD83, UTM ZONE 18
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
3. All boundaries and dimensions are approximate
4. Contains information licensed under the Open Government Licence – Ontario
5. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
6. Geographic dataset source: Ontario GeoHub
7. Hard surface areas were determined based on a detailed Site survey completed by McIntosh Perry Consulting Engineers Ltd. Information from the survey was sent to GEMTEC in CAD format via the file: "CCO-23-3606-2023-08-24.dwg". The base map used for the figure may not be representative of current Site use or hard surface coverage



DRAWING		SITE LOCATION PLAN	
CLIENT		1694027 ONTARIO INC.	
PROJECT		SCOPED HYDROGEOLOGICAL INVESTIGATION & TERRAIN ANALYSIS 106 & 122 REISS ROAD OTTAWA (CARP), ONTARIO	
DRAWN BY	S.L.	CHECKED BY	B.R.
PROJECT NO.	100165.024	REVISION NO.	0
DATE	JANUARY 2024	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



LEGEND

- APPROXIMATE TEST WELL LOCATION (CURRENT GEMTEC INVESTIGATION)
- EXISTING WATER WELLS
- APPROXIMATE SITE BOUNDARY

GENERAL NOTE(S)

1. Coordinate system: NAD83, UTM ZONE 18
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
3. All boundaries and dimensions are approximate
4. Contains information licensed under the Open Government Licence – Ontario
5. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
6. Geographic dataset source: Ontario GeoHub
7. Hard surface areas were determined based on a detailed Site survey completed by McIntosh Perry Consulting Engineers Ltd. Information from the survey was sent to GEMTEC in CAD format via the file: "CCO-23-3606-2023-08-24.dwg". The base map used for the figure may not be representative of current Site use or hard surface coverage

SCALE 1:1,000

DRAWING **DETAILED SITE PLAN**

CLIENT **1694027 ONTARIO INC.**

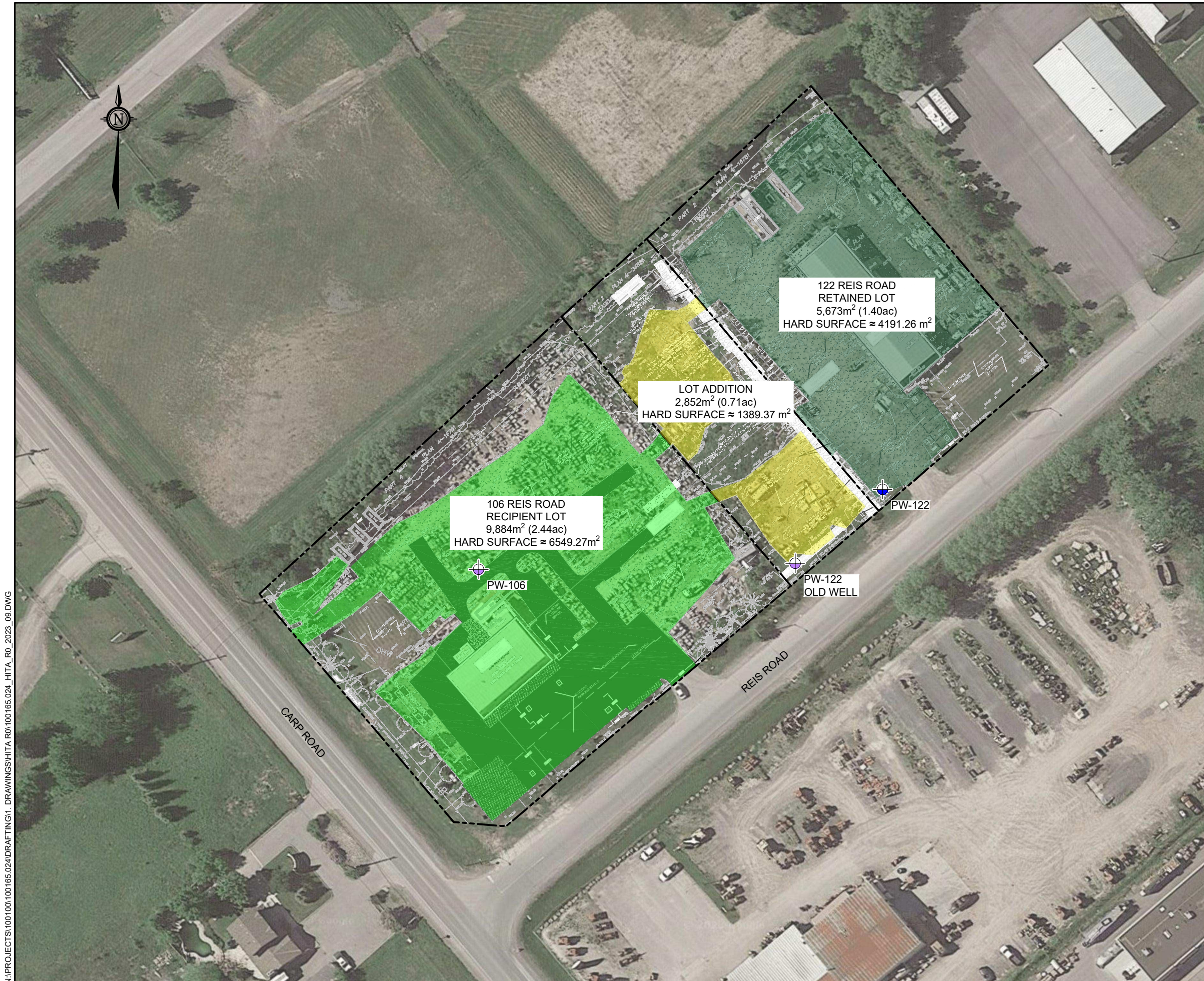
PROJECT **SCOPED HYDROGEOLOGICAL INVESTIGATION & TERRAIN ANALYSIS
106 & 122 REIS ROAD
OTTAWA (CARP), ONTARIO**

DRAWN BY S.L.	CHECKED BY B.R.
PROJECT NO. 100165.024	REVISION NO. 0
DATE JANUARY 2024	FIGURE NO. FIGURE 2

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

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

N:\PROJECTS\100100100165.024\DRAWING\1. DRAWINGS\HITA R0100165.024_HITA_R0_2023_09.DWG



LEGEND

- APPROXIMATE TEST WELL LOCATION (CURRENT GEMTEC INVESTIGATION)
- EXISTING WATER WELLS
- APPROXIMATE SITE BOUNDARY

HARD SURFACE COVER

- 122 REIS ROAD
- LOT ADDITION
- 106 REIS ROAD

GENERAL NOTE(S)

- Coordinate system: NAD83, UTM ZONE 18
- Distances, elevations, and coordinates are shown in metres unless denoted otherwise
- All boundaries and dimensions are approximate
- Contains information licensed under the Open Government Licence – Ontario
- Maps Data: Google, ©2023 CNES / Airbus, First Base Solutions, Maxar Technologies
- Geographic dataset source: Ontario GeoHub
- Hard surface areas were determined based on a detailed Site survey completed by McIntosh Perry Consulting Engineers Ltd. Information from the survey was sent to GEMTEC in CAD format via the file: "CCO-23-3606-2023-08-24.dwg". The base map used for the figure may not be representative of current Site use or hard surface coverage

SCALE 1:1,000

0 20 40 60m

DRAWING HARD SURFACE COVERAGE

CLIENT 1694027 ONTARIO INC.

PROJECT SCOPED HYDROGEOLOGICAL INVESTIGATION & TERRAIN ANALYSIS
106 & 122 REIS ROAD
OTTAWA (CARP), ONTARIO

DRAWN BY S.L.	CHECKED BY B.R.
PROJECT NO. 100165.024	REVISION NO. 0
DATE JANUARY 2024	FIGURE NO. FIGURE 3

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

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

N:\PROJECTS\100100100165.024\DRAWING\1. DRAWINGS\HITA R0100165.024_HITA_R0_2023_09.DWG



APPENDIX B

Water Well Record Summary

MECP Online Well Database Summary (500m Radius)

