

August 14, 2020

File: 64853.01

CannaGenetics Inc.
28 Bluemeadow Way
Ottawa, Ontario
K2M 1L6

**Re: Hydrogeological Investigation and Terrain Analysis
Proposed Rezoning
Part of Lots 13 and 14, Concession 3
Huntley, Ontario**

1.0 INTRODUCTION

This report presents the results of a hydrogeological investigation carried out as part of a proposed rezoning application for a portion of the property located at Part of Lots 13 and 14, Concession 3 in Huntley, Ontario (herein referred to as the 'Site'). The properties legal description is Blocks 10 and 12, Plan 4M-1511 (1500 Thomas Argue Road). The property is currently zoned as Air Transportation Facility Zone – Carp Airport Subzone (T1B) and the rezoning application is to allow for "Cannabis Production Facility" as a permitted use. The proposed lot development plan is provided in Appendix A.

The property is currently vacant and has been used as agricultural land in the past. A newly drilled on site test well (TW19-1) was used to evaluate water quality and quantity for this investigation.

The purpose of the investigation was to confirm the following:

- The quality of the well water meets the Ontario Drinking Water Standards and maximum treatable limits prescribed in Ontario Ministry of the Environment, Conservation and Parks (MECP) Procedure D-5-5;
- The quantity of well water meets the MECP Procedure D-5-5 requirements; and,
- The septic impact assessment meets the MECP Procedure D-5-4 requirements.

2.0 SITE BACKGROUND

2.1 Site Geology

Surficial geology maps of the Ottawa area (Ontario Geologic Survey, 2010) indicate that the site is underlain by coarse textured glaciomarine deposits (sand, gravel, minor silt and clay). Bedrock geology maps of the Ottawa area (Ontario Geological Survey, 2011 and Paleozoic Geology of

Southern Ontario, 1972) show that the overburden has a thickness of 25 to 50 metres and is underlain by interbedded limestone and shale bedrock of the Verulam Formation.

3.0 TERRAIN ANALYSIS

3.1 Subsurface Conditions

The subsurface conditions at the Site are described in the geotechnical investigation completed by GEMTEC, titled “Geotechnical Investigation, Property Rezoning Application, Part Lots 13 and 14, Concession 3, Blocks 10 and 12, Plan 4M-1511., Ottawa, Ontario” and dated July 23, 2020. The field work for the geotechnical investigation was carried out on December 21, 2018 and January 4, 2019. Five (5) boreholes (numbered 18-1 through 18-5) were advanced to depths ranging from about 6.0 to 31.7 metres below surface grade. Standpipe piezometers were installed in three (3) of the boreholes (18-1, 18-3, and 18-5) to measure the stabilized groundwater conditions. The locations of the boreholes are shown on the Site Plan, Figure 1 and the Record of Borehole Sheets are provided in Appendix B.

The following presents an overview of the subsurface conditions encountered in the boreholes advanced during the geotechnical investigation.

3.2 Topsoil

A layer of topsoil was encountered from surface at all borehole locations. The topsoil generally consists of dark brown silty sand with trace to some clay and organic material. The thickness of the topsoil ranges from about 150 to 410 millimetres.

3.3 Sandy Silt

A sandy silt deposit was encountered below the topsoil at all of the borehole locations. The sandy silt can be described as brown to grey brown, becoming grey with depth with varying amounts of clay and shells. Where fully penetrated, the thickness of the sandy silt deposit ranges from about 2.2 to 5.2 metres below ground surface. Borehole 18-5 was terminated within the sandy silt deposit at a depth of about 6 metres below ground surface (elevation 106.4 metres, geodetic).

A grain size distribution test was undertaken on a sample of the sandy silt from borehole 18-2. The results are provided on the Soils Grading Chart in Appendix B and summarized in Table 1.1.

Table 1.1 – Summary of Grain Size Distribution Testing –Sandy Silt

Location	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
18-2	5	3.1 – 3.7	0	34	53	13

3.4 Layered Sandy Silt and Clayey Silt

Layered deposits of grey sandy silt and clayey silt were encountered below the sandy silt deposits at boreholes 18-1 to 18-4 inclusive, at depths ranging from 2.6 to 5.3 metres below ground surface (elevations 106.9 to 109.3 metres).

All of the boreholes, with the exception of borehole 18-5, were terminated within the layered sandy silt and clayey silt at depths ranging from about 6.1 to 16.1 metres below ground surface (elevations 96.1 to 106.1 metres).

A grain size distribution test was undertaken on a sample of the layered sandy silt and clayey silt from borehole 18-2. The results are provided on the Soils Grading Chart in Appendix B and summarized in Table 2.2.

Table 2.2 – Summary of Grain Size Distribution Testing – Layered Sandy Silt and Clayey Silt

Location	Sample Number	Sample Depth (metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
18-2	10	6.9 – 7.5	0	16	60	24

3.5 Groundwater

A summary of the stabilized groundwater levels measured in the piezometers are presented in Table 2.3.

Table 2.3 – Summary of Groundwater Levels in Piezometers

Borehole	Measurement Date	Depth below ground surface (metres)	Groundwater Elevation (metres)
18-3	December 27, 2018	0.9	112.5
18-5	December 27, 2018	0.1*	112.2
18-5	August 7, 2020	1.72	110.59

*Groundwater frozen in piezometer at time of measurement.

It should be noted that the groundwater levels may be higher during wet periods of the year such as the early spring or following periods of precipitation.

4.0 IMPACT ASSESSMENT

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

It should be noted that the following information is provided for general guidance purposes only and that the septic system installed on the Site should be designed using specific subsurface conditions at the location of the proposed septic system. In all cases, the septic system design must conform to the Ontario Building Code (OBC) requirements.

4.1 Hydrogeological Sensitivity

Areas of thin soils cover, highly permeable soils, fractured bedrock exposed at ground surface and karst environments contribute to hydrogeological sensitivity of the site, which may not allow for sufficient attenuative processes for on-site septic systems and negatively impact the receiving aquifer. The overburden thickness at the Site is approximately 41.4 metres based on the on-site water well record. The sandy silt and clayey silt soils are not considered to be highly permeable, based on silt and clay contents ranging from 66 to 84% (refer to grain size distribution testing, Appendix B). Karst mapping (Brunton and Dodge, 2008) does not indicate the presence of any inferred or potential karstic features. The Site is not considered to be hydrogeologically sensitive.

4.2 Groundwater Impacts

4.2.1 On-Site Septic

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, nitrate dilution calculations for commercial properties outlined in MECP D-5-4 were followed.

The nitrate concentration at the site boundaries was calculated using the following information:

- Site area of 4.25 hectares (refer to Lot Development Plan, Appendix A);
- 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;
 - Pre and post-development water holding capacity of 125 mm: Urban lawns, silt-loam.
- An annual water surplus of 0.349 metres/year (pre and post-development) for soils with a water holding capacity of 125 mm (Carleton Place - Appleton data, Environment Canada Water Surplus Datasets, attached in Appendix C);
- Post-Development hard surface area of up to 57%; and,
 - Total building footprints (47%) and parking lot (area to be determined; assumed to be up to 10%).

- The use of advanced treatment systems in the construction of the septic systems at the commercial 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).
 - It is noted that the nitrate concentration of the irrigation and process water is unknown and pre-treatment may be required prior to discharge to the septic system. It is assumed that the effluent exiting the treatment unit will have a maximum nitrate concentration of 20 mg/L.

The calculated maximum allowable flow for the proposed development is 10,473 litres per day. The septic system considerations were assessed by Novatech in a memorandum entitled “Cannagenetics Inc. – Westkan Business Park and Septic System Considerations” and dated March 7, 2019 – revised June 12, 2020 (Appendix C). The septic demands were estimated to be less than 10,000 litres per day, which includes 1,500 L/day assuming 20 employees (75 litres per employee per day) and 8,500 L/day for process and production discharge. Based on the MECP Procedure D-5-4 commercial/industrial nitrate dilution calculations, the Site can support the proposed on-site septic system.

4.2.2 Septic Impacts to Neighbouring Properties

The Carp Road Corridor Groundwater Study (Dillon, 2004) indicates the shallow groundwater flow direction is north to northeast, towards the Carp River. The downgradient properties consist of agricultural lands and residential / commercial properties along Carp Road, which are approximately 230 metres northeast. Based on the nitrate impact assessment for commercial/industrial properties, nitrate impacts to neighbouring water well users are not anticipated.

4.3 Background Nitrate Conditions

To further evaluate the potential risk of septic effluent on the water supply aquifer, the background water quality in the receiving aquifer was assessed. Water samples were collected on August 7, 2020 from monitoring well 18-5 (Figure 1). The monitoring well was purged three times the well volume and groundwater quality samples were collected and submitted to an accredited laboratory for analysis of nitrate and nitrite (laboratory certificate of analysis provided in Appendix C). The nitrate and nitrite concentrations were reported to be 0.1 mg/L and <0.25 mg/L respectively.

5.0 GROUNDWATER SUPPLY INVESTIGATION

5.1 Background Water Well Records

A search of the Ministry of Environment, Conservation and Parks (MECP) water well records (<https://www.ontario.ca/environment-and-energy/map-well-records>) returned 30 water well records within 500 metres of the Site. The results of the well record search are provided in Appendix D.

Of the 30 well records, eight are listed as water supply wells (domestic, industrial or municipal) and 11 are listed as monitoring wells, test holes or not used. A review of the well construction details indicates that five of the water supply wells are completed within the limestone bedrock and three water supply wells are completed in overburden sands and gravels.

The water supply well listed as a ‘municipal well’ is completed in the overburden sands and gravels at a depth of 27.4 metres below ground surface. The ‘municipal well’ is addressed 1508 Thomas Argue Road – the Carp Airport.

