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

October 3, 2023 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).
- 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.

## 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 on the Site, and within 500 metres of the Site include activities related to industrial operations within the 'commercial/industrial subdivision', private septic systems, and historical agricultural activities.

### 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 withing 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 and 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 and 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 at 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 |
| 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 |

| Well Construction Details | PW-122 (A320528) | PW-122 – Old Well (1532401) | PW 106 (A055265) |
|---|---|---|---|
| Total Well Depth | 49.7 metres | 15.24 metres | 73.15 metres |
| Bedrock Description | Limestone | Limestone | Limestone |

Notes: Following lot-line adjustment, PW-122 (old well) will be on the 106 Reis Road property. It is understood that the owner of 106 Reis Road may use the well for irrigation purposes. If the well will not be used, it is recommended that it be abandoned by a licensed well technician in accordance with O.Reg 903.

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 9 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 1,350 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).

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. 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 were exceeded in the water samples. No health-related exceedances were reported.

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 $CaCO_3$ on November 23, 2022 and June 238, 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 $CaCO_3$ 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 $CaCO_3$ is considered poor but tolerable and hardness levels exceeding 500 mg/L as $CaCO_3$ 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.

### 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.

## 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 presence of highly permeable soils, the Site may be hydrogeologically sensitive and protective measures should be considered.

## 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 s was calculated using the following information:

- Lot area:
  - 106 Reis Road (current): 9,884 $m^2$;
  - 122 Reis Road (current): 8,525 $m^2$;
  - 106 Reis Road (proposed – lot addition): 12,736 $m^2$;
  - 122 Reis Road (proposed – lot removal): 5,673 $m^2$;
- 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 current hard surface (Table 4) and the proposed hard surface areas (Table 5).

**Table 4: Calculated Maximum Septic Flows – Existing Conditions**

| | Maximum allowable septic flow | | Maximum Number of Users[2] | |
|---|---|---|---|---|
| Hard Surface Area (%) | Conventional Septic | Advanced Septic (50% nitrate reduction) | Conventional Septic | Advanced Septic[1] (50% nitrate reduction) |
| 106 Reis (66%)[(1)] | 817 | 2,450 | 11 | 33 |
| 122 Reis (65%)[(1)] | 721 | 2,163 | 10 | 29 |

Notes
1. Existing hard surface coverage provided by McIntosh Perry in CAD format.

**Table 5: Calculated Maximum Septic Flows – Proposed Lot Addition**

| | Maximum allowable septic flow | | Maximum Number of Users[2] | |
|---|---|---|---|---|
| Hard Surface Area (%) | 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 |

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 not sufficient to support the current property demands of 675 L/day and 9 employees. To continue the use of the conventional system installed at 122 Reis Road, the hard surface area of the property would have to be reduced to a total of 51%. Alternatively, an advanced treatment septic system can be installed at the property, which would increase the allowable flows to 1,089 L/day and 15 employees. Additional scenarios with varying hard surface percentages and number of employees are provided in Appendix E (Table E2 for 106 Reis Road and Table E4 for 122 Reis Road).

**Table 6: Calculated Maximum Septic Flows – Modifications to Hard Surface Area Required to Utilize Conventional Septic System.**

| Hard Surface Area | Maximum Septic Flow-Conventional[2] (litres per day) | Maximum Number of Users[3] |
|---|---|---|
| 106 Reis (71%)[1] | 904 | 12 |
| 122 Reis (51%) | 681 | 9 |

Notes:
1. The hard surface percentage displayed for 106 Reis Road is the maximum hard surface coverage the property can increase to, while still supporting 12 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. To continue the use of the conventional system installed at 106 Reis Road, the hard surface area of the property cannot exceed a total of 72% hard surface area. With the existing hard surface coverages, an advanced treatment septic system installation at 106 Reis Road after the lot line adjustment would support septic flows of 3,524 L/day and 47 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, under the following scenarios (see below). 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:
        - Maximum septic flow of 1,175 litres per day.
        - Conventional septic system.
        - Maximum of 16 employees.
    - 106 Reis Road – increase hard surface to maximum of 72% with current number of employees:
        - Maximum septic flow of 873 litres per day.
        - Conventional septic system.
        - Maximum of 12 employees.
    - Additional scenarios with varying hard surface coverage and maximum number of employees, while maintaining allowable septic flows as per MECP Procedure D-5-4 are presented in Table E2 in Appendix E.

- Following the lot line adjustment, site alterations will be required for 122 Reis Road to meet MECP Procedure D-5-4 predictive assessment for commercial/industrial properties based on the current number of employees (nine), which will involve reducing the hard surface coverage, reducing number of employees, or utilizing advanced treatment septic systems.
    - 122 Reis Road - maximum 51% hard surface (reduce hard surface areas)
        - Maximum septic flow of 681 litres per day.

        - Conventional septic system.
        - Maximum of 9 employees.
    - 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.