(1 of 5)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
7049235	HUNTLEY TOWNSHIP CON 02 008	2007-07-27	DO	73.2	8.9	10.7	2.9	0227	GREY SAND 0029 GREY LMSN 0240
1503120	HUNTLEY TOWNSHIP CON 03 008	1966-04-24	DO	7.9		7.9	1.8	FR 0023	RED MSND 0023 GRVL 0026
1510546	HUNTLEY TOWNSHIP CON 02 009	1970-01-21	DO	23.2	9.1	9.4	3.0	FR 0075	GREY GRVL HPAN 0030 BLCK SHLE 0065 GREY LMSN 0076
1514322	HUNTLEY TOWNSHIP CON 03 008	1974-09-17	DO	9.8		9.4	1.5	FR 0031	GREY GRVL BLDR PCKD 0032
1517694	HUNTLEY TOWNSHIP CON 02 008	1981-10-19	DO	7.6		6.7	2.4	FR 0025	GREY CLAY 0003 GREY HPAN GRVL 0021 GREY GRVL 0025
1516131	HUNTLEY TOWNSHIP CON 03 008	1977-08-28	DO	19.5	1.2	7.6	9.1	FR 0055	GREY SAND STNS 0004 GREY LMSN 0064
1521487	HUNTLEY TOWNSHIP CON 02 008	1987-06-24	CO	15.2	1.8	6.4	0.9	FR 0036 FR 0047	BRWN SAND CLAY PCKD 0003 GREY CLAY STNS HARD 0006 GREY LMSN FCRD 0008 GREY GRVL LMSN LOOS
1525420	HUNTLEY TOWNSHIP CON 02 008	1991-05-30	DO	90.8	8.5	9.1	7.6	UK 0289	BRWN CLAY SAND DRY 0008 GREY HPAN BLDR PCKD 0028 GREY LMSN SOFT 0298
1525480	HUNTLEY TOWNSHIP CON 02 008	1991-06-16	DO	68.0	4.6	6.4	9.1	UK 0219	BRWN CLAY STNS PCKD 0006 GREY GRVL SAND WBRG 0015 GREY LMSN MGVL 0223
1526582	HUNTLEY TOWNSHIP CON 02 008	1992-09-14	DO	76.2	4.9	6.4	1.8	UK 0049 UK 0243	BRWN CLAY SNDY STNS 0005 GREY SAND BLDR 0016 GREY LMSN 0250
1531859	HUNTLEY TOWNSHIP CON 02 007	2001-04-24	DO	85.0	8.5		3.4	FR 0275	BRWN HPAN BLDR 0014 GREY HPAN BLDR 0028 GREY LMSN LYRD 0275 GREY LMSN 0279
1532012	HUNTLEY TOWNSHIP CON 02 007	2001-06-06	CO	46.0	6.1		3.4	FR 0090 FR 0135	BRWN LOAM STNS 0006 GREY CLAY 0015 GREY GRVL 0018 GREY HPAN 0020 GREY LMSN 0151
1532109	HUNTLEY TOWNSHIP CON 02 008	2001-07-05	DO	79.2	5.8		1.5	SU 0050 SU 0250	GREY CLAY 0018 BRWN GRVL 0019 GREY SHLE LMSN 0260

AC = Cooling and A/C
IR = Irrigation
OT = Other

CO = Commercial
MN = Municipal
PS = Public

DE = Dewatering
MO = Monitoring
ST = Livestock

DO = Domestic
MT = Monitoring and Test Hole
TH = Test Hole

IN = Industrial
NU = Not Used

MECP Online Well Database Summary (500m Radius)

(2 of 5)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
1532401	HUNTLEY TOWNSHIP CON 02 008	2001-10-12	DO	15.2	7.3		1.2	UK 0025 UK 0045	BRWN SAND 0005 GREY SAND GRVL BLDR 0018 GREY GRVL FCRD ROCK 0024 GREY LMSN 0050
1533699	HUNTLEY TOWNSHIP CON 02 008	2003-03-17	DO	14.6	4.0	6.4	3.4	UK 0040	BRWN LOAM SAND GRVL 0013 GREY LMSN 0048
1533700	HUNTLEY TOWNSHIP CON 03 008	2003-03-17	NU	62.5	12.2	14.0	3.4	UK 0060 UK 0145	BRWN SAND GRVL 0040 GREY LMSN 0205
1533703	HUNTLEY TOWNSHIP CON 03 007	2003-03-17	NU	61.0	7.6	10.1	3.7	UK 0148	SAND GRVL 0025 GREY LMSN 0200
1534968	HUNTLEY TOWNSHIP CON 02 008	2004-08-24	DO	45.1	4.9	6.4	1.9	0140	BRWN SAND STNS 0006 GREY HPAN 0010 GREY SAND GRVL 0016 GREY LMSN 0148
1535259	HUNTLEY TOWNSHIP CON 03 008	2004-09-15	NU	6.0		3.0			BRWN FSND 0004 GREY CLAY HARD 0007 BRWN FSND 0014 GREY SAND CGVL 0020
1535575	HUNTLEY TOWNSHIP CON 02 008	2005-05-02	DO	83.2	7.6	9.4	4.5	0038 0266	BRWN LOAM STNS LOOS 0011 BRWN LOAM 0020 GREY HPAN PCKD 0025 GREY LMSN 0273
1535953	HUNTLEY TOWNSHIP CON 03 008	2005-09-29	DO	18.3	8.8	10.7	6.3	0037 0054	CLAY SNDY GRVL 0029 LMSN DKCL 0060
1536096	HUNTLEY TOWNSHIP CON 02 008	2005-10-27	DO	45.7	1.2	7.3	1.6	0144	SAND GRVL 0004 GREY LMSN 0120 GREY LMSN SNDS 0150
1536327	HUNTLEY TOWNSHIP CON 02 008	2006-04-24	DO	18.3	5.5	7.0	0.9	0025 0055	CLAY 0018 GREY LMSN 0060
1536645	HUNTLEY TOWNSHIP CON 02 006	2006-07-26	MO	15.2	4.9	7.0	1.3	0030 0041	SAND CLAY 0016 GREY LMSN 0050
1536723	HUNTLEY TOWNSHIP CON 02 008	2006-09-08	NU	73.2	6.4	12.3	2.1	0232	CLAY SNDY BLDR 0021 GREY LMSN 0240
1536847	HUNTLEY TOWNSHIP CON	2006-11-02		17.8					0058

AC = Cooling and A/C
IR = Irrigation
OT = Other

CO = Commercial
MN = Municipal
PS = Public

DE = Dewatering
MO = Monitoring
ST = Livestock

DO = Domestic
MT = Monitoring and Test Hole
TH = Test Hole

IN = Industrial
NU = Not Used

MECP Online Well Database Summary (500m Radius)

(3 of 5)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
1536857	HUNTLEY TOWNSHIP CON 02 008	2006-09-22	MO	12.2	7.3	10.1	2.9	0039	SAND GRVL 0024 LMSN FCRD 0040
7105837	HUNTLEY TOWNSHIP CON	2008-03-28	DO	14.6		10.7	3.8	UK 0044	BRWN LOAM SNDY GRVL 0037 GREY SAND HARD 0048
7105838	HUNTLEY TOWNSHIP CON 03 008	2008-03-27	DO	16.5		15.8	5.2	UK 0052	BRWN LOAM SNDY GRVL 0035 GREY GRVL PCKD 0054
7141532	HUNTLEY TOWNSHIP CON 02 008	2010-01-11		43.3					0142
7141533	HUNTLEY TOWNSHIP CON	2010-01-11	MO	12.8					0042
7141751	HUNTLEY TOWNSHIP CON	2009-02-09	MO	24.4					0080
7141759	HUNTLEY TOWNSHIP CON	2010-02-08	DO	48.8	6.1	15.8	1.2	UT 0148 UT 0155	SAND GRVL 0020 GREY LMSN 0160
7141771	HUNTLEY TOWNSHIP CON 02 008	2009-12-21	DO	97.5	9.7	16.5	1.0	UT 0297 UT 0311	GREY CLAY 0019 SAND GRVL BLDR 0032 GREY LMSN 0320
7146322	HUNTLEY TOWNSHIP CON 02 008	2010-04-30	CO	87.5	7.3	9.1	0.7	0278	BRWN SAND CLAY SILT 0004 GREY SILT SAND 0020 GREY TILL SAND GRVL 0024 GREY LMSN SHLE 0287
7147331	HUNTLEY TOWNSHIP CON 02 008	2010-05-12	NU	30.8	6.1	7.9	2.4	UT 0038 UT 0082 UT 0088	SAND CLAY GRVL 0020 GREY LMSN 0101
7147771	HUNTLEY TOWNSHIP CON 02 009	2010-05-20	NU	42.7	1.8	6.1	0.9	UT 0131	BRWN SAND CLAY STNS 0003 BRWN SAND CLAY STNS 0006 BRWN SHLE 0008 BRWN LMSN 0140
7150117	OTTAWA CITY	2010-08-12	CO	85.3	4.4	7.0	0.5	UT 0135 UT 0268	BRWN SAND STNS CLAY 0014 BRWN LMSN LMSN LYRD 0135 GREY LMSN SNDS 0280
7164962	HUNTLEY TOWNSHIP CON 02 007	2011-06-03	CO	97.6	4.6	6.4	1.8	UT 0308	BRWN TILL SAND 0009 GREY GRVL BLDR 0015 GREY LMSN SHLE 0320

AC = Cooling and A/C
IR = Irrigation
OT = Other

CO = Commercial
MN = Municipal
PS = Public

DE = Dewatering
MO = Monitoring
ST = Livestock

DO = Domestic
MT = Monitoring and Test Hole
TH = Test Hole

IN = Industrial
NU = Not Used

MECP Online Well Database Summary (500m Radius)