5.2 Test Well Construction

The water supply well was constructed at 1500 Thomas Argue Road on May 24, 2019, by a licensed MECP well contractor (Air Rock Drilling; License No. 1119) using a rotary air percussion drill rig. The approximate location of the water well is provided on the Detailed Site Plan, Figure 1. A copy of the MECP Water Well Record is provided in Appendix D.

The construction details from the MECP Water Well Record are summarized in the following table.

Well Construction Details (“TW19-1”; Well Tag A260891)	
Depth to Bedrock	41.4 metres
Length of Well Casing	43.3 metres
Length of Well Casing Above Ground Surface	0.61 metres
Length of Well Casing Set Into Bedrock	1.8 metres
Depth Water Found	45.7 metres
Total Well Depth	48.8 metres

5.3 Groundwater Quantity

A pumping test was carried out on the water well by a member of GEMTEC staff on June 12, 2019. The well was pumped at a constant rate of approximately 57 litres per minute for a period of eight hours. The water from the pumping test was discharged to the ground surface a minimum of 10 metres from the test well such that the discharge flow was away from the well head.

Water level measurements were taken at regular intervals throughout the pumping test. Water levels were also taken during the recovery phase of the pumping test (after the pump was turned off). The drawdown and recovery graph is provided in Appendix E. The transmissivity of the water supply aquifer was estimated from the pump test drawdown data using Aqtesolv version 4.5, a commercially available software program from HydroSOLVE Inc. An analysis of the pump test and recovery data was carried out using the Cooper-Jacob method of analysis. The results of the Aqtesolv 4.5 analysis are provided in Appendix E.

The Cooper-Jacob and Theis Recovery analyses indicates that the transmissivity of the water supply aquifer is approximately 5.2 to 6.9 m²/day. A qualitative evaluation of the drawdown pumping test data indicates approximately 10 metres of drawdown within the first hour of pumping from a static water level of 8.33 metres below ground surface. The water level gradually decreased throughout the remaining seven hours of pumping, to a maximum measured drawdown of 11.6 metres and final water level of 19.94 metres below ground surface. The pumping test discharged a total of about 27,816 litres from the well over the course of the pumping test. Based on the depth of the well and the water level after eight hours of pumping, the remaining available drawdown in the well is approximately 28 metres.

The septic system and water demand considerations were assessed by Novatech in a memorandum entitled “CannaGenetics Inc. – Westkan Business Park and Septic System Considerations” and dated March 7, 2019 – revised June 12, 2020 (Appendix C). The septic demands were estimated to be less than 10,000 litres per day, which includes 1,500 L/day assuming 20 employees and 8,500 L/day for process and production discharge. The water demand within the facility for process and production (fertilising and irrigation) will utilize 53,000 litre reservoirs, which will have a maximum discharge of 8,500 L/day. Therefore, the daily water demand is expected to limited to 10,000 litres per day. The 53,000-litre reservoir can be initially filled over a 2-day period by pumping 26,500 litres per day, which is less than the 27,816 litres pumped during the 8-hour pumping test.

The high sustained flow rate in combination with the remaining available drawdown indicates that the well should be capable of providing adequate quantities of groundwater for typical commercial and/or industrial use, including a cannabis production facility. Furthermore, the recovery of the well following the pumping test indicates that the water well should be able to sustain repeated pumping in the long term.

5.4 Groundwater Quality

Water samples were collected by GEMTEC during the pumping test on June 12, 2019 (TW19-1). Due to elevated organic and bacteriological water quality results, TW19-1 was chlorinated and resampled on May 11, 2020 and June 1, 2020.

A summary of the field measurements is provided in Tables F1 (Appendix F). The results of the laboratory analysis on the water samples are summarized in Table F2 along with the applicable standards, guidelines and objectives provided in the Ontario Drinking Water Quality Standards (ODWQS). Copies of the laboratory certificates of analysis for the water samples are provided in Appendix F.

The following comments are provided regarding the drinking water quality and exceedances of the ODWQS.

5.4.1 Maximum Acceptable Concentration Exceedances

Total chlorine measurements made at regular intervals during the pumping test and prior to sampling confirmed that total chlorine concentrations in the well water was non-detectable at the time of bacteriological sampling.

The results of the bacteriological analysis from the June 12, 2019 pumping test indicate that the water samples met all the standards of the ODWQS for bacteriological parameters. Upon resampling on May 11, 2020 total coliform, e.coli and fecal coliform concentrations were detected; however, following a second round of chlorination and re-sampling on June 1, 2020, TW19-1 reported non-detectable total coliform, e.coli and fecal coliform concentrations. The bacterial exceedances detected on May 11, 2020 may be the result of insufficient well chlorination combined with the well sitting idle for a period of approximately 11 months.

5.4.2 Operational Guideline Exceedances

Operational related exceedances of the ODWQS were detected for hardness and for organic nitrogen. The operational guideline exceedances are discussed in the following section:

Hardness

The hardness of the water samples was reported to be 123, 135 and 144 mg/L as CaCO_3 , which exceeds the ODWQS operational guideline for hardness. 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 ODWQS 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.

Organic Nitrogen

The organic nitrogen concentration was reported to be 0.4 and 0.3 mg/L [TKN – ammonia] during the pumping test which slightly exceeds the operational guideline of 0.15 mg/L for ODWQS. The ODWQS indicates that levels of organic nitrogen in excess of 0.15 mg/L may be caused by septic tank or sewage effluent contamination and may cause taste and odour problems.

It is noted that following well chlorination and resampling on May 11, 2020 and June 1, 2020, the organic nitrogen concentrations decreased below the ODWQS operational guideline of 0.15 mg/L.

5.4.3 Aesthetic Objective Exceedances

Aesthetic objective exceedances of the ODWQS were detected for total dissolved solids, dissolved organic carbon, colour and sulphide. These exceedances are discussed in the following sections:

Total Dissolved Solids (TDS)

The TDS concentration during the pumping test were measured to be 548 and 552 mg/L. Elevated levels of TDS can lead to problems associated with encrustation and corrosion. Following additional well development on May 11, 2020 the TDS concentration decreased to 448 mg/L which meets the ODWQS.

Nevertheless, 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, temperature, pH, alkalinity, and calcium observed in the June 12, 2019 8-hr sample. A copy of the calculation to determine the LSI value is provided in Appendix G. The LSI was calculated to be 0.67 using an estimated groundwater temperature of 10°C. This indicates that the water is scale forming but non-corrosive.

Dissolved Organic Carbon (DOC)

The analyses of the water samples collected during the June 12, 2019 pumping test indicated DOC concentrations of 1.5 and 2.1 mg/L, which are within the ODWQS aesthetic objective of 5 mg/L. Following well chlorination and resampling on May 11, 2020 and June 1, 2020, the DOC concentrations increased to 12.0 and 24.4 mg/L respectively, which exceed the ODWQS aesthetic objective and the maximum concentration considered reasonably treatable of 10.0 mg/L.

It is noted that the DOC concentrations are currently under quality assurance / quality control review by the laboratory based on the sharp increase in May 11 and June 1, 2020 results and corresponding decreases in other organic parameters such as tannins and lignins, ammonia, TKN and organic nitrogen. The elevated DOC may be a by-product of well chlorination or the result of laboratory error. The project analytical laboratory is currently investigating the results of numerous

elevated dissolved organic carbon readings. Recent duplicate samples reported DOC concentrations of 17.4 mg/L compared to secondary laboratory DOC concentration of 1.82 mg/L. Additional duplicate samples from the project laboratory reported DOC concentrations of 8.3 mg/L and 6.2 mg/L compared to a secondary laboratory DOC of 0.8 and 0.7 mg/L and tertiary laboratory DOC of 1.48 and 1.16 mg/L.

Elevated DOC concentrations may be caused by organic material and is usually higher in surface waters. Dissolved organic carbon above the aesthetic objective of 5 mg/L can result in unpleasant taste, odour and colour. Furthermore, high DOC concentrations when chlorinated can result in harmful by-products (i.e. trihalomethanes) which have long-term health effects. Dissolved organic carbon can be treated using coagulation/flocculation, biological filtration, granulated charcoal and distillation. It is noted that treatment requirements dramatically increase and the maximum concentration considered reasonably treatable of 10 mg/L.

Colour

The colour concentrations from the 4-hr and 8-hr samples collected during the pumping test were reported to be 11 and 10 TCU which exceeded the aesthetic objective of 5 TCU listed by the ODWQS. The field measured colour concentrations were also measured to be 12 and 10 TCU, respectively (refer to Table F1 in Appendix F). The samples exceeded the treatable limits of 7 TCU provided in Table 3 of the Appendix in the MECF Guideline D-5-5. Elevated levels of colour can be associated with certain metals, hydrogen sulphide and organic substances in the water.

Following additional well development and re-sampling, the field measured colour decreased to 0 TCU and the laboratory measured colour on May 11 and June 1, 2020 were reported to be 12 and 6 TCU, respectively. The sample collected on June 1, 2020 meets the maximum treatable limit of 7 TCU for the laboratory and field measured samples. The decrease in colour may be attributed to the measured decrease in hydrogen sulphide. Furthermore, it is noted that dissolved organic carbon (DOC) can also contribute to colour; however, the colour in the samples decreased as the DOC concentrations continued to increase.

Water having a faint purple colour can be caused by elevated sulphide concentrations, which ranged from 3.00 mg/L to 1.51 mg/L. Colour is not generally considered a health issue and the aesthetic objective is set by appearance. The use of carbon filter treatment systems can be used to reduce colour levels. Furthermore, hydrogen sulphide related colour can be treated through hydrogen sulphide treatment using manganese greensand filters, aeration and/or oxidation.

Hydrogen Sulphide

Hydrogen sulphide concentrations in TW19-1 were measured to be 3.00, 2.30, 1.94 and 1.51 mg/L. The sulphide concentrations continued to decrease following additional well development on May 11, 2020 and June 1, 2020 and are expected to continue to decrease with additional

pumping. Hydrogen sulphide concentrations of up to 2.5 mg/L can be reasonably treatable using manganese greensand filters and can also be treated at higher concentrations using adsorption, aeration, chlorination/filtration, chlorination/activated-carbon filters and/or oxidation.