    - 122 Reis Road - maximum 74% hard surface and utilization of advanced septic treatment system
        - Maximum septic flow of 1,089 litres per day.
        - Advanced treatment septic system.
        - Maximum of 15 employees.
    - Additional scenarios with varying hard surface coverage and maximum number of employees, while maintaining allowable septic flows as per MECP Procedure D-5-4 are presented in Table E4 in Appendix E.

- 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 MCCRT and is considered to be safe for consumption. Groundwater treatment may be desirable 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. Consideration can be given to point of use treatment systems or using the groundwater for plumbing systems only and providing potable water to tenants / employees.

    - Hardness concentrations exceed the ODWQS operational objective of 80-100 mg/L. Water having a hardness over 100 mg/L is often softened for domestic use.

    - Manganese concentrations 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.

    - Iron concentrations 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 Guuideline D-5-5.

- True Colour levels 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.

- Sulfide concentrations exceed the ODWQS aesthetic objective of 0.05 mg/L. Sulphide can be effectively removed from well water using aeration treatment at lower levels.

- Total dissolved solids levels 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.

- Chloride levels 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. Alternatively, the Site water supply can be used strictly for plumbing and lawn care purposes, and drinking water can be supplied to the employees from an off-Site source (i.e. bottled water).

### 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.
- 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”.
    - If the old water supply well at 122 Reis Road (PW-122- Old Well) will no longer be in use, it is recommended that the well is abandoned by a qualified well technician, in accordance with O. Reg. 903.

### 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


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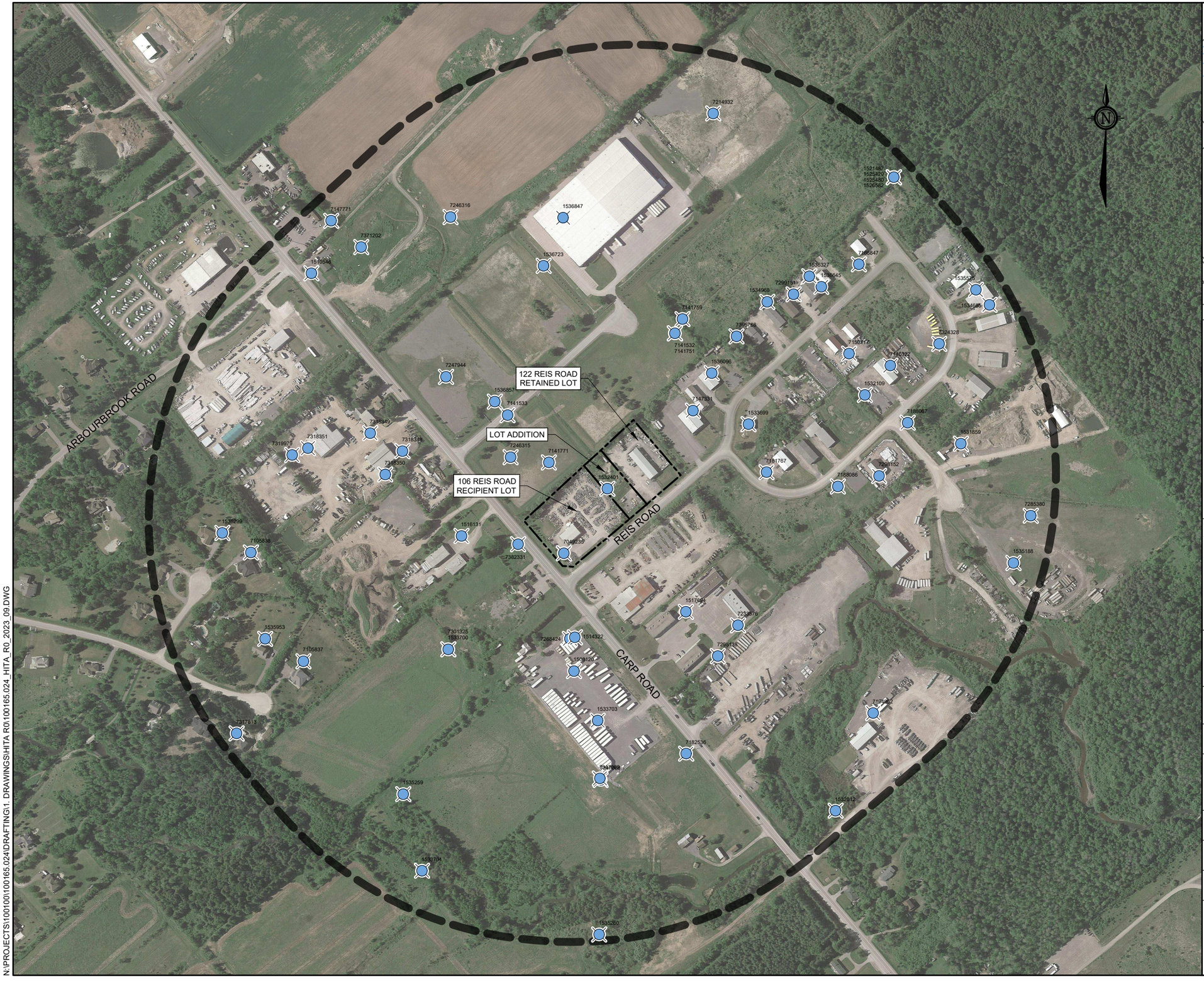
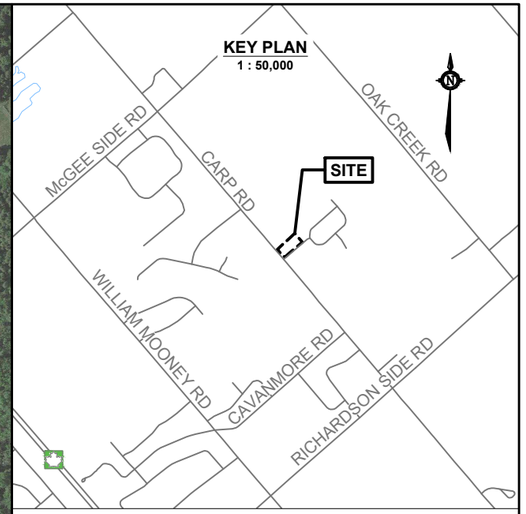
# APPENDIX A