(4 of 5)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
7166847	HUNTLEY TOWNSHIP CON 02 008	2011-05-04	DO CO	106.1	7.3	10.4	1.3	UT 0333	BRWN LOAM SNDY LOOS 0012 GREY TILL 0024 GREY LMSN LYRD MGRD 0348
7181767	HUNTLEY TOWNSHIP CON 02 008	2012-04-27	CO	25.3	16.2	17.4	0.8	0068 0079	GREY CLAY SNDY 0004 BRWN SAND 0009 GREY CLAY SLTY 0015 GREY SAND GRVL 0040 GREY TILL DNSE 0053 GREY LMSN SHLE FCRD 0083
7182536	HUNTLEY TOWNSHIP CON 03 008	2012-06-07	CO	8.2	6.1	7.3	1.5	UT 0027	BRWN SAND PCKD 0002 GREY CLAY STNS HPAN 0020 GREY LMSN FCRD 0027
7188067	HUNTLEY TOWNSHIP	2011-07-07	NU	14.6	6.1	7.9	4.1	FR 0020	BRWN SAND PCKD 0006 GREY HPAN STNS 0020 GREY LMSN HARD 0048
7188086	HUNTLEY TOWNSHIP CON 02 008	2012-01-01	NU	18.3	4.3	6.1	2.6	UT 0055	BRWN SAND LOOS 0010 GREY HPAN STNS 0014 GREY LMSN 0060
7233576	HUNTLEY TOWNSHIP	2014-09-17	NU	68.6	7.6	9.4	3.3	UT 0190 UT 0218	BRWN LOAM STNS WBRG 0004 GREY TILL PCKD 0020 GREY GRVL PCKD 0025 GREY LMSN LYRD 0225
7246315	HUNTLEY TOWNSHIP CON 02 009	2015-06-06	DO	85.3	2.4	13.4		0055 0235	HPAN CLAY GRVL 0008 GREY SNDS 0018 HPAN CLAY GRVL 0026 GREY SNDS 0280
7246316	HUNTLEY TOWNSHIP CON	2015-07-07	DO	61.0	8.5	13.4		UT	LOAM SAND 0015 CLAY STNS 0028 GREY SNDS 0200
7247944	HUNTLEY TOWNSHIP CON	2015-08-06	TH	64.3	4.0	13.4		UT 0050 UT 0155	CLAY STNS 0013 GREY SNDS 0200 SNDS 0211
7268424	HUNTLEY TOWNSHIP CON	2016-06-09	DO	54.9	48.2	50.0	8.7	UT 0169 UT 0174	GREY CLAY 0158 GREY SHLE LMSN 0180
7295138	HUNTLEY TOWNSHIP CON	2017-08-16	DO	61.0	37.8	39.6		UT 0171	CLAY 0117 SAND 0124 GREY LMSN 0200
7298152	HUNTLEY TOWNSHIP CON 03 013/014	2017-10-05	DO	85.3		na			0200 GREY LMSN 0280
7299151	HUNTLEY TOWNSHIP CON 03 013/014	2017-09-07	DO	85.3	36.0	37.2		UT 0132	SAND CLAY 0005 GREY CLAY 0104 SAND GRVL 0112 GRVL BLDR 0118 GREY LMSN 0132 GREY LMSN 0133 GREY LMSN 0280

AC = Cooling and A/C
IR = Irrigation
OT = Other

CO = Commercial
MN = Municipal
PS = Public

DE = Dewatering
MO = Monitoring
ST = Livestock

DO = Domestic
MT = Monitoring and Test Hole
TH = Test Hole

IN = Industrial
NU = Not Used

MECP Online Well Database Summary (500m Radius)

(5 of 5)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
7301325	HUNTLEY TOWNSHIP CON 03 008								
7317813	HUNTLEY TOWNSHIP CON 03 008	2018-05-21	DO	38.1	14.3	17.1	4.3	UT 0090 UT 0119	BRWN LOAM SNDY 0022 GREY CLAY SNDY STNS 0047 GREY LMSN 0125
7318348	HUNTLEY TOWNSHIP CON 03 008	2018-07-16	TH MO	4.7		1.5			GREY ---- GRVL 0001 BRWN SAND 0011 GREY CLAY SILT SOFT 0015
7318349	HUNTLEY TOWNSHIP CON 03 008	2018-07-16	TH MO	3.1		1.5			GREY GRVL FILL PCKD 0002 BRWN SAND 0010
7318350	HUNTLEY TOWNSHIP CON 03 008	2018-07-16	TH MO	3.1		1.5			GREY ---- GRVL 0001 GREY GRVL 0003 BRWN SAND 0010
7318351	HUNTLEY TOWNSHIP CON 03 008	2018-07-16	TH MO	3.1		1.5			GREY GRVL 0001 BRWN GRVL SAND LOOS 0003 BRWN SAND 0010
7319979	HUNTLEY TOWNSHIP CON 03 008	2018-07-15	TH MO	3.1		1.5			GREY GRVL SAND PCKD 0001 GREY GRVL SAND LOOS 0003 BRWN SAND SAND SOFT 0010
7324328	HUNTLEY TOWNSHIP	2018-08-27	DO	99.1	8.2	9.8	3.2	UT 0311	BRWN STNS LOAM LOOS 0014 GREY SAND PCKD 0027 GREY LMSN HARD 0325
7347069	HUNTLEY TOWNSHIP CON 03 007	2019-05-31	MO	4.6		3.0		UT 0005	SAND 0015
7347068	HUNTLEY TOWNSHIP CON	2019-05-31	MO					UT 0005	
7357888	HUNTLEY TOWNSHIP	2019-12-02							
7371202	HUNTLEY TOWNSHIP CON	2020-09-29							
7382331	HUNTLEY TOWNSHIP CON	2021-01-06							
7395766		2021-05-25							

AC = Cooling and A/C
IR = Irrigation
OT = Other

CO = Commercial
MN = Municipal
PS = Public

DE = Dewatering
MO = Monitoring
ST = Livestock

DO = Domestic
MT = Monitoring and Test Hole
TH = Test Hole

IN = Industrial
NU = Not Used



APPENDIX C

Water Well Records – Site Wells

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

Address of Well Location (County/District/Municipality) Ottawa - Carleton			Township West Carleton			Lot 8	Concession 2
RR#/Street Number/Name #106 Reis Road			City/Town/Village Carleton Place			Site/Compartment/Block/Tract etc. Plan 4M-745 Block 1/36.7	
GPS Reading	NAD 83	Zone 18	Easting 422867	Northing 5017099	Unit Make/Model Mogellon	Mode of Operation: <input type="checkbox"/> Undifferentiated <input checked="" type="checkbox"/> Averaged <input type="checkbox"/> Differentiated, specify	

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres	
				From	To
	Grey Sand			0	8.84
	Grey Limestone			8.84	73.15

Hole Diameter		
Depth From	Metres To	Diameter Centimetres
0	73.15	15.25
Water Record		
Water found at	Kind of Water	
69.19 m	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Sulphur <input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals <input type="checkbox"/> Other:	
TESTED	<input type="checkbox"/> Fresh <input type="checkbox"/> Sulphur <input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals <input type="checkbox"/> Other:	
After test of well yield, water was		
<input checked="" type="checkbox"/> Clear and sediment free		
<input type="checkbox"/> Other (specify)		
Chlorinated <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Construction Record					
Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres		
			From	To	
15.88	<input checked="" type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	0	4.8	10.67	
Casing					
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized				
Screen					
Outside diam	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	Slot No.			
No Casing or Screen					
	<input checked="" type="checkbox"/> Open hole		10.06	73.15	

Test of Well Yield					
Pumping test method	Draw Down		Recovery		Time min
	Time min	Water Level Metres	Time min	Water Level Metres	
Subpump					
Pump intake seal (metres)	60.96	Static Level	2.90		20.19
Pumping rate (litres/min)	50	1	4.72	1	16.86
Duration of pumping (hrs + min)	1:0	2	6.09	2	15.55
Final water level end of pumping (metres)	20.19	3	7.20	3	14.60
Recommended pump type		4	8.14	4	13.72
Recommended pump depth (metres)	30.48	5	8.94	5	13.00
Recommended pump rate (litres/min)	45.30	10	12.11	10	10.39
If flowing give rate (litres/min)		15	14.30	15	8.63
		20	15.92	20	7.36
		25	17.18	25	6.43
If pumping discontinued, give reason		30	18.11	30	5.67
		40	19.22	40	4.71
		50	19.86	50	4.09
		60	20.19	60	3.67

Plugging and Sealing Record		
Depth set at - Metres	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
From To		
10.06 7.01	Neat Cement Slurry	1.816
7.01 0	Bentonite Slurry	2.245
Method of Construction		
<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond
<input type="checkbox"/> Rotary (conventional)	<input checked="" type="checkbox"/> Air percussion	<input type="checkbox"/> Jetting
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Boring	<input type="checkbox"/> Driving
<input type="checkbox"/> Digging	<input type="checkbox"/> Other	
Water Use		
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Supply
<input checked="" type="checkbox"/> Stock	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Municipal	<input type="checkbox"/> Cooling & air conditioning
Final Status of Well		
<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Recharge well	<input type="checkbox"/> Unfinished
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Dewatering
<input type="checkbox"/> Test Hole	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well

Location of Well	
In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.	
Audit No. Z 65135	Date Well Completed 2007 07 27
Was the well owner's information package delivered? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered 2007 07 27

Well Contractor/Technician Information	
Name of Well Contractor AIR ROCK DRILLING & LTD 1119	Well Contractor's Licence No.
Business Address (street name, number, city etc.) DRY RICHMOND ONT KANAZA	
Name of Well Technician (last name, first name) PURCELL STANNON	Well Technician's Licence No. 50122
Signature of Technician/Contractor	Date Submitted 2007 07 27

Ministry Use Only	
Data Source	Contractor 1119
Date Received SEP 17 2007	Date of Inspection
Remarks	Well Record Number

Tag#: A320528

Measurements recorded in: Metric Imperial

Page _____ of _____

Well Owner's Information

First Name _____ Last Name/Organization **Grace Monuments** E-mail Address _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name) _____ Municipality _____ Province _____ Postal Code _____ Telephone No. (inc. area code) _____

Well Location

Address of Well Location (Street Number/Name) **122 Reis Road** Township **West Carleton** Lot **8** Concession **2**

County/District/Municipality **Ottawa Carleton** City/Town/Village **Huntley** Province **Ontario** Postal Code **K0A1L0**

UTM Coordinates Zone **18** Easting **8422981** Northing **61017167** Municipal Plan and Sublot Number _____