5.4.4 Notable Parameters

The results of the chemical testing on the water samples indicate elevated sodium concentrations. Although the parameter does not exceed the ODWQS, they are noted, and are discussed in the follow sections:

Sodium

The sodium concentration was reported to be 156, 142 and 106 mg/L, which is not considered an exceedance of the ODWQS aesthetic objective of 200 milligrams per litre; however, it exceeds the health-related limit of 20 mg/L for persons on sodium restricted diets and should be reported to the local Medical Officer of Health. Furthermore, conventional water softeners could introduce elevated concentrations of sodium into the drinking water, therefore, a separate faucet, which bypasses the softener may be considered for drinking water purposes.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

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

- The surficial soils encountered at the Site consist of sandy silt underlain by layered sandy silt and clayey silt. The overburden thickness is up to 41.5 metres thick, based on the on-site test well (Tag #A260891).
 - The site is not considered to be hydrogeologically sensitive.
- The water supply well is completed in the limestone bedrock, with a total completion depth of approximately 48.8 metres.
- The test well (TW19-1) is capable of providing at least 27,816 litres per day, which is greater than the septic demand of 10,000 L/day which includes 8,500 L/day for process water (septic and water demand requirements provided by Novatech – Appendix C). The 53,000-litre reservoir can be initially filled over a period of two days. The maximum drawdown in the water level of the well was approximately 11.6 metres following 8 hours of pumping at a flow rate of 57 litres per minute. Based on a static water level of 8.33 metres below ground surface, the total well depth of 48.8 metres and the water level after 8 hours of pumping, the remaining available drawdown in the well is approximately 28 metres.

- The groundwater quality exceeds the ODWQS for the operational guideline for hardness, the aesthetic objectives for hydrogen sulphide, dissolved organic carbon and colour, the warning levels for sodium and the maximum acceptable concentration dissolved organic carbon.
 - The operational guideline for organic nitrogen was initially exceeded during the pumping test on June 19, 2019. The subsequent sampling on May 11 and June 1, 2020 did not exceed the ODWQS operational guideline.
 - The maximum acceptable concentration for total coliform, e.coli and fecal coliform exceeded the ODWQS following the first round of chlorination and re-sampling on May 11, 2020. The bacteriological parameters were non-detectable during the June 12, 2019 pumping test and following the second round of chlorination and re-sampling on June 1, 2020.
 - The DOC maximum acceptable concentration exceedances of 12.0 and 24.4 mg/L reported on May 11 and June 1, 2020 are significantly higher than detected in the water supply aquifer during the pumping test completed on June 12, 2019 (nitrate concentrations of 1.5 and 2.1 mg/L). The elevated DOC may be a by-product of well chlorination or the result of laboratory error. The project analytical laboratory is currently investigating the results of numerous elevated dissolved organic carbon readings. Recent duplicate samples reported DOC concentrations of:
 - Project laboratory DOC = 17.4 mg/L compared to secondary laboratory DOC concentration of 1.82 mg/L.
 - Project laboratory DOC = 8.3 mg/L and 6.2 mg/L compared to secondary laboratory DOC of 0.8 and 0.7 mg/L and tertiary laboratory DOC of 1.48 and 1.16 mg/L.
- The test well displays elevated organic parameters, namely tannins and lignins, organic nitrogen, colour, dissolved organic carbon and bacteriological parameters (total coliform, e.coli and fecal coliform). The source of organic material has not been confirmed and based on the current results the groundwater is considered to be non-potable.
- The maximum allowable daily design sanitary sewage flows (DDSSF) is calculated to be 10,473 litres per day, assuming the use of an advanced treatment septic system. The maximum DDSSF is greater than the anticipated average DDSSF of 10,000 litres per day, based on:
 - 20 employees (75 litres/employee x 20 employees = 1,500 litres).
 - Process and production discharge = 8,500 litres.

6.2 Recommendations

Based on the results of this investigation, the following water supply recommendations are provided:

Water Supply Recommendations

- 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”.
- Groundwater quality treatment may be utilized to treat the following ODWQS exceedances:
 - Hardness – Hardness levels in TW19-1 exceed the ODWQS operational guideline and can be treated using water softening by conventional sodium ion exchange.
 - Hydrogen sulphide – Exceeds the ODWQS aesthetic objective of 0.05 mg/L and can be treated using manganese greensand filters, adsorption, aeration, chlorination/filtration, chlorination/activated-carbon filters and oxidation.
 - Colour – Colour exceeded the ODWQS aesthetic objective concentration of 5 TCU. Colour can be treated using carbon filter treatment systems and may be further reduced through hydrogen sulphide removal.
 - Sodium - Sodium concentrations in the raw water supply exceed the ODWQS warning level for persons on sodium restricted diets and the local Medical Officer of Health should be notified.
 - Dissolved organic carbon – Dissolved organic carbon can be treated using coagulation/flocculation, biological filtration, granulated charcoal and distillation. It is noted that treatment requirements dramatically increase and the ODWQS maximum concentration considered reasonably treatable is 10 mg/L. Furthermore, chlorination as a treatment option is not recommended as it may result in harmful by-products (i.e. trihalomethanes).
- A water quality treatment specialist should be retained to correctly size treatment systems, confirm maximum treatability limits and ensure there are no interference effects between systems.
- The water supply well should be used for plumbing and process water (i.e. fertilization and irrigation) only and potable water should be provided to employees. Based on the bacteriological and organic exceedances, the groundwater is considered non-potable. Additional water quality sampling is recommended to confirm bacteriological and organic parameters.

Septic System Recommendations

- The proposed development will be serviced by advanced treatment septic sewage disposal system that achieve a minimum of 50% reduction in nitrogen, approved under the Ontario Building Code, prior to the effluent being disposed to a Class IV leaching bed (Type A or Type

B). The advanced treatment septic system is recommended to be BNQ certified. A site-specific investigation should be conducted on each lot for the design of the septic system;

- Based on the observed groundwater levels, the septic leaching beds may need to be partially or fully raised.
- 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.
- It is recommended that a water quality and/or septic specialist confirm the advanced septic treatment system is capable of reducing nitrate concentrations of the discharged effluent (including production and process waters) to 20 mg/L.
- If the maximum daily design sewage flow exceeds 10,000 litres per day, additional investigation and permitting is required, as described in the *Ontario Water Resources Act*.
- It is recommended that the property owners construct, maintain and check their onsite septic system in accordance with the Ontario Building Code.

LIMITATIONS OF REPORT

This report was prepared for CannaGenetics Inc. and is intended for the exclusive use of CannaGenetics Inc. This report may not be relied upon by any other person or entity without the express written consent of GEMTEC and CannaGenetics Inc. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgments of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared. This report has been prepared for the application noted and it is based, in part, on visual observations made at the site and laboratory analyses of specific chemical parameters and material during a specific time interval, all as described in the report.

Should new information become available during future work, including water quality sampling, environmental site assessments or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

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



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

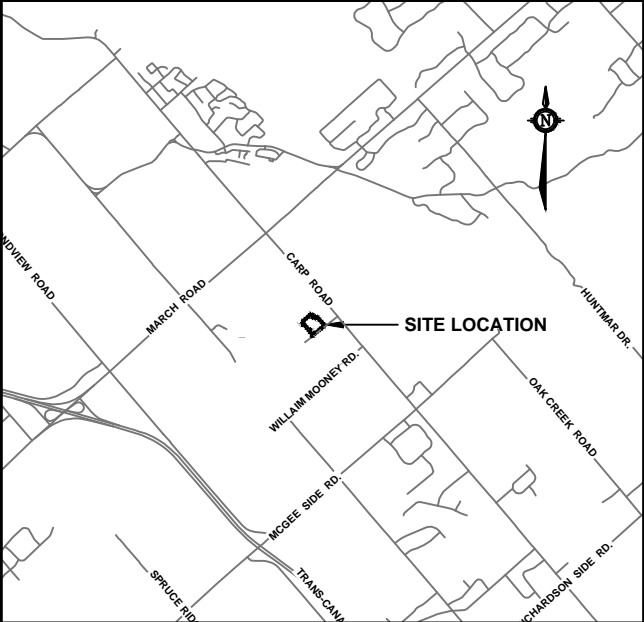


Shaun Pelkey, M.Sc.E., P.Eng.
Principal, Environmental Engineer



7.0 REFERENCES

- Armstrong, D.K. and Dodge, J.E.P. 2007. Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219
- Brunton, F.R. and Dodge, J.E.P. 2008. Karst of southern Ontario and Manitoulin Island; Ontario Geological Survey, Groundwater Resources Study 5.
- City of Ottawa. 2004. Carp Road Corridor, Community Design Plan. June 2004.
- Cuddy, S., Chan, G.S., and Post, R. 2013. Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications. Lake Simcoe Region Conservation Authority.
- Dillon Consulting Limited. 2004. Carp Road Corridor, Groundwater Study. November 30, 2004.
- GEMTEC, 2020. Geotechnical Investigation, Property Rezoning Application, Part Lots 13 and 14, Concession 3, Blocks 10 and 12, Plan 4M-1511., Ottawa, Ontario" and dated July 23, 2020.
- Mississippi Valley Conservation and Rideau Valley Conservation Authority. 2011. Mississippi-Rideau Source Protection Region, Assessment Report, Mississippi Valley Source Protection Area. August 4, 2011.
- Ontario Geological Survey. 2010. Surficial geology of Southern Ontario. Ontario Geological Survey, Miscellaneous Release-Data 128-Revision 1.
- Ontario Geological Survey. 2011. 1:250 000 scale bedrock geology of Ontario. Ontario Geological Survey, Miscellaneous Release-Data 126-Revision 1.
- Ontario Ministry of the Environment and Climate Change. 1996. Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment. August 1996.
- Ontario Ministry of the Environment and Climate Change. 1996. Procedure D-5-4, Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment. August 1996.
- Ontario Ministry of the Environment and Climate Change. 2008. Ontario Drinking Water Quality Standards, Safe Drinking Water Act, 2002, Ontario Regulation 169/03 as amended by Ontario Regulation 327/08.
- Ontario Ministry of the Environment and Climate Change. 2006. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines. June 2006.
- Ontario Ministry of the Environment and Climate Change. 1995. MOEE Hydrogeological Technical Requirements for Land Development Applications. April 1995.