Figures




## 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
2. All boundaries and dimensions are approximate
3. Contains information licensed under the Open Government Licence – Ontario
4. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
5. Geographic dataset source: Ontario GeoHub
6. 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 1:5,000

0 100 200 300m

DRAWING

SITE LOCATION PLAN

CLIENT

1694027 ONTARIO INC.

PROJECT

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

| DRAWN BY | CHECKED BY |
|---|---|
| S.L. | B.R. |
| PROJECT NO. | REVISION NO. |
| 100165.024 | 0 |
| DATE | FIGURE NO. |
| AUGUST 2023 | **FIGURE 1** |

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

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**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
2. All boundaries and dimensions are approximate
3. Contains information licensed under the Open Government Licence – Ontario
4. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
5. Geographic dataset source: Ontario GeoHub
6. 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

DETAILED SITE PLAN

CLIENT

1694027 ONTARIO INC.

PROJECT

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

| DRAWN BY | CHECKED BY |
|---|---|
| S.L. | B.R. |
| PROJECT NO. | REVISION NO. |
| 100165.024 | 0 |
| DATE | FIGURE NO. |
| AUGUST 2023 | **FIGURE 2** |

GEMTEC
Consulting Engineers and Scientists
32 Steacie Drive
Ottawa, ON, K2K 2A9
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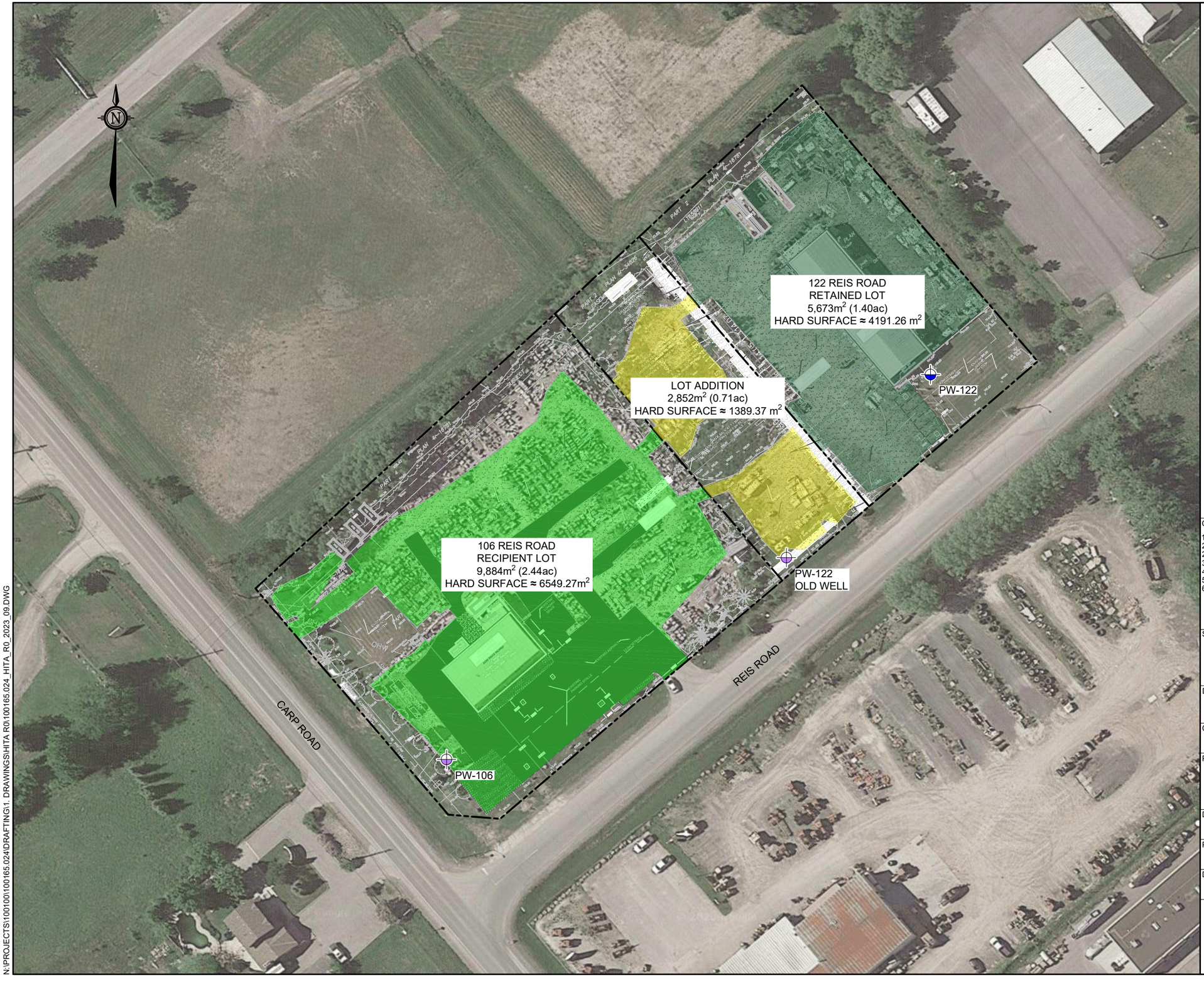
ottawa@gemtec.ca