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Grey	Gravel	fill	Packed	0'	3'
Grey	Sand	gravel Boulders	Loose + Dense	3'	10'
Grey	Gravel	Broken Rock		10'	23'
Grey	Line Stone			23'	163'

Annular Space

Depth Set at (m/ft) From **0'** To **24'** Type of Sealant Used (Material and Type) **Quik Grout** Volume Placed (m³/ft³) _____

Method of Construction

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

Well Use

Commercial Not used Municipal Dewatering Test Hole Monitoring Irrigation Cooling & Air Conditioning Livestock Industrial Other, specify _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)	
			From	To
6	STEEL	188	+2'	25'

Status of Well

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

Construction Record - Screen

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

Water Details

Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Hole Diameter	
		Depth (m/ft) From To	Diameter (cm/in)
21'		0	23 8.5"
38'		23	163 6"
160'			

Well Contractor and Well Technician Information

Business Name of Well Contractor **Colt's Plumbing inc.** Well Contractor's Licence No. **771613**

Business Address (Street Number/Name) **2547 County Rd 29** Municipality **Mississippi Mills**

Province **ON** Postal Code **K0A2X0** Business E-mail Address _____

Bus. Telephone No. (inc. area code) **6138805645** Name of Well Technician (Last Name, First Name) **Skuse, Simon**

Well Technician's Licence No. _____ Signature of Technician and/or Contractor _____ Date Submitted **20220627**

Results of Well Yield Testing

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

If pumping discontinued, give reason: _____

Static Level	Draw Down		Recovery	
	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
0				
1	7		1	80
2	13.5		2	
3	18		3	
4	21.8		4	
5	25		5	
10	38		10	36
15	50		15	
20	58		20	28
25	64		25	
30	71		30	18
40	76		40	10
50	80		50	8
60	85		60	7

Pump intake set at (m/ft) **115**

Pumping rate (l/min / GPM) **10**

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft) **85**

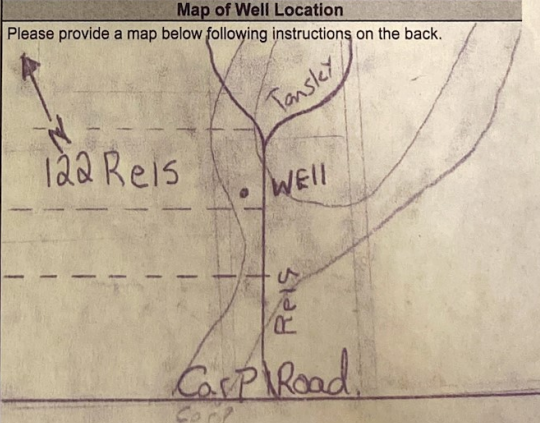
If flowing give rate (l/min/GPM) _____

Recommended pump depth (m/ft) **115**

Recommended pump rate (l/min/GPM) **10**

Well production (l/min/GPM) **12**

Disinfected? Yes No



Comments: **40' @ Reis + 5' off Lot line**

Well owner's information package delivered Yes No

Date Package Delivered **20220627**

Date Work Completed **20220627**

Ministry Use Only

Audit No. **Z370232**

Received _____



APPENDIX D

Water Quality Summary and Laboratory Certificates of Analysis

**Table D1:
Summary of Laboratory Water Quality Measurements**

Parameter	Units	PW-122	PW-122	PW-122	Ontario Drinking Water Standard	Type of Standard ^(1,2,3)
		23-Nov-22	28-Jun-23	Filtered 28-Jun-23		
Microbiological Parameters						
E. Coli	CFU/100 mL	-	ND (1)	-	0	MAC
Fecal Coliforms	CFU/100 mL	-	ND (1)	-	0	MAC
Total Coliforms	CFU/100 mL	-	ND (1)	-	0	-
General Inorganics						
Alkalinity, total	mg/L	-	314	-	30-500	OG
Ammonia as N	mg/L	0.2	0.17	-	-	-
Dissolved Organic Carbon	mg/L	-	3.0	-	5	AO
Colour	TCU	-	9	-	-	-
Colour, apparent	ACU	-	72	-	5	AO
Conductivity	uS/cm	-	1690	-	-	-
Hardness	mg/L	487	432	-	80-100	OG
pH	pH Units	-	7.6	-	6.5-8.5	OG
Phenolics	mg/L	-	0.014	-	-	-
Total Dissolved Solids	mg/L	-	948	-	500	AO
Sulphide	mg/L	-	0.27	-	0.05	AO
Tannin & Lignin	mg/L	-	0.1	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.3	0.2	-	-	-
Turbidity	NTU	-	11.5	-	5	AO
Organic Nitrogen ⁶						
Anions						
Chloride	mg/L	326	313	-	250	AO
Fluoride	mg/L	-	0.2	-	1.5	MAC
Nitrate as N	mg/L	ND (0.1)	ND (0.1)	-	10 ⁽⁴⁾	MAC
Nitrite as N	mg/L	ND (0.05)	ND (0.05)	-	1.0 ⁽⁴⁾	MAC
Sulphate	mg/L	-	80	-	500	AO
Metals						
Mercury	mg/L	-	ND (0.0001)	N/A	0.001	
Aluminum	mg/L	-	0.003	0.002	0.1	OG

Table D1:
Summary of Laboratory Water Quality Measurements

Parameter	Units	PW-122	PW-122	PW-122	Ontario Drinking Water Standard	Type of Standard ^(1,2,3)
		23-Nov-22	28-Jun-23	Filtered 28-Jun-23		
Antimony	mg/L	-	ND (0.0005)	ND (0.0005)	0.006	MAC
Arsenic	mg/L	-	ND (0.001)	ND (0.001)	0.025	MAC
Barium	mg/L	-	1.07	1.02	1	MAC
Beryllium	mg/L	-	ND (0.0005)	ND (0.0005)	-	-
Boron	mg/L	-	0.05	0.05	5	MAC
Cadmium	mg/L	-	ND (0.0001)	ND (0.0001)	0.005	MAC
Calcium	mg/L	148	128	126	-	-
Chromium	mg/L	-	ND (0.001)	ND (0.001)	0.05	MAC
Cobalt	mg/L	-	ND (0.0005)	ND (0.0005)	-	-
Copper	mg/L	-	0.0079	0.0018	1	AO
Iron	mg/L	-	1.2	1.1	0.3	AO
Lead	mg/L	-	0.0004	ND (0.0001)	0.01	MAC
Magnesium	mg/L	28.5	27.2	28.9	-	-
Manganese	mg/L	-	0.134	0.131	0.05	AO
Molybdenum	mg/L	-	ND (0.0005)	ND (0.0005)	-	-
Nickel	mg/L	-	0.001	0.001	-	-
Potassium	mg/L	-	5.2	7.3	-	-
Selenium	mg/L	-	ND (0.001)	ND (0.001)	0.01	MAC
Silver	mg/L	-	ND (0.0001)	ND (0.0001)	-	-
Sodium	mg/L	183	157	200	200 ⁽²⁰⁾⁽⁵⁾	AO
Strontium	mg/L	-	1.85	2.24	-	-
Thallium	mg/L	-	ND (0.001)	ND (0.001)	-	-
Uranium	mg/L	-	0.0001	0.0001	0.02	MAC
Vanadium	mg/L	-	ND (0.0005)	ND (0.0005)	-	-
Zinc	mg/L	-	0.058	0.006	5	AO
Volatiles						
Acetone	ug/L	-	ND (5.0)	-	-	-
Benzene	ug/L	-	ND (0.5)	-	0.001 mg/L (1 ug/L)	MAC
Bromodichloromethane	ug/L	-	ND (0.5)	-	-	-

**Table D1:
Summary of Laboratory Water Quality Measurements**

Parameter	Units	PW-122	PW-122	PW-122	Ontario Drinking Water Standard	Type of Standard ^(1,2,3)
		23-Nov-22	28-Jun-23	Filtered 28-Jun-23		
Bromoform	ug/L	-	ND (0.5)	-	-	-
Bromomethane	ug/L	-	ND (0.5)	-	-	-
Carbon Tetrachloride	ug/L	-	ND (0.2)	-	0.002 mg/L (2 ug/L)	MAC
Chlorobenzene	ug/L	-	ND (0.5)	-	0.08 mg/L (80 ug/L)	MAC
Chloroethane	ug/L	-	ND (1.0)	-	-	-
Chloroform	ug/L	-	ND (0.5)	-	-	-
Chloromethane	ug/L	-	ND (3.0)	-	-	-
Dibromochloromethane	ug/L	-	ND (0.5)	-	-	-
Dichlorodifluoromethane	ug/L	-	ND (1.0)	-	-	-
Ethylene dibromide	ug/L	-	ND (0.2)	-	-	-
1,2-Dichlorobenzene	ug/L	-	ND (0.5)	-	0.2 mg/L (200 ug/L)	MAC
1,3-Dichlorobenzene	ug/L	-	ND (0.5)	-	-	-
1,4-Dichlorobenzene	ug/L	-	ND (0.5)	-	0.005 mg/L (5 ug/L)	MAC
1,1-Dichloroethane	ug/L	-	ND (0.5)	-	-	-
1,2-Dichloroethane	ug/L	-	ND (0.5)	-	0.005 mg/L (5 ug/L)	MAC
1,1-Dichloroethylene	ug/L	-	ND (0.5)	-	0.014 mg/L (14 ug/L)	MAC
cis-1,2-Dichloroethylene	ug/L	-	ND (0.5)	-	-	-
trans-1,2-Dichloroethylene	ug/L	-	ND (0.5)	-	-	-
1,2-Dichloroethylene, total	ug/L	-	ND (0.5)	-	-	-
1,2-Dichloropropane	ug/L	-	ND (0.5)	-	-	-
cis-1,3-Dichloropropylene	ug/L	-	ND (0.5)	-	-	-
trans-1,3-Dichloropropylene	ug/L	-	ND (0.5)	-	-	-
1,3-Dichloropropene, total	ug/L	-	ND (0.5)	-	-	-
Ethylbenzene	ug/L	-	ND (0.5)	-	0.14 mg/L (140 ug/L)	MAC
Hexane	ug/L	-	ND (1.0)	-	-	-
Methyl Ethyl Ketone (2-Butanone)	ug/L	-	ND (5.0)	-	-	-
Methyl Butyl Ketone (2-Hexanone)	ug/L	-	ND (10.0)	-	-	-
Methyl Isobutyl Ketone	ug/L	-	ND (5.0)	-	-	-
Methyl tert-butyl ether	ug/L	-	ND (2.0)	-	-	-