LEGEND

----- SUBJECT SITE

BOREHOLE LOCATION IN PLAN
(geotechnical investigation by GEMTEC)

BH # ← BOREHOLE LOCATION
XX.XX ← GROUND SURFACE ELEVATION, IN METRES
GEODETIC DATUM

WATER WELL
(current investigation by GEMTEC)

WATER WELL RECORDS
(500m radius)

Scale 1:5000

0 100 200 300m

GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

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

Drawing		SITE PLAN	
Client		CannaGenetics Inc.	
Project		1500 THOMAS ARGUE ROAD CARP, ONTARIO	
Drwn by	Chkd by		
P.C.	N.S.		
Date	July 2020	Rev.	0
		FIGURE 1	



APPENDIX A

Lot Development Plan



APPENDIX B

Record of Borehole Sheets
Grain Size Distribution Curves

RECORD OF BOREHOLE 18-1

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jan 4 2019

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED		WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Vibratory Hammer 98 mm Diameter (OD) casing	Ground Surface		111.88										
		Dark brown sandy silt, with organic material (TOPSOIL)		111.47	1	SS	508	4	●					Bentonite
				0.41										
		Brown to grey brown SANDY SILT, trace shells			2	SS	330	13	●					
1					3	SS	330	13	●					
					4	SS	330	13	●					
2					5	SS	457	3	●					
		Grey, layered SANDY SILT and CLAYEY SILT		109.29	6	SS	356	NA		⊕		+		
3				2.59	7	SS	610	W.H.						
					8	SS	406	NA	⊕		+			
4					9	SS	610	W.H.	⊕		+			
5									⊕		+			
6									⊕		+			
		End of borehole		105.78					⊕		+			
6				6.10										
7														
8														

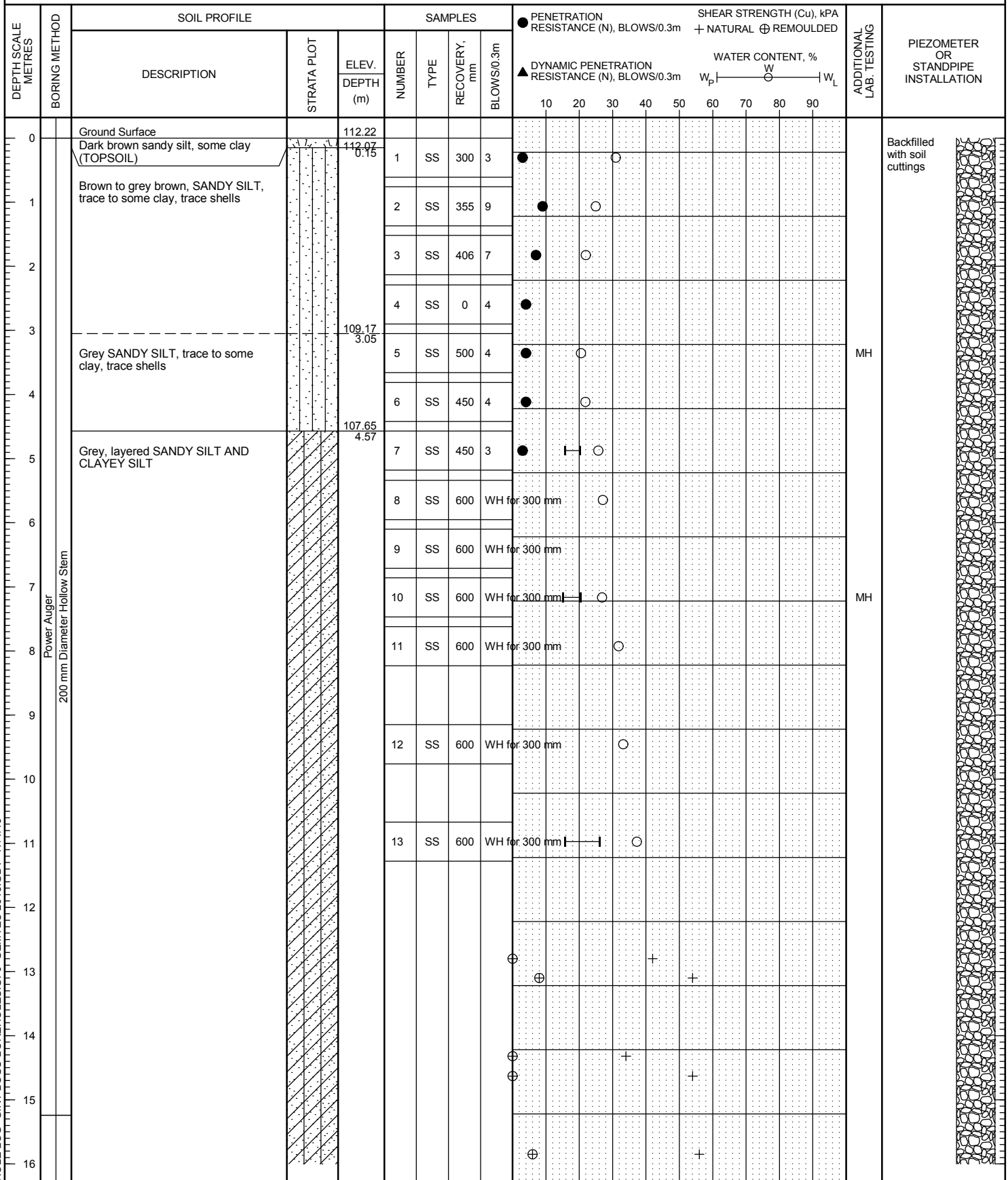
Filter Sand
 50 mm diameter,
 3.05 m length
 PVC well screen



RECORD OF BOREHOLE 18-2

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1

SHEET: 1 OF 2
 DATUM: CGVD28
 BORING DATE: Dec 21 2018



GEO - BOREHOLE LOG GINT LOGS BOREHOLES.GPJ GEMTEC 2018.GDT 17/1/19

RECORD OF BOREHOLE 18-2

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1

SHEET: 2 OF 2
 DATUM: CGVD28
 BORING DATE: Dec 21 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m 10 20 30 40 50 60 70 80 90	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
16									⊕			
17												
18												
19												
20												
21												
22									▲			
23									▲			
24									▲			
25									▲			
26									▲			
27									▲			
28									▲			
29									▲			
30									▲			
31									▲			
32		End of Borehole		80.51 31.71					▲			

GEO - BOREHOLE LOG GINT LOGS BOREHOLES.GPJ GEMTEC 2018.GDT 17/1/19

RECORD OF BOREHOLE 18-3

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Dec 21 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPa		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	● RESISTANCE (N), BLOWS/0.3m	▲ RESISTANCE (N), BLOWS/0.3m	+ NATURAL ⊕ REMOULDED			
											WATER CONTENT, %			
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		113.43										
		Dark brown sandy silt, some clay (TOPSOIL)		113.28 0.15	1	SS	250	1	●					
		Brown to grey brown, SANDY SILT, trace shells												
1					2	SS	406	6	●					
					3	SS	450	13	●					
2														
				4	SS	300	5	●						
3		Grey SANDY SILT, trace clay and shells		110.38 3.05	5	SS	450	3	●					
4				6	SS	450	2	●						
5				7	SS	600	1	●						
		Grey, layered SANDY SILT AND CLAYEY SILT		108.09 5.34	8	SS	600	WH for 300 mm						
6														
7														
		End of Borehole		106.11 7.32										
8														

51 mm diameter, 3.05 metres long well screen

Bentonite seal

Filter sand

Sand bedding

GROUNDWATER OBSERVATIONS




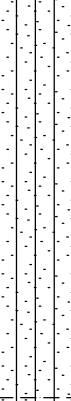

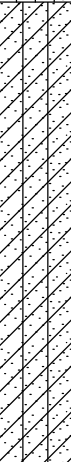
DATE	DEPTH (m)	ELEV. (m)
18/12/27	0.90 ▽	112.53

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/12/27	0.90	112.53

RECORD OF BOREHOLE 18-4

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1



SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jan 4 2019

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m										SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	WATER CONTENT, %															
				DEPTH (m)					W _p	W	W _L													
0	Vibratory Hammer 98 mm Diameter (OD) casing	Ground Surface		110.60															Borehole backfilled with sand					
		Dark brown silty sand, with organic material (TOPSOIL)		110.29 0.31	1	SS	457	5	●															
		Brown to grey brown SANDY SILT			2	SS	584	7	●															
1					3	SS	508	12	●															
					4	SS	406	7	●															
2					5	SS	432	3	●															
		Grey SANDY SILT, trace to some clay		108.16 2.44	6	SS	310	3	●															
3		Grey, layered SANDY SILT AND CLAYEY SILT			7	SS	610	W.H.																
4																								
					8	SS	610	W.H.	⊕			+												
5																								
6								⊕				+												
	End of borehole			104.50 6.10				⊕				+												
7																								
8																								

RECORD OF BOREHOLE 18-5

CLIENT: CannaGenetics
 PROJECT:
 JOB#: 6485301
 LOCATION: See Borehole Location Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Dec 21 2018

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m												SHEAR STRENGTH (Cu), kPa												ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE (N), BLOWS/0.3m												WATER CONTENT, %														
									Wp												W														
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		112.31					●												+ NATURAL ⊕ REMOULDED												Bentonite seal		
		Turned Dark brown silty clayey TOPSOIL		112.16 0.15	1	SS	355	3	▲																										
		Brown to grey brown SANDY SILT, trace to some clay																																	
1						2	SS	450	8	●																									
2						3	SS	406	13	●																									
			Grey SANDY SILT, trace to some clay		110.18 2.13																														
							4	SS	450	7	●																								
3																																			
					5	SS	450	7	●																										
4					6	SS	500	4	●																										
5					7	SS	500	2	●																										
					8	SS	600	WH for 300 mm																											
6		End of Borehole		106.36 5.95																													Filter sand 51 mm diameter, 3.05 metres long well screen		
7																																			
8																																			

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/12/27	0.11	112.20

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
18/12/27	0.11	112.20

LIST OF ABBREVIATIONS AND TERMINOLOGY

SAMPLE TYPES

AS	auger sample
CA	casing sample
CS	chunk sample
BS	Borros piston sample
DO	drive open
MS	manual sample
RC	rock core
ST	slotted tube
TO	thin-walled open Shelby tube
TP	thin-walled piston Shelby tube
WS	wash sample

PENETRATION RESISTANCE

Standard Penetration Resistance, N

The number of blows by a 63.5 kg hammer dropped 760 millimetre required to drive a 50 mm drive open sampler for a distance of 300 mm. For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

Dynamic Penetration Resistance

The number of blows by a 63.5 kg hammer dropped 760 mm to drive a 50 mm diameter, 60° cone attached to 'A' size drill rods for a distance of 300 mm.