N:\PROJECTS\100\100\100165.024\DRAFTING\1. DRAWINGS\HITA R0\100165.024_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)

1. Coordinate system: NAD83, UTM ZONE 18
2. Distances, elevations, and coordinates are shown in metres unless denoted otherwise
2. All boundaries and dimensions are approximate
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4. Maps Data: Google, @2023 CNES / Airbus, First Base Solutions, Maxar Technologies
5. Geographic dataset source: Ontario GeoHub
6. 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 | CHECKED BY |
|---|---|
| S.L. | B.R. |
| PROJECT NO. | REVISION NO. |
| 100165.024 | 0 |
| DATE | FIGURE NO. |
| AUGUST 2023 | **FIGURE 3** |

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# APPENDIX B

Water Well Record Summary

# MECP Online Well Database Summary (500m Radius)



| 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
CO = Commercial
DE = Dewatering
DO = Domestic
IN = Industrial
IR = Irrigation
MN = Municipal
MO = Monitoring
MT = Monitoring and Test Hole
NU = Not Used
OT = Other
PS = Public
ST = Livestock
TH = Test Hole

# MECP Online Well Database Summary (500m Radius)



| 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
CO = Commercial
DE = Dewatering
DO = Domestic
IN = Industrial
IR = Irrigation
MN = Municipal
MO = Monitoring
MT = Monitoring and Test Hole
NU = Not Used
OT = Other
PS = Public
ST = Livestock
TH = Test Hole

# MECP Online Well Database Summary (500m Radius)



| 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
CO = Commercial
DE = Dewatering
DO = Domestic
IN = Industrial
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MO = Monitoring
MT = Monitoring and Test Hole
NU = Not Used
OT = Other
PS = Public
ST = Livestock
TH = Test Hole

# MECP Online Well Database Summary (500m Radius)



| 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
CO = Commercial
DE = Dewatering
DO = Domestic
IN = Industrial
IR = Irrigation
MN = Municipal
MO = Monitoring
MT = Monitoring and Test Hole
NU = Not Used
OT = Other
PS = Public
ST = Livestock
TH = Test Hole

# MECP Online Well Database Summary (500m Radius)



| 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
CO = Commercial
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OT = Other
PS = Public
ST = Livestock
TH = Test Hole

# APPENDIX C

Water Well Records – Site Wells

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☐ Imperial

Well Tag No. (Place Sticker and/or Print Below) **Tag#:A320528**

# Well Record

*Regulation 903 Ontario Water Resources Act*

Page _____ of _____

## Well Owner's Information

| First Name | Last Name/Organization | E-mail Address | ☐ Well Constructed by Well Owner |
|---|---|---|---|
| | Grace Monuments | | |

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

## Well Location

| Address of Well Location (Street Number/Name) | Township | Lot | Concession |
|---|---|---|---|
| 122 Reis Road | West Carelton | 8 | 2 |

| County/District/Municipality | City/Town/Village | Province | Postal Code |
|---|---|---|---|
| Ottawa Carelton | Huntley | Ontario | K0A 1L0 |

| UTM Coordinates | Zone | Easting | Northing | Municipal Plan and Sublot Number | Other |
|---|---|---|---|---|---|
| NAD 83 | 18 | 422981 | 5011716 | " | |

## 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 | Depth (m/ft) To |
|---|---|---|---|---|---|
| Grey | Gravel | fill | Packed | 0' | 3' |
| Grey | Sand | gravel Boulders | Loose + Dence. | 3' | 10' |
| Grey | Gravel | Broken Rock. | | 10' | ~~23~~ 23' |
| Grey | Limestone. | | | 23' | 163' |