**Table D1:
Summary of Laboratory Water Quality Measurements**

Parameter	Units	PW-122	PW-122	PW-122	Ontario Drinking Water Standard	Type of Standard ^(1,2,3)
		23-Nov-22	28-Jun-23	Filtered 28-Jun-23		
Methylene Chloride	ug/L	-	ND (5.0)	-	0.05 mg/L (50 ug/L)	MAC
Styrene	ug/L	-	ND (0.5)	-	-	-
1,1,1,2-Tetrachloroethane	ug/L	-	ND (0.5)	-	-	-
1,1,2,2-Tetrachloroethane	ug/L	-	ND (0.5)	-	-	-
Tetrachloroethylene	ug/L	-	ND (0.5)	-	0.01 mg/L (10 ug/L)	MAC
Toluene	ug/L	-	ND (0.5)	-	0.06 mg/L (60 ug/L)	MAC
1,1,1-Trichloroethane	ug/L	-	ND (0.5)	-	-	-
1,1,2-Trichloroethane	ug/L	-	ND (0.5)	-	-	-
Trichloroethylene	ug/L	-	ND (0.5)	-	0.005 mg/L (5 ug/L)	MAC
Trichlorofluoromethane	ug/L	-	ND (1.0)	-	-	-
1,3,5-Trimethylbenzene	ug/L	-	ND (0.5)	-	-	-
Vinyl Chloride	ug/L	-	ND (0.5)	-	0.001 mg/L (1 ug/L)	MAC
m/p-Xylene	ug/L	-	ND (0.5)	-	-	-
o-Xylene	ug/L	-	ND (0.5)	-	-	-
Xylenes, total	ug/L	-	ND (0.5)	-	0.09 mg/L (90 ug/L)	MAC

NOTES:

1. MAC = Maximum Acceptable Concentration;
2. OG = Operational Guideline
3. AO = Aesthetic Objective
4. The total of Nitrate and Nitrite should not exceed 10 mg/litre.
5. The aesthetic objective for sodium is 200 mg/litre. The local medical officer of health should be notified when the sodium concentration exceeds 20 mg/litre for persons on sodium restricted diets.
6. Organic Nitrogen = Total Kjeldahl Nitrogen - N-NH₃ and should not exceed 0.15 mg/litre.
7. '-' signifies no value provided
8. 'ND' = No concentration detected above method detection limit



**Table D2:
Summary of Field Water Quality Measurements**

TW22-02	Time Since Initiaion of Pumping	Temp (°C)	pH	Electrical Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Turbidity (NTU)	Apparent Colour¹ (TCU²)	True Colour³ (TCU)	Free Chlorine (mg/L)	Total Chlorine (mg/L)
Pressure Tank Bypass Nov. 23, 2022	10 minutes	10.84	7.22	1640	1050	2.5	-	-	-	-
	15 minutes	10.81	7.19	1640	1050	2.3	-	-	-	-
Pressure Tank Bypass June 28, 2023	10 minutes	15.7	7.84	1519	762	4.04	10	-	<0.02	<0.02

NOTES:

1. Apparent Colour = Unfiltered sample
2. TCU = True Colour Units
3. True Colour = Sample filtered using 0.45 micron filter
4. 'ND' = No concentration detected above method detection limit



Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Brent Redmond

Client PO:
Project: 101377.001
Custody: 17552

Report Date: 1-Dec-2022
Order Date: 23-Nov-2022

Order #: 2248286

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

Parcel ID	Client ID
2248286-03	PW-122

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

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

Report Date: 01-Dec-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

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	24-Nov-22	24-Nov-22
Ammonia, as N	EPA 351.2 - Auto Colour	24-Nov-22	25-Nov-22
Anions	EPA 300.1 - IC	28-Nov-22	28-Nov-22
Colour	SM2120 - Spectrophotometric	24-Nov-22	25-Nov-22
Colour, apparent	SM2120 - Spectrophotometric	24-Nov-22	25-Nov-22
Conductivity	EPA 9050A- probe @25 °C	24-Nov-22	24-Nov-22
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	25-Nov-22	25-Nov-22
E. coli	MOE E3407	24-Nov-22	24-Nov-22
Fecal Coliform	SM 9222D	24-Nov-22	24-Nov-22
Hardness	Hardness as CaCO ₃	24-Nov-22	24-Nov-22
Heterotrophic Plate Count	SM 9215C	24-Nov-22	24-Nov-22
Metals, ICP-MS	EPA 200.8 - ICP-MS	24-Nov-22	24-Nov-22
pH	EPA 150.1 - pH probe @25 °C	24-Nov-22	24-Nov-22
Phenolics	EPA 420.2 - Auto Colour, 4AAP	24-Nov-22	24-Nov-22
Hardness	Hardness as CaCO ₃	24-Nov-22	24-Nov-22
Sulphide	SM 4500SE - Colourimetric	24-Nov-22	25-Nov-22
Tannin/Lignin	SM 5550B - Colourimetric	28-Nov-22	29-Nov-22
Total Coliform	MOE E3407	24-Nov-22	24-Nov-22
Total Dissolved Solids	SM 2540C - gravimetric, filtration	24-Nov-22	25-Nov-22
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	24-Nov-22	25-Nov-22
Turbidity	SM 2130B - Turbidity meter	24-Nov-22	24-Nov-22

Certificate of Analysis

Report Date: 01-Dec-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

		Client ID:	PW-122	-
		Sample Date:	23-Nov-22 13:30	-
		Sample ID:	2248286-03	-
		MDL/Units	Drinking Water	-
Microbiological Parameters				
E. coli	1 CFU/100mL		-	-
Fecal Coliforms	1 CFU/100mL		-	-
Total Coliforms	1 CFU/100mL		-	-
Heterotrophic Plate Count	10 CFU/mL		-	-
General Inorganics				
Alkalinity, total	5 mg/L		-	-
Ammonia as N	0.01 mg/L		0.20	-
Dissolved Organic Carbon	0.5 mg/L		-	-
Colour	2 TCU		-	-
Colour, apparent	2 ACU		-	-
Conductivity	5 uS/cm		-	-
Hardness	mg/L		487	-
Hardness	mg/L		-	-
pH	0.1 pH Units		-	-
Phenolics	0.001 mg/L		-	-
Total Dissolved Solids	10 mg/L		-	-
Sulphide	0.02 mg/L		-	-
Tannin & Lignin	0.1 mg/L		-	-
Total Kjeldahl Nitrogen	0.1 mg/L		0.3	-
Turbidity	0.1 NTU		-	-
Anions				
Chloride	1 mg/L		326 [3]	-
Fluoride	0.1 mg/L		-	-
Nitrate as N	0.1 mg/L		<0.1 [3]	-
Nitrite as N	0.10 mg/L		<0.10 [3]	-
Sulphate	1 mg/L		-	-
Metals				
Calcium	0.1 mg/L		148	-
Iron	0.1 mg/L		-	-
Magnesium	0.2 mg/L		28.5	-
Manganese	0.005 mg/L		-	-
Potassium	0.1 mg/L		-	-
Sodium	0.2 mg/L		183	-

Certificate of Analysis

Report Date: 01-Dec-2022

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

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%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									
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						
Fecal Coliforms	ND	1	CFU/100mL						
Total Coliforms	ND	1	CFU/100mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Certificate of Analysis

Report Date: 01-Dec-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Alkalinity, total	259	5	mg/L	266			2.5	14	
Ammonia as N	0.190	0.01	mg/L	0.204			6.7	17.7	
Dissolved Organic Carbon	8.8	0.5	mg/L	9.7			10.2	37	
Colour	4	2	TCU	4			0.0	12	
Colour, apparent	29	2	ACU	30			3.4	12	
Conductivity	955	5	uS/cm	1000			4.9	5	
pH	7.6	0.1	pH Units	7.5			1.5	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	100	10	mg/L	96.0			4.1	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	0.4	0.1	mg/L	0.4			4.8	11	
Total Kjeldahl Nitrogen	1.05	0.1	mg/L	1.11			5.1	16	
Turbidity	9.8	0.1	NTU	9.7			1.1	10	
Metals									
Calcium	8.3	0.1	mg/L	8.0			2.5	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Magnesium	2.7	0.2	mg/L	2.6			0.8	20	
Manganese	ND	0.005	mg/L	ND			NC	20	
Potassium	0.8	0.1	mg/L	0.7			4.7	20	
Sodium	17.9	0.2	mg/L	17.7			1.2	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	BAC14
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	BAC14
Heterotrophic Plate Count	60	10	CFU/mL	80			29.0	30	