WH

Sampler advanced by static weight of hammer and drill rods.

WR

Sampler advanced by static weight of drill rods.

PH

Sampler advanced by hydraulic pressure from drill rig.

PM

Sampler advanced by manual pressure.

SOIL TESTS

C	consolidation test
H	hydrometer analysis
M	sieve analysis
MH	sieve and hydrometer analysis
U	unconfined compression test
Q	undrained triaxial test
V	field vane, undisturbed and remoulded shear strength

SOIL DESCRIPTIONS

Relative Density 'N' Value

Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

Consistency Undrained Shear Strength (kPa)

Very soft	0 to 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	over 100

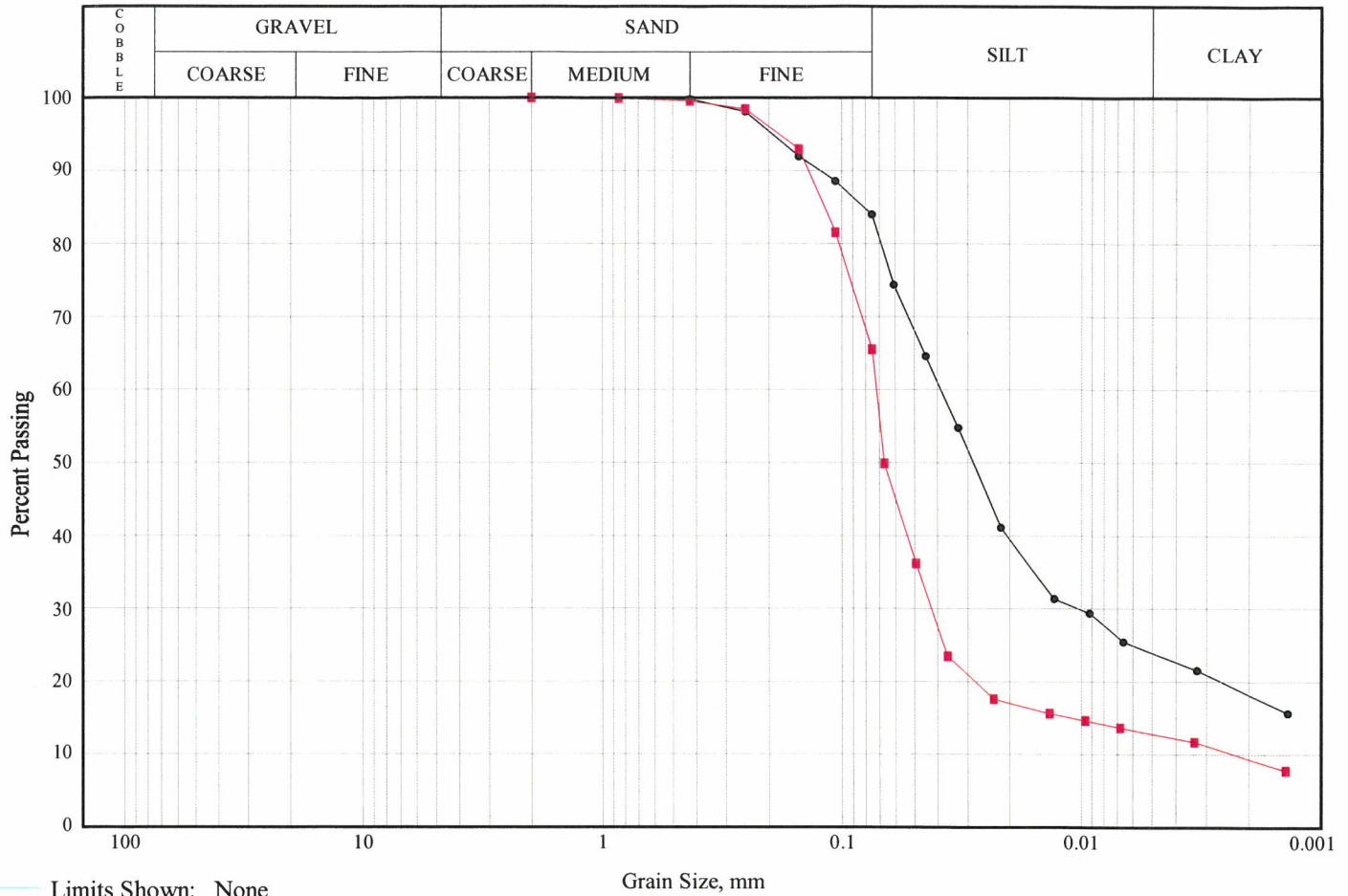
LIST OF COMMON SYMBOLS

c_u	undrained shear strength
e	void ratio
C_c	compression index
c_v	coefficient of consolidation
k	coefficient of permeability
I_p	plasticity index
n	porosity
u	pore pressure
w	moisture content
w_L	liquid limit
w_P	plastic limit
ϕ^1	effective angle of friction
γ	unit weight of soil
γ^1	unit weight of submerged soil
σ	normal stress



Project #: 6485301

Soils Grading Chart



Grain Size, mm

[illegible]



APPENDIX C

Nitrate Dilution Calculations
Surplus Datasheets
Overburden Laboratory Certificates of Analysis
Septic Demand – Novatech

TABLE 1: Allowable Flows - Commercial Septic Systems

								Scenario 1: 58% hard surface and use of tertiary treatment			Scenario 2: Runoff Captured and use of tertiary treatment		
Site	Area m ²	Topography Factor	Soil Factor	Vegetation Factor	Infiltration Factor	Annual Water Surplus (m ³ /year)	Infiltration Volume (m ³ /year)	Hard Surface Area	Available Infiltration (litres per day)	Maximum Septic Flow (litres per day)	Hard Surface Area	Available Infiltration (litres per day)	Maximum Septic Flow (litres per day)
Blocks 10 and 12, Plan 4M-1511 (1500 Thomas Argue Road)	42455	0.20	0.30	0.10	0.60	0.349	14817	0.57	10473	10473	0.00	24356	24356

- Notes:
- 1. Scenario No. 1 values are calculated under the following:
 - a) Carried out in accordance with Section 5.6.3 of the MECP Procedure D-5-4
 - b) Incorporates a value of 20 mg/L nitrate in the discharged effluent from the advanced septic treatment system
 - c) 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 advanced septic treatment unit
 - d) A total of 57% hard surface from which runoff is not available for infiltration
 - 2. Scenario No. 2 values are calculated under the following:
 - a) Carried out in accordance with Section 5.6.3 of the MECP Procedure D-5-4
 - b) Incorporates a value of 20 mg/L nitrate in the discharged effluent from the advanced septic treatment system
 - c) 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 advanced septic treatment unit
 - d) Assumes all runoff is captured and infiltrated

CarletonPlace-Appleton WATER BUDGET MEANS FOR THE PERIOD 1984-2006 DC20492

LAT.... 45.15 WATER HOLDING CAPACITY...125 MM HEAT INDEX... 35.93
 LONG... 76.20 LOWER ZONE..... 75 MM A..... 1.068

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-9.9	68	18	20	1	1	0	35	63	121	303
28- 2	-8.1	51	16	28	1	1	0	39	71	124	354
31- 3	-2.4	60	28	81	7	7	0	101	21	125	414
30- 4	6.1	71	67	25	34	34	0	59	0	123	485
31- 5	12.9	83	83	0	80	80	0	16	0	111	566
30- 6	18.0	88	88	0	115	113	-2	7	0	79	657
31- 7	20.4	96	96	0	133	122	-10	2	0	51	753
31- 8	19.3	81	81	0	116	94	-21	1	0	36	833
30- 9	14.7	88	88	0	75	69	-6	3	0	52	923
31-10	8.1	84	83	1	36	36	0	14	0	85	86
30-11	1.5	85	65	12	10	10	0	38	8	114	172
31-12	-5.9	67	26	16	2	2	0	34	33	121	238
AVE	6.2 TTL	921	739	183	610	569	-39	349			

CarletonPlace-Appleton STANDARD DEVIATIONS FOR THE PERIOD 1984-2006 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.4	33	23	20	1	1	0	41	40	12	64
28- 2	2.4	23	18	27	1	1	0	35	45	4	71
31- 3	2.2	28	19	36	4	4	0	38	42	0	74
30- 4	1.6	40	38	43	8	8	0	47	0	6	96
31- 5	1.6	35	35	0	11	11	0	20	0	23	100
30- 6	1.4	38	38	0	9	9	6	14	0	37	106
31- 7	1.1	42	42	0	8	20	19	7	0	46	127
31- 8	1.2	38	38	0	8	24	26	2	0	47	135
30- 9	1.5	34	34	0	8	14	13	14	0	47	139
31-10	1.3	35	37	5	6	6	0	29	2	39	35
30-11	1.8	26	24	10	4	4	0	39	17	20	50
31-12	3.4	28	24	17	2	2	0	33	31	10	60