## Annular Space

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

## Method of Construction

☒ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, specify _____

☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

## Well Use

☐ Public ☒ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ 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 | Depth (m/ft) To |
|---|---|---|---|---|
| 6 | STEEL | 188 | +2' | 25' |

## Construction Record - Screen

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

## 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 _____

## Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 115

Pumping rate (l/min / GPM): 10

Duration of pumping: 1 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

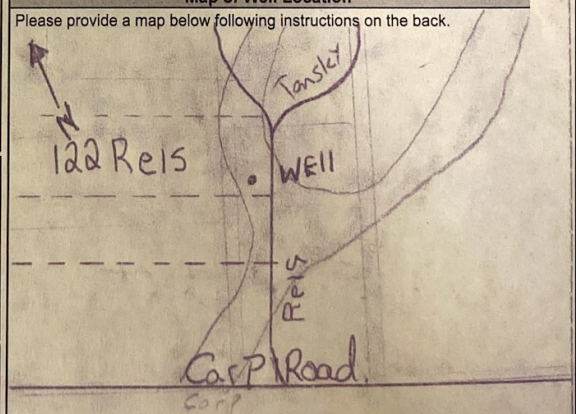
Well production (l/min/GPM): 12

Disinfected? ☒ Yes ☐ No

| Draw Down Time (min) | Draw Down Water Level (m/ft) | Recovery Time (min) | Recovery Water Level (m/ft) |
|---|---|---|---|
| Static Level | 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 |

## Map of Well Location

Please provide a map below following instructions on the back.




## Water Details

| Water found at Depth | Kind of Water | Hole Diameter Depth From | Depth To | Diameter (cm/in) |
|---|---|---|---|---|
| 21' (m/ft) ☐ Gas | ☐ Fresh ☐ Untested ☐ Other, specify | 0 | 23 | 8.5 |
| 38' (m/ft) ☐ Gas | ☐ Fresh ☐ Untested ☐ Other, specify | 23 | 163 | 6" |
| 160 (m/ft) ☐ Gas | ☐ Fresh ☐ Untested ☐ Other, specify | | | |

## Well Contractor and Well Technician Information

| Business Name of Well Contractor | Well Contractor's Licence No. |
|---|---|
| Colt's Plumbing inc. | 7716 |

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

| Province | Postal Code | Business E-mail Address |
|---|---|---|
| On | K0A2X0 | |

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

| Well Technician's Licence No. | Signature of Technician and/or Contractor | Date Submitted |
|---|---|---|
| | | 2022/06/27 |

Comments: 40' ℄ Reis + 5' off Lot line

| Well owner's information package delivered | Date Package Delivered | Date Work Completed |
|---|---|---|
| ☒ Yes ☐ No | 2022/06/27 | 2022/06/27 |

**Ministry Use Only**

Audit No. Z370232

Received

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**Contractor's Copy**

Ontario Ministry of the Environment

# The Ontario Water Resources Act
# WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 (1 2) **1532401** Municipality 1500S (10 14) Con. CON 02 (15 22 23 24)

| County or District | Township/Borough/City/Town/Village | Con | block | tract | survey, etc. | Lot (25-27) |
|---|---|---|---|---|---|---|
| Ottawa Carleton | West Carleton Huntley | 2 | | | | 8 |

Address: 164 Robertson Rd., Nepean ON. K2H 121

Date completed (48-53): 12 day 10 month 01 year

21 (1 2) UTM (10 12 17) Northing (18 24) RC (25) Elevation (26) RC (30) Basin Code (31) ii iii iv (47)

## LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

| General colour | Most common material | Other materials | General description | Depth - feet From | Depth - feet To |
|---|---|---|---|---|---|
| Brown | sand | | | 0 | 5 |
| Grey | sand gravel and boulders | | | 5 | 18 |
| Grey | gravel | broken rock | | 18 | 23'6" |
| Grey | Limestone | | | 23'6" | 50 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Note casing was left 4 ft. above ground level at time of drilling. | | | | | |
| | | | | | |

31 (10 14 15 21 32 43 54 65 75 80)

32

## 41 WATER RECORD

| Water found at - feet | Kind of water |
|---|---|
| 25 (10-13) | 1 ☐ Fresh 3 ☐ Sulphur 14; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas |
| 45 (15-18) | 1 NOT TESTED 3 ☐ Sulphur 19; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas |
| 20-23 | 1 ☐ Fresh 3 ☐ Sulphur 24; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas |
| 25-28 | 1 ☐ Fresh 3 ☐ Sulphur 29; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas |
| 30-33 | 1 ☐ Fresh 3 ☐ Sulphur 34; 2 ☐ Salty 4 ☐ Minerals; 6 ☐ Gas (60) |

## 51 CASING & OPEN HOLE RECORD

| Inside diam inches | Material | Wall thickness inches | Depth - feet From | Depth - feet To |
|---|---|---|---|---|
| | 1 ☒ Steel (12); 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☐ Open hole; 5 ☐ Plastic | .188 | 0 | 25 (15-16) |
| 17-18: 6 | 1 ☐ Steel (19); 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☒ Open hole; 5 ☐ Plastic | | 25 | 50 (20-23) |
| 24-25 | 1 ☐ Steel (26); 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☐ Open hole; 5 ☐ Plastic | | | 27-30 |