Certificate of Analysis

Report Date: 01-Dec-2022

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Ammonia as N	0.466	0.01	mg/L	0.204	105	81-124			
Dissolved Organic Carbon	12.4	0.5	mg/L	3.1	93.2	60-133			
Phenolics	0.026	0.001	mg/L	ND	104	67-133			
Total Dissolved Solids	98.0	10	mg/L	ND	98.0	75-125			
Sulphide	0.51	0.02	mg/L	ND	101	79-115			
Tannin & Lignin	1.3	0.1	mg/L	0.4	86.4	71-113			
Total Kjeldahl Nitrogen	1.73	0.1	mg/L	ND	86.6	81-126			
Metals									
Calcium	17200	0.1	mg/L	8050	91.8	80-120			
Iron	2250	0.1	mg/L	62.9	87.4	80-120			
Magnesium	12000	0.2	mg/L	2640	94.0	80-120			
Manganese	56.7	0.005	mg/L	2.34	109	80-120			
Potassium	9590	0.1	mg/L	719	88.7	80-120			
Sodium	25400	0.2	mg/L	17700	76.9	80-120			QM-07

Certificate of Analysis

Report Date: 01-Dec-2022

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

Order Date: 23-Nov-2022

Client PO:

Project Description: 101377.001

Qualifier Notes:

Sample Qualifiers :

3 : Subcontracted analysis - Eurofins Environment Testing

QC Qualifiers :

BAC14 A2C - Background counts greater than 200

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

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

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

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

Client PO:
Project: 100165.024
Custody: 17254

Report Date: 6-Jul-2023
Order Date: 28-Jun-2023

Order #: 2326325

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

Parcel ID	Client ID
2326325-01	PW-122
2326325-02	PW-122 (Filtered)

Approved By:



Dale Robertson, BSc

Laboratory Director

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

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	30-Jun-23	30-Jun-23
Ammonia, as N	EPA 351.2 - Auto Colour	30-Jun-23	30-Jun-23
Anions	EPA 300.1 - IC	29-Jun-23	29-Jun-23
Colour	SM2120 - Spectrophotometric	29-Jun-23	29-Jun-23
Colour, apparent	SM2120 - Spectrophotometric	29-Jun-23	29-Jun-23
Conductivity	EPA 9050A- probe @25 °C	30-Jun-23	30-Jun-23
Dissolved Organic Carbon	MOE 3247B - Combustion IR	29-Jun-23	30-Jun-23
E. coli	MOE E3407	29-Jun-23	29-Jun-23
Fecal Coliform	SM 9222D	29-Jun-23	29-Jun-23
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	4-Jul-23	4-Jul-23
Metals, ICP-MS	EPA 200.8 - ICP-MS	28-Jun-23	29-Jun-23
pH	EPA 150.1 - pH probe @25 °C	30-Jun-23	30-Jun-23
Phenolics	EPA 420.2 - Auto Colour, 4AAP	29-Jun-23	29-Jun-23
Hardness	Hardness as CaCO ₃	28-Jun-23	29-Jun-23
Sulphide	SM 4500SE - Colourimetric	29-Jun-23	30-Jun-23
Tannin/Lignin	SM 5550B - Colourimetric	30-Jun-23	30-Jun-23
Total Coliform	MOE E3407	29-Jun-23	29-Jun-23
Total Dissolved Solids	SM 2540C - gravimetric, filtration	30-Jun-23	30-Jun-23
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	29-Jun-23	30-Jun-23
Turbidity	SM 2130B - Turbidity meter	29-Jun-23	29-Jun-23
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	2-Jul-23	2-Jul-23

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Client ID:	PW-122	PW-122 (Filtered)	-	-	-	-
Sample Date:	28-Jun-23 12:15	28-Jun-23 12:15	-	-	-	-
Sample ID:	2326325-01	2326325-02	-	-	-	-
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	314	-	-	-	-
Ammonia as N	0.01 mg/L	0.17	-	-	-	-
Dissolved Organic Carbon	0.5 mg/L	3.0	-	-	-	-
Colour	2 TCU	9	-	-	-	-
Colour, apparent	2 ACU	72	-	-	-	-
Conductivity	5 uS/cm	1690	-	-	-	-
Hardness	mg/L	432	-	-	-	-
pH	0.1 pH Units	7.6	-	-	-	-
Phenolics	0.001 mg/L	0.014	-	-	-	-
Total Dissolved Solids	10 mg/L	948	-	-	-	-
Sulphide	0.02 mg/L	0.27	-	-	-	-
Tannin & Lignin	0.1 mg/L	0.1	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.2	-	-	-	-
Turbidity	0.1 NTU	11.5	-	-	-	-

Anions

Chloride	1 mg/L	313	-	-	-	-
Fluoride	0.1 mg/L	0.2	-	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-	-
Sulphate	1 mg/L	80	-	-	-	-

Metals

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Client ID:	PW-122	PW-122 (Filtered)	-	-	-	-
Sample Date:	28-Jun-23 12:15	28-Jun-23 12:15	-	-	-	-
Sample ID:	2326325-01	2326325-02	-	-	-	-
Matrix:	Drinking Water	Drinking Water	-	-	-	-
MDL/Units						

Metals

Mercury	0.0001 mg/L	<0.0001	-	-	-	-
Aluminum	0.001 mg/L	0.003	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	1.07	1.02	-	-	-
Beryllium	0.0005 mg/L	<0.0005	<0.0005	-	-	-
Boron	0.01 mg/L	0.05	0.05	-	-	-
Cadmium	0.0001 mg/L	<0.0001	<0.0001	-	-	-
Calcium	0.1 mg/L	128	126	-	-	-
Chromium	0.001 mg/L	<0.001	<0.001	-	-	-
Cobalt	0.0005 mg/L	<0.0005	<0.0005	-	-	-
Copper	0.0005 mg/L	0.0079	0.0018	-	-	-
Iron	0.1 mg/L	1.2	1.1	-	-	-
Lead	0.0001 mg/L	0.0004	<0.0001	-	-	-
Magnesium	0.2 mg/L	27.2	28.9	-	-	-
Manganese	0.005 mg/L	0.134	0.131	-	-	-
Molybdenum	0.0005 mg/L	<0.0005	<0.0005	-	-	-
Nickel	0.001 mg/L	0.001	0.001	-	-	-
Potassium	0.1 mg/L	5.2	7.3	-	-	-
Selenium	0.001 mg/L	<0.001	<0.001	-	-	-
Silver	0.0001 mg/L	<0.0001	<0.0001	-	-	-
Sodium	0.2 mg/L	157	200	-	-	-
Strontium	0.01 mg/L	1.85	2.24	-	-	-
Thallium	0.001 mg/L	<0.001	<0.001	-	-	-
Uranium	0.0001 mg/L	0.0001	0.0001	-	-	-

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Client ID:	PW-122	PW-122 (Filtered)	-	-	-	-
Sample Date:	28-Jun-23 12:15	28-Jun-23 12:15	-	-	-	-
Sample ID:	2326325-01	2326325-02	-	-	-	-
Matrix:	Drinking Water	Drinking Water	-	-	-	-
MDL/Units						

Metals

Vanadium	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
Zinc	0.005 mg/L	0.058	0.006	-	-	-	-

Volatiles

Acetone	5 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 ug/L	<1.0	-	-	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-	-	-
Chloromethane	3 ug/L	<3.0	-	-	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-	-	-
Dichlorodifluoromethane	1 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	-	-	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-	-	-

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Client ID:	PW-122	PW-122 (Filtered)	-	-	-	-
Sample Date:	28-Jun-23 12:15	28-Jun-23 12:15	-	-	-	-
Sample ID:	2326325-01	2326325-02	-	-	-	-
Matrix:	Drinking Water	Drinking Water	-	-	-	-
MDL/Units						

Volatiles

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 ug/L	<1.0	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5 ug/L	<5.0	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10 ug/L	<10.0	-	-	-	-
Methyl Isobutyl Ketone	5 ug/L	<5.0	-	-	-	-
Methyl tert-butyl ether	2 ug/L	<2.0	-	-	-	-
Methylene Chloride	5 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 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	-	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-	-

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Client ID:	PW-122	PW-122 (Filtered)	-	-	
Sample Date:	28-Jun-23 12:15	28-Jun-23 12:15	-	-	-
Sample ID:	2326325-01	2326325-02	-	-	
Matrix:	Drinking Water	Drinking Water	-	-	
MDL/Units					

Volatiles

Dibromofluoromethane	Surrogate	114%	-	-	-	-
Toluene-d8	Surrogate	104%	-	-	-	-
4-Bromofluorobenzene	Surrogate	105%	-	-	-	-

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

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					
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								
Mercury	ND	0.0001	mg/L					
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					

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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					
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					
Total Coliforms	ND	1	CFU/100mL					
Fecal 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					

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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					
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					
1,1,1,2,2-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					

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: 4-Bromofluorobenzene	85.0		%	106	50-140			
Surrogate: Dibromofluoromethane	87.6		%	110	50-140			
Surrogate: Toluene-d8	84.9		%	106	50-140			