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

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

Client PO:
Project: 64853.01
Custody: 12093

Report Date: 11-Aug-2020
Order Date: 7-Aug-2020

Order #: 2032511

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

Paracel ID	Client ID
2032511-01	MW1

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 11-Aug-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 7-Aug-2020

Client PO:

Project Description: 64853.01

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	11-Aug-20	11-Aug-20

Certificate of Analysis

Client: GEMTEC Consulting Engineers and Scientists Limited

Client PO:

Report Date: 11-Aug-2020

Order Date: 7-Aug-2020

Project Description: 64853.01

Client ID:	MW1	-	-	-
Sample Date:	07-Aug-20 09:00	-	-	-
Sample ID:	2032511-01	-	-	-
MDL/Units	Drinking Water	-	-	-

Anions

Nitrate as N	0.1 mg/L	0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.25 [1]	-	-	-

Certificate of Analysis

Report Date: 11-Aug-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 7-Aug-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						

Certificate of Analysis

Report Date: 11-Aug-2020

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

Order Date: 7-Aug-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.02	0.1	mg/L	ND	102	86-114			
Nitrite as N	0.974	0.05	mg/L	ND	97.4	85-115			

Certificate of Analysis

Report Date: 11-Aug-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 7-Aug-2020

Client PO:

Project Description: 64853.01

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limit because of dilution required due to the presence of high levels of non-target analytes.

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

MEMORANDUM

DATE: MARCH 7, 2019
REVISED: JUNE 12, 2020
TO: ADAM THOMPSON, NOVATECH
FROM: ALEX MCAULEY, P.ENG
RE: CANAGENETICS INC. – WESTKAN BUSINESS PARK
SEPTIC SYSTEM CONSIDERATIONS
NOVATECH FILE # 118179
CC:

As discussed, Novatech has prepared a memo based on our review of the Septic Demands email (dated 6/2/2019) provided by Cannagenetics. The items noted below are items for further discussion and consideration as the design progresses.

Assumptions

- Due to the elevated ground water table, a fully raised septic system is anticipated.
- Imported sand for the septic system will have a Percolation Rate of 8 min/cm.
- The underlying soil has a Percolation Rate of 50 min/cm.
- It is assumed that all process/production discharge is suitable for onsite disposal within the proposed septic system.
- Septic System flow allowance is 10,000L/day per lot to avoid triggering Reasonable Use criteria which has onerous treatment, cost and approvals considerations.
- There will be up to 20 employees daily.
- There will be 280 reservoirs (50 USgal, or 189L) within the facility for fertilising and irrigation, with a combined total volume of approximately 53,000L.
- The reservoirs will be drained periodically (approximately once every 4 weeks) to the septic system.

Considerations

- For preliminary design purposes, the proposed septic system will be limited to 10,000 L/day.
- The demands have been divided into two main categories, employee usage and production/process.
 - The theoretical design flow is based on 20 employees 1,500L/day (75L/day/employee).
 - Process and Production discharge, which includes the draining of reservoirs, would be limited to 8,500L/day (10,000L/day limit minus 1,500L/day for employee usage).
- Based on a total reservoir volume of 53,000L, and a maximum discharge of 8,500L/day, draining of the reservoirs would need to be completed over a minimum of 7 days to not overload the septic system.
- Recommend flow monitoring after construction to confirm the flow numbers based on actual usage.
- Discharge in excess of 10,000L/day, or any water not suitable for the proposed septic system would be required to be hauled offsite for disposal at a licensed facility.
- Minimum setbacks required per the Ontario Building Code (OBC) based on a 1.5m raised septic field from the septic tiles are:
 - To property lines: 6.0m
 - To buildings: 8.0m
 - To any well: 18.0m
 - To the septic tank: 1.5m
- Mounding calculations will be required and may increase the above noted setback requirements.

Refer to attached Septic System Design Flows Sheet (Dated March 7, 2019) for preliminary calculations.

Date: March 7, 2019

SEPTIC SYSTEM DESIGN FLOWS			
Activity			Flow/Unit (L/day) [1]
Proposed Production Facility			
	Qty	Multiplier	
Employees	20	75 L/day	1,500
Process Water	1	8,500 L/day	8,500
		Site TOTAL [2]	10,000
Septic Sizing Options (Conventional System)			
	Flow	Pipe length	Tank Size
	Q (L/day)	(m)	(L)
Absorption Trench (OBC 8.7.3)		$=(Q*8)\div 200$	$=Q*3$
Phase 1	10,000	400	30,000
Percolation Rate [3]	T	8	=min/cm
Loading Rate Calculations			
	Flow	Loading Rate	Area Req'd
	Q (L/day)	L/m ² /day	(m ²)
Contact Area Required	10,000	6	1,667
	Length (m)	Width (m)	Area (m ²)
Contact Area Provided (Preliminary Dimensions)	50	34	1,700

Notes:

[1] Flows per OBC Table 8.2.1.3B and per MOECC guidelines

[2] Max allowable flow is based on a maximum 10,000L/day to fall below the limit where Reasonable Use would apply.

[3] Percolation Rate is assumed to be 8 for imported septic sand, and 50 for the underlying soil due to ground water.

[4] Assumptions:

- 20 employees per day
- 8,500L/day of discharged production water



APPENDIX D

MECP Water Well Records



Ontario

Ministry of the Environment
and Climate ChangeTag#: A260891 (Print Below)

A260891

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page of

Well-Owner's Information

First Name Jo Goff Graham Last Name / Organization Cannagenetics Premium Cannabis Products Incorporated E-mail Address _____
Mailing Address (Street Number/Name) 28 Bluemeadow Way Municipality Ottawa Province ON Postal Code K2M 1L8 Telephone No. (inc. area code) _____
☒ Well Constructed by Well Owner

Well Location

Address of Well Location (Street Number/Name) NO CIVIC Russ Bradley Airport Township West Carleton Lot X Concession X
County/District/Municipality Ottawa Carleton City/Town/Village Carp Province Ontario Postal Code _____
UTM Coordinates Zone 18 Easting 494001 Northing 5040311 Municipal Plan and Sublot Number 4M-1511
NAD 83

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From To
	Clay			0' 138'
Grey	Limestone			138' 150'
Grey	Limestone			150' 180'

Annular Space		
Depth Set at (m/ft) From To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
142' 132'	Neat cement	18.72
132' 0'	Bentonite slurry	42.00

Method of Construction		Well Use	
<input type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary (Conventional) <input type="checkbox"/> Rotary (Reverse) <input type="checkbox"/> Boring <input checked="" type="checkbox"/> Air percussion <input type="checkbox"/> Other, specify _____	<input type="checkbox"/> Diamond <input type="checkbox"/> Jetting <input type="checkbox"/> Driving <input type="checkbox"/> Digging	<input checked="" type="checkbox"/> Public <input type="checkbox"/> Domestic <input type="checkbox"/> Livestock <input type="checkbox"/> Irrigation <input type="checkbox"/> Industrial <input type="checkbox"/> Other, specify _____	<input type="checkbox"/> Commercial <input type="checkbox"/> Municipal <input type="checkbox"/> Test Hole <input type="checkbox"/> Cooling & Air Conditioning <input type="checkbox"/> Not used <input type="checkbox"/> Dewatering <input type="checkbox"/> Monitoring

Construction Record - Casing			Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____
6 1/4"	Steel	188"	+2' 142'	
6"	Open Hole		142' 180'	

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

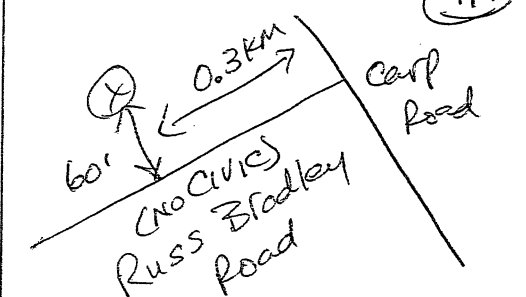
Water Details		Hole Diameter	
Water found at Depth <u>150' (m)</u> <input type="checkbox"/> Gas <input checked="" type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth _____ (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	0' 142'	93 1/4"
Water found at Depth _____ (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	142' 180'	6"

Well Contractor and Well Technician Information
Business Name of Well Contractor Air Rock Drilling Co. Ltd. Well Contractor's Licence No. 1119
Business Address (Street Number/Name) 6659 Franktown Road, RR#1 Municipality Richmond
Province ON Postal Code K0A 2Z0 Business E-mail Address air-rock@sympatico.ca
Bus. Telephone No. (inc. area code) 613-382-170 Name of Well Technician (Last Name, First Name) Purcell, Shannon
Well Technician's Licence No. T4033 Signature of Technician and/or Contractor [Signature] Date Submitted 2019 05 24

Results of Well Yield Testing					
After test of well yield, water was: <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify <u>Not tested</u>		Draw Down		Recovery	
		Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason: <u>X</u>		Static Level			113
Pump intake set at (m/ft) <u>150</u>		1	40.2	1	95.7
Pumping rate (l/min / GPM) <u>20</u>		2	47.4	2	83.5
Duration of pumping <u>4</u> hrs + <u>0</u> min		3	53.3	3	75.9
Final water level end of pumping (m/ft) <u>113</u>		4	58.2	4	89.1
If flowing give rate (l/min / GPM) <u>X</u>		5	62.5	5	83
Recommended pump depth (m/ft) <u>150</u>		10	77.8	10	44
Recommended pump rate (l/min / GPM) <u>20</u>		15	87.3	15	37.4
Well production (l/min / GPM) <u>20</u>		20	93.8	20	35.8
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		25	98.3	25	35
		30	102	30	34.5
		40	106	40	33.8
		50	110	50	32.8
		60	113	60	32.1

Map of Well Location

Please provide a map below following instructions on the back.