## SCREEN

| Sizes of opening (Slot No.) (31-33) | Diameter (34-38) inches | Length (39-40) feet |
|---|---|---|
| Material and type | Depth at top of screen (41-44) feet | (30) |

## 61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

| Depth set at - feet From | Depth set at - feet To | Material and type (Cement grout, bentonite, etc.) |
|---|---|---|
| 25 (10-13) | 0 (14-17) | Grouted Cement(5) |
| 18-21 | 22-25 | |
| 26-29 | 30-33 (80) | |

## 71 PUMPING TEST

Pumping test method (10): 1 ☒ Pump 2 ☐ Bailer

Pumping rate (11-14): 15 GPM

Duration of pumping (15-16): 1 Hours (17-18) Mins

25 Water levels during: 1 ☒ Pumping 2 ☐ Recovery

| Static level (19-21) | Water level end of pumping (22-24) | 15 minutes (26-28) | 30 minutes (29-31) | 45 minutes (32-34) | 60 minutes (35-37) |
|---|---|---|---|---|---|
| 4 feet | 25 feet | 48 feet | 48 feet | 25 feet | 25 feet |

If flowing give rate (38-41): GPM

Pump intake set at: feet

Water at end of test (42): ☐ Clear ☒ Cloudy

Recommended pump type: ☐ Shallow ☒ Deep

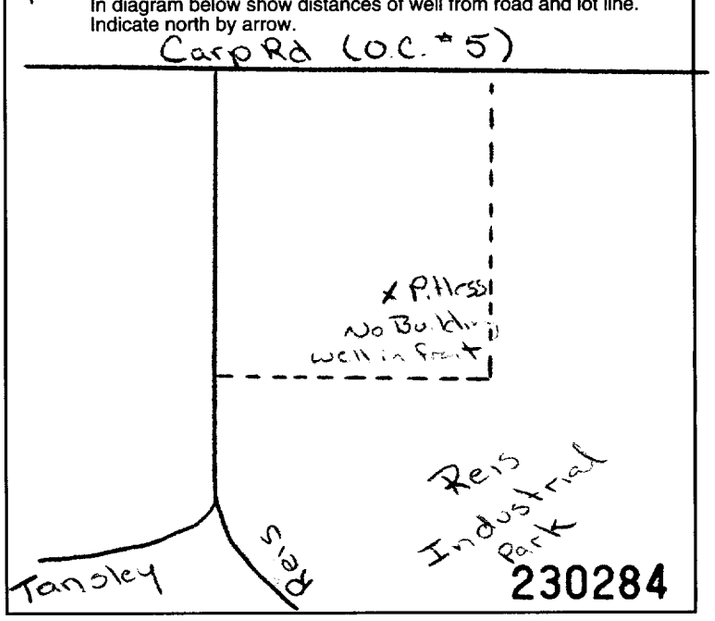
Recommended pump setting (43-45): 30 feet

Recommended pump rate (46-49): 5 GPM

(50-53)

## LOCATION OF WELL

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




## FINAL STATUS OF WELL (54)

1 ☒ Water supply; 2 ☐ Observation well; 3 ☐ Test hole; 4 ☐ Recharge well; 5 ☐ Abandoned, insufficient supply; 6 ☐ Abandoned, poor quality; 7 ☐ Abandoned (Other); 8 ☐ Dewatering; 9 ☐ Unfinished; 10 ☐ Replacement well

## WATER USE (55-56)

1 ☒ Domestic; 2 ☐ Stock; 3 ☐ Irrigation; 4 ☐ Industrial; 5 ☐ Commercial; 6 ☐ Municipal; 7 ☐ Public supply; 8 ☐ Cooling & air conditioning; 9 ☐ Not use; 10 ☐ Other

## METHOD OF CONSTRUCTION (57)

1 ☐ Cable tool; 2 ☐ Rotary (conventional); 3 ☐ Rotary (reverse); 4 ☐ Rotary (air); 5 ☒ Air percussion; 6 ☐ Boring; 7 ☐ Diamond; 8 ☐ Jetting; 9 ☐ Driving; 10 ☐ Digging; 11 ☐ Other

| Name of Well Contractor | Well Contractor's Licence No. |
|---|---|
| Capital Water Supply Ltd. | 1558 |
| Address: Box 490, Stittsville, ON. K2S 1A6 | |
| Name of Well Technician: S. Miller | Well Technician's Licence No.: T0097 |
| Signature of Technician/Contractor | Submission date: day 16 mo 10 yr 01 |

## MINISTRY USE ONLY

| Data source (58) | Contractor (59-62) | Date received (63-68) (80) |
|---|---|---|
| | 1558 | NOV 27 2001 |
| Date of inspection | Inspector | |
| Remarks: CSS.ES | | |

0506 (07/00) Front Form 9

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Ontario Ministry of the Environment