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	313	1	mg/L	313			0.1	20	
Fluoride	0.23	0.1	mg/L	0.24			3.2	20	
Nitrate as N	ND	0.1	mg/L	ND			NC	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
Sulphate	80.6	1	mg/L	80.4			0.2	20	
General Inorganics									
Alkalinity, total	314	5	mg/L	314			0.2	14	
Ammonia as N	0.168	0.01	mg/L	0.172			2.2	17.7	
Dissolved Organic Carbon	2.6	0.5	mg/L	3.0			10.7	37	
Colour	9	2	TCU	9			0.0	12	
Colour, apparent	72	2	ACU	72			0.0	12	
Conductivity	1690	5	uS/cm	1690			0.5	5	
pH	7.7	0.1	pH Units	7.6			0.3	3.3	
Phenolics	0.013	0.001	mg/L	0.014			4.4	10	
Total Dissolved Solids	954	10	mg/L	948			0.6	10	
Sulphide	0.28	0.02	mg/L	0.27			3.0	10	
Tannin & Lignin	0.1	0.1	mg/L	0.1			NC	11	
Total Kjeldahl Nitrogen	0.22	0.1	mg/L	0.20			11.0	16	
Turbidity	ND	0.1	NTU	ND			NC	10	
Metals									
Mercury	ND	0.0001	mg/L	ND			NC	20	
Aluminum	0.038	0.001	mg/L	0.038			0.2	20	
Antimony	ND	0.0005	mg/L	ND			NC	20	
Arsenic	ND	0.001	mg/L	ND			NC	20	
Barium	0.014	0.001	mg/L	0.014			2.1	20	
Beryllium	ND	0.0005	mg/L	ND			NC	20	
Boron	ND	0.01	mg/L	ND			NC	20	
Cadmium	ND	0.0001	mg/L	ND			NC	20	
Calcium	7.7	0.1	mg/L	7.7			0.3	20	
Chromium	ND	0.001	mg/L	ND			NC	20	

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Cobalt	ND	0.0005	mg/L	ND			NC	20	
Copper	0.0035	0.0005	mg/L	0.0035			0.1	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Lead	0.0003	0.0001	mg/L	0.0003			1.8	20	
Magnesium	1.8	0.2	mg/L	1.8			0.0	20	
Manganese	ND	0.005	mg/L	ND			NC	20	
Molybdenum	ND	0.0005	mg/L	ND			NC	20	
Nickel	ND	0.001	mg/L	ND			NC	20	
Potassium	0.6	0.1	mg/L	0.7			4.2	20	
Selenium	ND	0.001	mg/L	ND			NC	20	
Silver	ND	0.0001	mg/L	ND			NC	20	
Sodium	14.6	0.2	mg/L	14.3			2.2	20	
Thallium	ND	0.001	mg/L	ND			NC	20	
Uranium	ND	0.0001	mg/L	ND			NC	20	
Vanadium	ND	0.0005	mg/L	ND			NC	20	
Zinc	ND	0.005	mg/L	ND			NC	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	2.90	0.5	ug/L	2.44			17.2	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	12.7	0.5	ug/L	13.3			4.8	30	
Chloromethane	ND	3.0	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	0.5	ug/L	ND			NC	30	
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	

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	84.4		%		106	50-140			
Surrogate: Dibromofluoromethane	95.7		%		120	50-140			
Surrogate: Toluene-d8	84.4		%		106	50-140			

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	323	1	mg/L	313	105	70-124			
Fluoride	1.22	0.1	mg/L	0.24	98.3	70-130			
Nitrate as N	1.06	0.1	mg/L	ND	106	77-126			
Nitrite as N	0.887	0.05	mg/L	ND	88.7	82-115			
Sulphate	88.1	1	mg/L	80.4	77.0	70-130			
General Inorganics									
Ammonia as N	1.22	0.01	mg/L	0.172	105	81-124			
Dissolved Organic Carbon	10.0	0.5	mg/L	ND	100	60-133			
Phenolics	0.039	0.001	mg/L	0.014	102	67-133			
Total Dissolved Solids	94.0	10	mg/L	ND	94.0	75-125			
Sulphide	0.74	0.02	mg/L	0.27	95.2	79-115			
Tannin & Lignin	1.1	0.1	mg/L	0.1	98.2	71-113			
Total Kjeldahl Nitrogen	1.22	0.1	mg/L	0.20	103	81-126			
Metals									
Mercury	0.0028	0.0001	mg/L	ND	91.8	70-130			
Aluminum	84.8	0.001	mg/L	38.2	93.1	80-120			
Antimony	40.6	0.0005	mg/L	0.402	80.3	80-120			
Arsenic	53.6	0.001	mg/L	0.361	106	80-120			
Barium	62.6	0.001	mg/L	13.6	98.0	80-120			
Beryllium	54.7	0.0005	mg/L	0.0429	109	80-120			
Boron	53.7	0.01	mg/L	5.06	97.3	80-120			
Cadmium	51.6	0.0001	mg/L	0.0323	103	80-120			
Calcium	17000	0.1	mg/L	7700	93.4	80-120			
Chromium	53.3	0.001	mg/L	0.153	106	80-120			
Cobalt	51.1	0.0005	mg/L	0.0429	102	80-120			
Copper	52.6	0.0005	mg/L	3.48	98.2	80-120			
Iron	2230	0.1	mg/L	5.8	88.9	80-120			
Lead	47.5	0.0001	mg/L	0.330	94.4	80-120			
Magnesium	11000	0.2	mg/L	1760	92.3	80-120			
Manganese	55.5	0.005	mg/L	3.60	104	80-120			

Certificate of Analysis

Report Date: 06-Jul-2023

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Molybdenum	48.2	0.0005	mg/L	0.314	95.7	80-120			
Nickel	50.9	0.001	mg/L	0.488	101	80-120			
Potassium	10300	0.1	mg/L	667	96.5	80-120			
Selenium	49.8	0.001	mg/L	0.147	99.3	80-120			
Silver	49.8	0.0001	mg/L	0.0381	99.5	80-120			
Sodium	23200	0.2	mg/L	14300	89.8	80-120			
Thallium	49.2	0.001	mg/L	0.036	98.2	80-120			
Uranium	48.7	0.0001	mg/L	0.0292	97.3	80-120			
Vanadium	52.1	0.0005	mg/L	0.204	104	80-120			
Zinc	52.1	0.005	mg/L	2.63	98.9	80-120			
Volatiles									
Acetone	72.7	5.0	ug/L	ND	72.7	50-140			
Benzene	25.7	0.5	ug/L	ND	64.4	60-130			
Bromodichloromethane	34.0	0.5	ug/L	ND	84.9	60-130			
Bromoform	24.2	0.5	ug/L	ND	60.4	60-130			
Bromomethane	43.5	0.5	ug/L	ND	109	50-140			
Carbon Tetrachloride	37.8	0.2	ug/L	ND	94.5	60-130			
Chlorobenzene	32.8	0.5	ug/L	ND	81.9	60-130			
Chloroethane	35.2	1.0	ug/L	ND	87.9	50-140			
Chloroform	37.2	0.5	ug/L	ND	93.1	60-130			
Chloromethane	41.4	3.0	ug/L	ND	103	50-140			
Dibromochloromethane	37.1	0.5	ug/L	ND	92.8	60-130			
Dichlorodifluoromethane	46.1	1.0	ug/L	ND	115	50-140			
1,2-Dibromoethane	37.7	0.2	ug/L	ND	94.3	60-130			
1,2-Dichlorobenzene	29.8	0.5	ug/L	ND	74.6	60-130			
1,3-Dichlorobenzene	31.0	0.5	ug/L	ND	77.5	60-130			
1,4-Dichlorobenzene	30.0	0.5	ug/L	ND	75.0	60-130			
1,1-Dichloroethane	38.1	0.5	ug/L	ND	95.2	60-130			
1,2-Dichloroethane	27.9	0.5	ug/L	ND	69.7	60-130			
1,1-Dichloroethylene	45.2	0.5	ug/L	ND	113	60-130			
cis-1,2-Dichloroethylene	36.2	0.5	ug/L	ND	90.6	60-130			

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
trans-1,2-Dichloroethylene	39.8	0.5	ug/L	ND	99.5	60-130			
1,2-Dichloropropane	25.8	0.5	ug/L	ND	64.5	60-130			
cis-1,3-Dichloropropylene	39.3	0.5	ug/L	ND	98.3	60-130			
trans-1,3-Dichloropropylene	44.8	0.5	ug/L	ND	112	60-130			
Ethylbenzene	33.8	0.5	ug/L	ND	84.4	60-130			
Hexane	44.3	1.0	ug/L	ND	111	60-130			
Methyl Ethyl Ketone (2-Butanone)	66.0	5.0	ug/L	ND	66.0	50-140			
Methyl Butyl Ketone (2-Hexanone)	65.1	10.0	ug/L	ND	65.1	50-140			
Methyl Isobutyl Ketone	86.5	5.0	ug/L	ND	86.5	50-140			
Methyl tert-butyl ether	80.0	2.0	ug/L	ND	80.0	50-140			
Methylene Chloride	37.2	5.0	ug/L	ND	93.0	60-130			
Styrene	27.8	0.5	ug/L	ND	69.6	60-130			
1,1,1,2-Tetrachloroethane	45.6	0.5	ug/L	ND	114	60-130			
1,1,2,2-Tetrachloroethane	33.7	0.5	ug/L	ND	84.2	60-130			
Tetrachloroethylene	32.6	0.5	ug/L	ND	81.5	60-130			
Toluene	32.8	0.5	ug/L	ND	82.1	60-130			
1,1,1-Trichloroethane	40.4	0.5	ug/L	ND	101	60-130			
1,1,2-Trichloroethane	25.9	0.5	ug/L	ND	64.7	60-130			
Trichloroethylene	25.5	0.5	ug/L	ND	63.8	60-130			
Trichlorofluoromethane	43.7	1.0	ug/L	ND	109	60-130			
1,3,5-Trimethylbenzene	33.7	0.5	ug/L	ND	84.3	60-130			
Vinyl chloride	46.4	0.5	ug/L	ND	116	50-140			
m,p-Xylenes	67.5	0.5	ug/L	ND	84.4	60-130			
o-Xylene	32.5	0.5	ug/L	ND	81.2	60-130			
Surrogate: 4-Bromofluorobenzene	89.8		%		112	50-140			
Surrogate: Dibromofluoromethane	98.6		%		123	50-140			
Surrogate: Toluene-d8	80.0		%		100	50-140			

Certificate of Analysis

Report Date: 06-Jul-2023

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

Order Date: 28-Jun-2023

Client PO:

Project Description: 100165.024

Qualifier Notes:

Sample Qualifiers :

QC Qualifiers:

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.