Comments: *1 HR 156 PM Sat @ 150'
Well owner's information package delivered Yes Date Package Delivered 2019 05 13
Date Work Completed 2019 05 24
Ministry Use Only
Audit No. 2302233
Received: _____

CERTIFICATE OF WELL COMPLIANCE



I (**Jeremy Hanna**) **AIR ROCK DRILLING CO. LTD.** - DO HEREBY CERTIFY

that I am licensed to drill water wells in the Province of Ontario, and that I have

supervised the drilling of the water well on the property of :

OWNER: Cannagenetics Premium Cannabis Products

Location: Incorporated (NOCVIC) Russ Bradley Road, Carp

LOT: X CON: X PLAN # 4M-1511 S/L # X

Ottawa-Carleton / Geographical Township of West Carleton

I CERTIFY FURTHER that, I am aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to this site and City Standards.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased, grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

Signed this 24TH Day of MAY, 2019

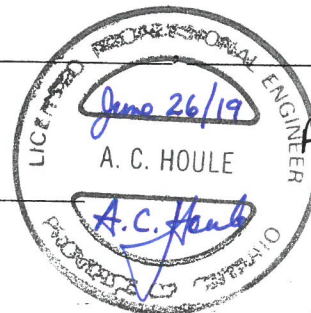
Jeremy Hanna (T3632)

Air Rock Drilling Co. Ltd. (# 1119)

The Engineer on behalf of the Landowner set out above, Certifies that he/she has inspected the well and it was constructed in accordance with the specifications in O.Reg 903, this report and the Hydrogeological Report with regards to casing length and grouting requirements.

Signed this 26 day of June, 2019

A.C. Houle, P. Eng.
(Engineer) Gentec



Shaping our future together
Ensemble, formons notre avenir

City of Ottawa
Client Service Centre
8743 Victoria Street
Ottawa, ON K2C 3G6

Ville d'Ottawa
Centre de service
8743, rue Victoria
Ottawa, ON K2C 3G6

MECP Water Well Record Summary (500 Metre Radius)

Borehole_ID	Well_ID	Completed	Depth (m)	Depth to Bedrock (m)	Static Water Level (m bgs)	Water Found (m bgs)	Water Detail	Well Use	Formation Screened
10025174	1503131	1952-01-30	42.7	-	7.3	21.3, 27.4, 39.6	FR	DO	Sand
1002810661	7127229	2009-06-15	-	-	-	-	-	MO	Silt clay sand
1002810652	7127229	2009-06-15	-	-	-	-	-	MO	Silt clay sand
1002033066	7120701	2008-07-28	-	-	-	-	-	-	-
11760829	7035379	2006-07-28	3.8	-	-	-	-	-	Silty sand
1002810679	7127229	2009-06-16	-	-	-	-	-	MO	Silt clay sand
1002810688	7127229	2009-06-16	-	-	-	-	-	MO	Silt clay sand
11172992	1535240	2004-09-20	43.9	38.7	-	-	-	NU	Limestone
1002810643	7127229	2009-06-15	-	-	-	-	-	MO	Silt clay sand
1002810634	7127229	2009-06-15	-	-	-	-	-	MO	Silt clay sand
1002810607	7127228	2009-06-17	-	-	-	-	-	-	-
11172991	1535239	2004-09-21	39.3	34.7	-	-	-	NU	Limestone
1002810697	7127229	2009-06-16	-	-	-	-	-	MO	Silt clay sand
10036546	1514573	1975-02-13	53.3	37.5	5.5	50.9	SU	DO	Limestone
11691846	1536752	2006-07-10	3.7	-	-	-	-	-	Silty sand
10039561	1517689	1981-11-11	65.5	24.1	2.4	25.3, 56.4	FR	DO	Granite
1003226487	7120701	2008-07-28	-	-	-	-	-	-	-
10025114	1503071	1967-09-30	61	41.1	15.2	60.4	SU	DO	Limestone
10032160	1510130	1969-06-27	61	39.9	9.8	50.3	SU	IN	Limestone
1002636942	7127228	2009-06-07	-	-	-	-	-	-	-
1003226491	7120701	2008-07-28	-	-	-	-	-	-	-
1003226495	7120701	2008-07-28	-	-	-	-	-	-	-
1002810612	7127228	2009-06-17	-	-	-	-	-	-	-
1002810625	7127229	2009-06-15	-	-	-	-	-	MO	Silt clay sand
11316326	1535787	2005-09-20	27.4	-	5.9	-	-	MN	Gravel
10025172	1503129	1958-06-14	57	46.3	8.5	55.8	SU	DO	Limestone
10041985	1520137	1985-09-05	7.6	-	1.8	7.3	FR	DO	Gravel
1003226499	7120701	2008-07-28	-	-	-	-	-	-	-
10038723	1516828	1978-11-01	44.2	10.7	12.2	44.2	FR	DO	Limestone
1002810670	7127229	2009-06-16	-	-	-	-	-	MO	Silt clay sand

Data from: <https://data.ontario.ca/dataset/well-records>
Last Updated: April 30, 2020

MECP Water Well Record Summary (500 Metre Radius)

Code Description for "Well Use"		Code Description for "Water Detail"	
DO	Domestic	FR	Fresh
ST	Livestock	SA	Salty
IR	Irrigation	SU	Sulphur
IN	Industrial	MN	Mineral
CO	Commercial	UK	Unknown
MN	Municipal	GS	Gas
PS	Public	IR	Iron
AC	Cooling and A/C	UT	Untested
NU	Not Used	OT	Other
OT	Other	-	-
TH	Test Hole	-	-
DE	Dewatering	-	-
MO	Monitoring	-	-
MT	Monitoring Testhole	-	-
AB	Abandoned	-	-

Well Statistics		Well Statistics	
Water Detail	Count	Well Use	Count
FR	4	DO	0
SA	0	ST	0
SU	4	IR	0
MN	0	IN	0
UK	0	CO	0
GS	0	MN	0
IR	0	PS	0
UT	0	AC	0
OT	0	NU	0
-	-	OT	0
-	-	TH	0
-	-	DE	0
-	-	MO	0
-	-	MT	0
-	-	AB	0

Well Statistics				
	Well Depth (m)	Depth to Bedrock (m)	Static Water Level (m bgs)	Water Found (m bgs)
min	3.7	10.7	1.8	7.3
max	65.5	46.3	15.2	60.4
average	39.3	34.1	7.6	44.8



APPENDIX E

Test Well Pumping Test and Analysis



GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

Pumping Test Analysis Report

Project: Hydrogeological Investigation

Project Number: 64853.01

Client: Cannagenetics Inc.

Location: 1500 Thomas Argue Road, Ottawa, Ontario

P-Test Date: June 12, 2019

Test Conducted by: LT

Pumping Well: TW19-1

Well Tag: A260891

Analysis Performed by: AP

Method: Raw Pumping Test Data

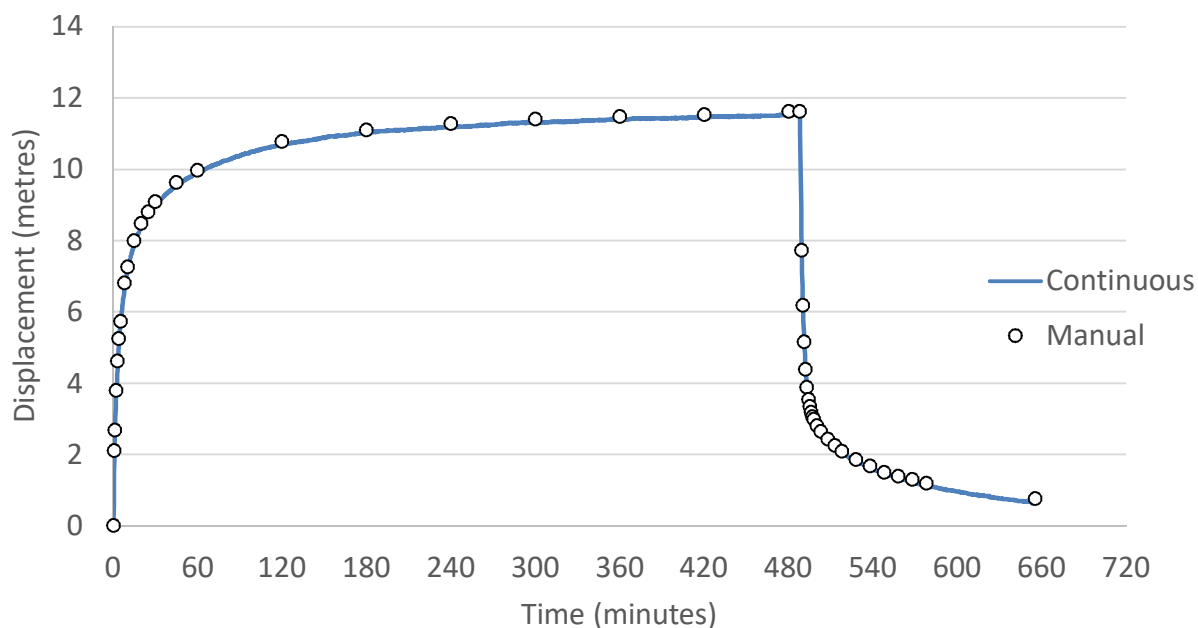
Static WL: 8.33 m bgs

Well Depth: 48.8 m

Discharge: Constant: 57 L/min

Duration: 8 hours, 8 minutes

Pumping Test Data (TW19-1): Drawdown and Recovery





GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

Pumping Test Analysis Report

Project: Hydrogeological Investigation

Project Number: 64853.01

Client: Cannagenetics Inc.