Well Tag Number (Plate number below): A 055265

A055265

# Well Record

*Regulation 903 Ontario Water Resources Act*

page ___ of ___

## 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**

[redacted]

Address of Well Location (County/District/Municipality): Ottawa - Carleton | Township: West Carleton | Lot: 8 | Concession: 9

RR#/Street Number/Name: #106 Reis Road | City/Town/Village: Carp | Site/Compartment/Block/Tract etc.: Plan 4M-745 Block 1 Part 4, 5, 6, 7

GPS Reading | NAD: 8 3 | Zone: 18 | Easting: 422867 | Northing: 5017099 | Unit Make/Model: Magellan | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

## Log of Overburden and Bedrock Materials (see instructions)

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

## Hole Diameter

| Depth From | Depth To (Metres) | Diameter (Centimetres) |
|---|---|---|
| 0 | 73.15 | 15.88 |

## Water Record

| Water found at ___ Metres | Kind of Water | | |
|---|---|---|---|
| 69.19 m | ☐ Fresh | ☒ Sulphur | ☐ Gas |
| ☐ Salty | ☐ Minerals | ☐ Other: | |
| ___ m | ☐ Fresh | ☐ Sulphur | ☐ Gas |
| ☐ Salty | ☐ Minerals | ☐ Other: | |
| ___ m | ☐ Fresh | ☐ Sulphur | ☐ Gas |
| ☐ Salty | ☐ Minerals | ☐ Other: | |

TESTED

After test of well yield, water was: ☒ Clear and sediment free ☐ Other, specify

CLEAR NOT TESTED

Chlorinated ☒ Yes ☐ No

## Construction Record

| Inside diam (centimetres) | Material | Wall thickness (centimetres) | Depth From | Depth To (Metres) |
|---|---|---|---|---|
| **Casing** | | | | |
| 15.88 | ☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized | 0 | .48 | 10.67 |
| | ☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized | | | |
| | ☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized | | | |
| **Screen** | | | | |
| Outside diam | ☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized | Slot No. | | |
| **No Casing or Screen** | | | | |
| | ☒ Open hole | | 10.06 | 73.15 |

## Test of Well Yield

Pumping test method: SubPump

Pump intake set at - (metres): 70.16

Pumping rate (litres/min): 50 45

Duration of pumping: ___ hrs + 60 min

Final water level end of pumping: 70.19 metres

Recommended pump type: ☐ Shallow ☒ Deep

Recommended pump depth: 70.70 metres

Recommended pump rate (litres/min): 45 50

If flowing give rate - (litres/min):

If pumping discontinued, give reason:

| | Draw Down Time min | Draw Down Water Level Metres | Recovery Time min | Recovery Water Level Metres |
|---|---|---|---|---|
| Static Level | 2.90 | | 20.19 | |
| 1 | 4.72 | 1 | 16.86 | |
| 2 | 6.09 | 2 | 15.55 | |
| 3 | 7.00 | 3 | 14.60 | |
| 4 | 8.14 | 4 | 13.72 | |
| 5 | 8.94 | 5 | 13.00 | |
| 10 | 12.11 | 10 | 10.39 | |
| 15 | 14.30 | 15 | 8.63 | |
| 20 | 15.92 | 20 | 7.36 | |
| 25 | 17.18 | 25 | 6.43 | |
| 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

☒ Annular space ☐ Abandonment

| Depth set at - Metres From | To | Material and type (bentonite slurry, neat cement slurry) etc. | Volume Placed (cubic metres) |
|---|---|---|---|
| 10.06 | 7.01 | Neat Cement Slurry | .1816 |
| 7.01 | 0 | Bentonite Slurry | .245 |

## Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

## Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

## Final Status of Well

☒ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

## Well Contractor/Technician Information

Name of Well Contractor: AIR ROCK DRILLING CO LTD | Well Contractor's Licence No.: 1119

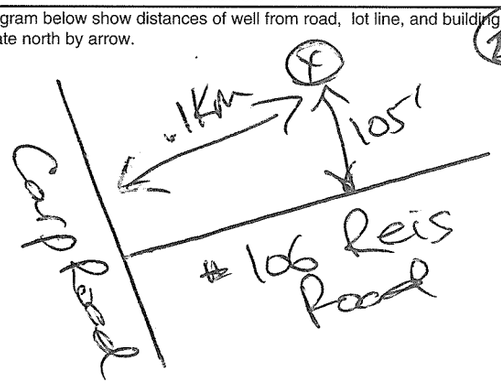
Business Address (street name, number, city etc.): BR#1 RICHMOND ONT K0A 2Z0

Name of Well Technician (last name, first name): PURCELL SHANNON | Well Technician's Licence No.: 7012