Parcel ID: 2326325



arent Blvd.
K1G 4J8
17
cellabs.com
.com

Parcel Order Number

2326325

Chain Of Custody

Ontario Drinking Water Samples

No 17254

Client Name: Gemtec	Project Ref: 100165.024	Waterworks Name:	Samples Taken By:
Contact Name: Andrius Paznekas	Quote #:	Waterworks Number:	Name: Bella Ruppert
Address:	PO #:	Address:	Signature: <i>Bella Ruppert</i>
After Hours Contact:	E-mail: andrius.paznekas@gemtec.ca	Public Health Unit:	Page 1 of 1
Telephone: 613-295-2425	Fax:	Turn Around Time Required:	<input type="checkbox"/> 1 day <input type="checkbox"/> 2 day <input type="checkbox"/> 3 day <input checked="" type="checkbox"/> 4 day

Samples Submitted Under: (Indicate ONLY one) <input type="checkbox"/> ON REG 170/03 <input type="checkbox"/> ON REG 319/08 <input type="checkbox"/> Private Well <input type="checkbox"/> ON REG 243/07 <input checked="" type="checkbox"/> Other: OReg 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?: <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		Are these samples for human consumption?: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		All information must be completed before samples will be processed.														
LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y/N	Resample	SAMPLE COLLECTED		# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S/F (REG 243)	Total Coliform/E. Coli	HPC	Lead	THM	Subdivision Report	Filtered/unfiltered metals	VOC	
						DATE	TIME											
1	PW-122	R	G	N		06-28-23	12:15	13										
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments: - Colour in NW + TCU		Method of Delivery: Walk in	
Relinquished By (Sign): <i>Bella Ruppert</i>	Received By: <i>[Signature]</i>	Received at Lab: SD	Verified By: <i>[Signature]</i>
Relinquished By (Print): Bella Ruppert	Date/Time: 06/28/23 1:23pm	Date/Time: June 28 2023 3:20 pm	Date/Time: June 28 2023 1:24
Date/Time: 06-28-23, 1:20 p.m.	Temperature: 12.8 °C	Temperature: 6.4 °C	pH Verified: <input type="checkbox"/> By: <i>[Signature]</i>



APPENDIX E

LSI Calculations

Langelier Saturation Index Calculation

Project: 100165.024

Location: 106 & 122 Reis Road, Carp, ON.

Inputs

pH =	7.6	
Total Dissolved Solids =	948	
Calcium (as CaCO ₃) =	320	Note: Ca (as CaCO ₃) = 2.5 x Ca
Alkalinity (as CaCO ₃) =	314	
Temperature (°C) =	15.7	Field Measured

Where Langelier Saturation Index (LSI) is defined as: $LSI = pH - pH_s$

Where: $pH_s = (9.3 + A + B) - (C + D)$

And: $A = \frac{(\log_{10}[TDS] - 1)}{10}$

$$B = -13.12 \cdot \log_{10}[Temp + 273] + 34.55$$

$$C = \log_{10}[Calcium] - 0.4$$

$$D = \log_{10}[Alkalinity]$$

Output:

A =	0.20
B =	2.27
C =	2.11
D =	2.50
pH _s =	7.16

LSI = 0.44

LSI Value

-2.0 to -0.5
-0.5 to 0.0
LSI = 0
0.0 to 0.5
0.5 to 2

Indication

Serious corrosion
Slight corrosion but non-scale forming
Balanced but corrosion possible
Slightly scale forming and corrosive
Scale forming but non corrosive



APPENDIX F

Nitrate Dilution Calculations

Table E1: Allowable Flows After Lot Removal - 122 Reis Rd

Site	Area (m ²)	Hard Surface Area (m ²)	Topography Factor	Soil Factor	Cover Factor	Infiltration Factor	Annual Water Surplus (m ³ /year)	Infiltration Volume (m ³ /year)
122 Reis Rd	5,673	4,191	0.20	0.40	0.10	0.70	0.383	2173

Hard Surface Area	Available Infiltration ¹ (litres per day)	Maximum Septic Flow- Conventional ² (litres per day)	Maximum Number of Users ³	Maximum Septic Flow- Advanced ² (litres per day)	Maximum Number of Users ³
<u>74%</u> ⁴	<u>1083</u>	<u>361</u>	<u>5</u>	<u>1083</u>	<u>14</u>

Notes:

1. Available infiltration (litres per day) = Infiltration volume (m³/year) x (1000 litres/m³) / (365 days/year) x (1 - hard surface area) x Infiltration Factor
2. Incorporates a value of 20 mg/L nitrate in the discharged effluent from the tertiary treatment system. The calculated maximum allowable flow is based on a simplification of the formula provided in Section 5.6.3, utilizing a concentration of 20 mg/L of Nitrate in the effluent discharging from the tertiary treatment unit
3. Assumes 75 litres per day per person
4. Existing hard surface coverage at 122 Reis Road following the lot removal.

Table E2: Allowable Flows After Lot Addition - 106 Reis Rd

Site	Area (m ²)	Hard Surface Area (m ²)	Topography Factor	Soil Factor	Cover Factor	Infiltration Factor	Annual Water Surplus (m ³ /year)	Infiltration Volume (m ³ /year)
106 Reis Road	12,736	7,938	0.20	0.40	0.10	0.70	0.383	4878

Hard Surface Area	Available Infiltration ¹ (litres per day)	Maximum Septic Flow- Conventional ² (litres per day)	Maximum Number of Users ³	Maximum Septic Flow- Advanced ² (litres per day)	Maximum Number of Users ³
<u>62%</u> ⁴	<u>3555</u>	<u>1185</u>	<u>16</u>	<u>3555</u>	<u>47</u>

Notes:

1. Available infiltration (litres per day) = Infiltration volume (m³/year) x (1000 litres/m³) / (365 days/year) x (1 - hard surface area) x Infiltration Factor
2. Incorporates a value of 20 mg/L nitrate in the discharged effluent from the tertiary treatment system. The calculated maximum allowable flow is based on a simplification of the formula provided in Section 5.6.3, utilizing a concentration of 20 mg/L of Nitrate in the effluent discharging from the tertiary treatment unit
3. Assumes 75 litres per day per person
4. Existing hard surface coverage at 106 Reis Road following the lot addition.

CarletonPlace+Appleton WATER BUDGET MEANS FOR THE PERIOD 1985-2020 DC20492

LAT.... 45.18 WATER HOLDING CAPACITY... 75 MM HEAT INDEX... 36.83
 LONG... 76.12 LOWER ZONE..... 45 MM A..... 1.082

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-9.4	64	17	23	1	1	0	39	58	74	297
28- 2	-8.1	52	15	26	1	1	0	39	68	75	349
31- 3	-2.2	61	29	77	7	7	0	98	24	75	410
30- 4	6.0	78	73	29	32	32	0	70	0	74	489
31- 5	13.3	77	77	0	82	82	0	14	0	56	566
30- 6	18.1	94	94	0	115	105	-10	8	0	37	661
31- 7	20.7	94	94	0	134	107	-27	5	0	19	756
31- 8	19.5	89	89	0	116	88	-28	1	0	19	846
30- 9	15.2	85	85	0	77	70	-7	5	0	30	932
31-10	8.4	88	86	1	37	37	0	20	0	60	88
30-11	1.6	76	58	12	11	11	0	46	6	73	164
31-12	-5.7	69	26	16	2	2	0	38	34	74	233
AVE	6.4 TTL	928	743	184	615	543	-72	383			

CarletonPlace+Appleton STANDARD DEVIATIONS FOR THE PERIOD 1985-2020 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	28	20	22	1	1	0	39	36	5	59
28- 2	2.6	22	16	25	1	1	0	32	42	0	65
31- 3	2.4	26	18	34	5	5	0	36	46	0	72
30- 4	1.6	41	40	47	8	8	0	59	0	5	92
31- 5	1.6	37	37	0	11	10	1	22	0	25	101
30- 6	1.2	39	39	0	8	18	19	14	0	31	110
31- 7	1.3	51	51	0	9	32	35	23	0	26	138
31- 8	1.1	42	42	0	7	28	30	2	0	28	141
30- 9	1.5	35	35	0	8	13	14	14	0	30	136
31-10	1.5	33	34	4	7	7	0	27	2	19	33
30-11	2.0	28	25	10	4	4	0	31	14	7	48
31-12	3.2	26	20	17	2	2	0	28	29	3	53