Signature of Technician/Contractor: X [signature] | Date Submitted: 2007 09 28

## Location of Well

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




Audit No.: Z 65135

Was the well owner's information package delivered? ☒ Yes ☐ No

Date Well Completed: 2007 09 27

Date Delivered: 2007 09 28

## Ministry Use Only

Data Source | Contractor: 1119

Date Received: SEP 17 2007 | Date of Inspection

Remarks | Well Record Number

0506E (08/2006) Ministry's Copy

*Cette formule est disponible en français*

# APPENDIX D

Water Quality Summary and
Laboratory Certificates of Analysis

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

| Parameter | Units | PW-122<br>23-Nov-22 | PW-122<br>28-Jun-23 | PW-122 Filtered<br>28-Jun-23 | Ontario Drinking Water Standard | Type of Standard[1,2,3] |
|---|---|---|---|---|---|---|
| ***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 Labratory Water Quality Measurements**

| Parameter | Units | PW-122<br>23-Nov-22 | PW-122<br>28-Jun-23 | PW-122 Filtered<br>28-Jun-23 | Ontario Drinking Water Standard | Type of Standard[1,2,3] |
|---|---|---|---|---|---|---|
| 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 Labratory Water Quality Measurements**

| Parameter | Units | PW-122<br>23-Nov-22 | PW-122<br>28-Jun-23 | PW-122 Filtered<br>28-Jun-23 | Ontario Drinking Water Standard | Type of Standard[1,2,3] |
|---|---|---|---|---|---|---|
| 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 Labratory Water Quality Measurements

| Parameter | Units | PW-122<br>23-Nov-22 | PW-122<br>28-Jun-23 | PW-122 Filtered<br>28-Jun-23 | Ontario Drinking Water Standard | Type of Standard[1,2,3] |
|---|---|---|---|---|---|---|
| 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 - $N\text{-}NH_3$ and should not exceed 0.15 mg/litre.
7. '-' signifies no value provided
8. 'ND' = No concentration detected above method detection limit

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## 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 Colour[1] (TCU[2]) | True Colour[3] (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

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# 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 :

| Paracel ID | Client ID |
|---|---|
| 2248286-03 | PW-122 |

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

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 CaCO3 | 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 CaCO3 | 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 | | | | | | |

## 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 | |

## 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 |

**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

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# 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:

| Paracel ID | Client ID |
|---|---|
| 2326325-01 | PW-122 |
| 2326325-02 | PW-122 (Filtered) |

Approved By:

Dale Robertson, BSc
Laboratory Director

## 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 CaCO3 | 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 | - | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **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 | - | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **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% | - | - | - | - | - |

## 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 | | | | | |

## 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 | | | | | |

## 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 | | | | | |
| 1,1,2,2-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 | | | | | |

## 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* | | | |

## 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 | |

## 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 | |

## 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 | |

## 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* | | | |

## 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 | | | |

## 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 | | | |

## 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

# 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 CaCO3) = 2.5 x Ca |
| Alkalinity (as $CaCO_3$) = | 314 | |
| Temperature ($^oC$) = | 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 | Indication |
|---|---|
| -2.0 to -0.5 | Serious corrosion |
| -0.5 to 0.0 | Slight corrosion but non-scale forming |
| LSI = 0 | Balanced but corrosion possible |
| 0.0 to 0.5 | Slightly scale forming and corrosive |
| 0.5 to 2 | Scale forming but non corrosive |

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# APPENDIX F

Nitrate Dilution Calculations

## Table E1: Current Allowable Flows - 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 | 9,884 | 6,549 | 0.20 | 0.40 | 0.10 | 0.70 | 0.383 | 3786 |

| 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] |
|---|---|---|---|---|---|
| 66% | 2450 | 817 | 11 | 2450 | 33 |

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

## 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] |
|---|---|---|---|---|---|
| **62%[4]** | **3555** | **1185** | **16** | **3555** | **47** |
| 63% | 3461 | 1154 | 15 | 3461 | 46 |
| 66% | 3181 | 1060 | 14 | 3181 | 42 |
| 69% | 2900 | 967 | 13 | 2900 | 39 |
| **72%[5]** | **2619** | **873** | **12** | **2619** | **35** |
| 80% | 1871 | 624 | 8 | 1871 | 25 |
| 90% | 935 | 312 | 4 | 935 | 12 |

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.
5. Maximum hard surface coverage allowable to support the current number of employees (12) at 106 Reis Road following lot addition.

## Table E3: Current Allowable Flows - 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 | 8,525 | 5,580 | 0.20 | 0.40 | 0.10 | 0.70 | 0.383 | 3265 |

| 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] |
|---|---|---|---|---|---|
| 65% | 2163 | 721 | 10 | 2163 | 29 |

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

## Table E4: 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] |
|---|---|---|---|---|---|
| **74%[4]** | **1083** | **361** | **5** | **1083** | **14** |
| 67% | 1375 | 458 | 6 | 1375 | 18 |
| 62% | 1583 | 528 | 7 | 1583 | 21 |
| 56% | 1833 | 611 | 8 | 1833 | 24 |
| **51%[5]** | **2042** | **681** | **9** | **2042** | **27** |

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 suyrface coverage at 122 Reis Road following the lot removal.
5. Maximum hard surface coverage allowable to support the current number of employees (9) at 122 Reis Road following lot removal.

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 |

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