Location: 1500 Thomas Argue Road, Ottawa, Ontario

P-Test Date: June 12, 2019

Test Conducted by: LT

Pumping Well: TW19-1

Well Tag: A260891

Analysis Performed by: AP

Method: Cooper-Jacob

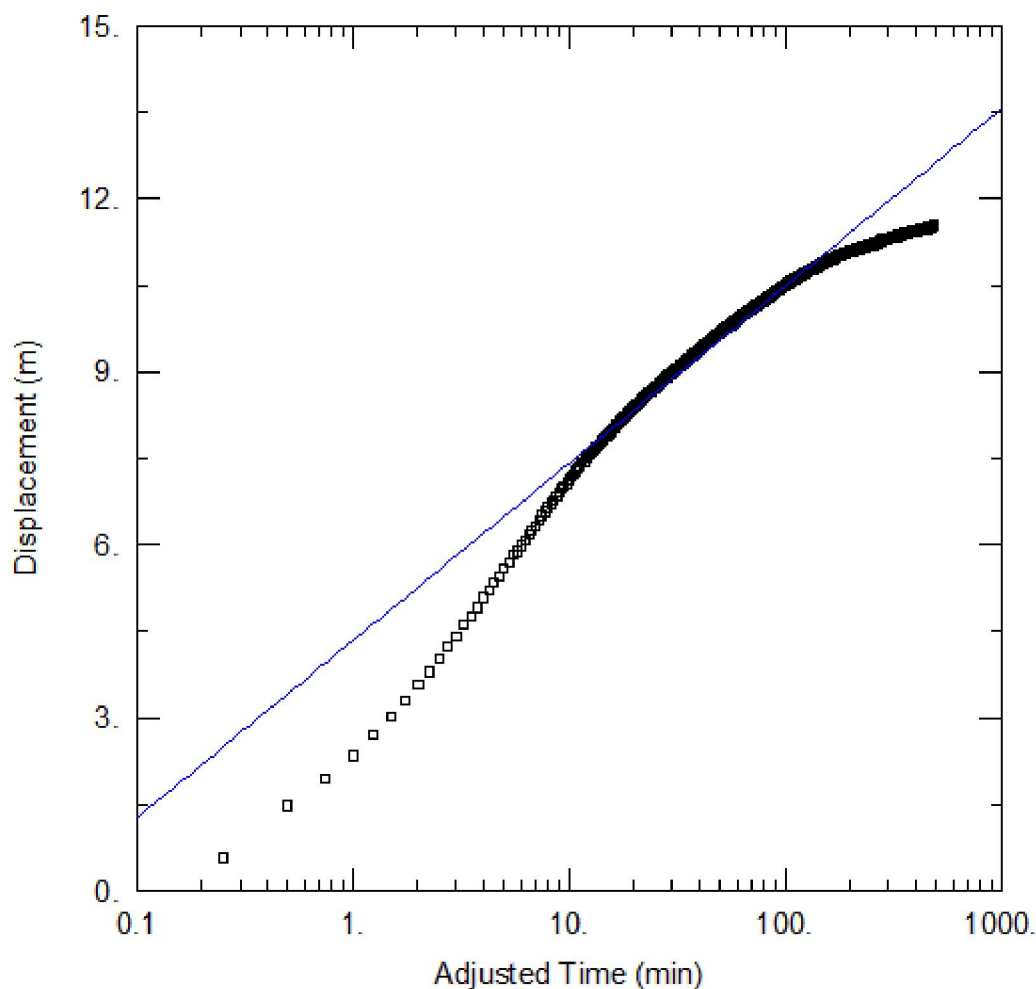
Static WL: 8.33 m bgs

Well Depth: 48.8 m

Discharge: Constant: 57 L/min

Duration: 8 hours, 8 minutes

Pumping Test Data (TW19-1): Transmissivity Analysis Drawdown



Estimated Hydraulic Conductivity (k) = $6 \times 10^{-5} \text{ m}^2/\text{s}$ or $5.2 \text{ m}^2/\text{day}$



GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

Pumping Test Analysis Report

Project: Hydrogeological Investigation

Project Number: 64853.01

Client: Cannagenetics Inc.

Location: 1500 Thomas Argue Road, Ottawa, Ontario

P-Test Date: June 12, 2019

Test Conducted by: LT

Pumping Well: TW19-1

Well Tag: A260891

Analysis Performed by: AP

Method: Theis Recovery

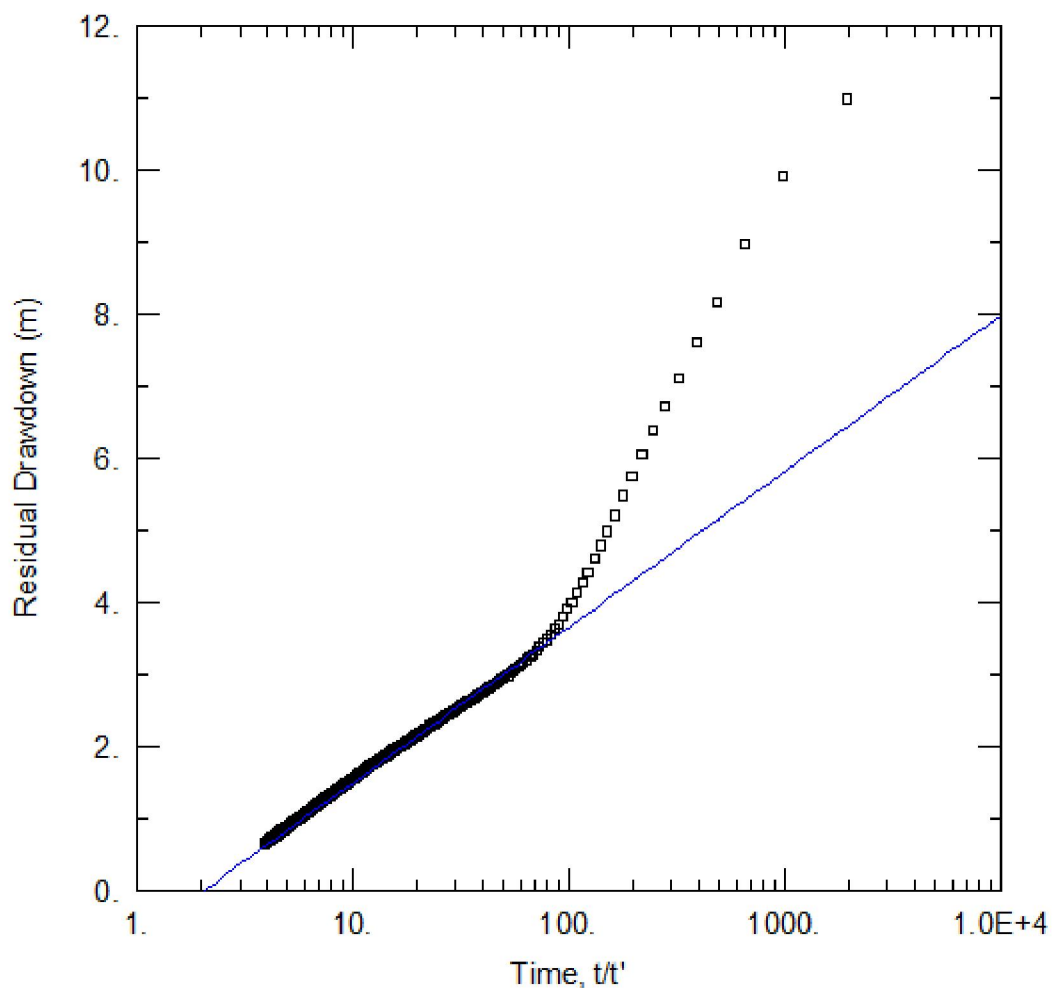
Static WL: 8.33 m bgs

Well Depth: 48.8 m

Discharge: Constant: 57 L/min

Duration: 8 hours, 8 minutes

Pumping Test Data (TW19-1): Transmissivity Analysis Recovery



Estimated Hydraulic Conductivity (k) = $8 \times 10^{-5} \text{ m}^2/\text{s}$ or $6.9 \text{ m}^2/\text{day}$



APPENDIX F

Summary of Field and Laboratory Measurements Laboratory Certificates of Analysis

Table 1
Summary of Field Parameters (TW19-1)

Date	Time Since Pumping Started (hr:min) @ Flow Rate	Temp (°C)	pH	EC ¹ (us/cm)	TDS ² (ppm)	Turbidity (NTU)	Colour (ACU)	Filtered Colour ³ (TCU)	Chlorine (mg/L)
Jun 12/19	1 @ 15 gpm	13.2	8.11	499	249	17.5	-	-	-
	2 @ 15 gpm	12.3	8.21	799	399	8.8	-	-	-
	3 @ 15 gpm	12.1	8.18	816	408	5.1	-	-	-
	4 @ 15 gpm	11.9	8.18	820	410	3.8	10	12	0
	5 @ 15 gpm	12.1	8.19	830	415	4.3	-	-	-
	6 @ 15 gpm	12.0	8.15	848	424	5.0	-	-	-
	7 @ 15 gpm	11.8	8.15	851	425	3.5	-	-	-
	8 @ 15 gpm	11.3	8.14	836	418	4.3	5	10	0
May 8/20	Well Chlorination								
May 11/20	7.5 hours @ 15 gpm	9.2	7.80	850	425	3.1	0	0	0
May 28/20	Well Chlorination								
Jun 1/20	7.5 hours @ 10 gpm	9.6	7.95	800	400	2.4	0	0	0

Notes:

1. EC: Electrical Conductivity
2. TDS: Total Dissolved Solids
3. Filtered using 0.45 micron filter.

Table 2
Summary of Laboratory Parameters Analyzed (TW19-1)

		Parameter	Units	TW19-1 Jun 12/19 4 hr P-Test	TW19-2 Jun 12/19 8 hr P-Test	TW19-1 R1 May 11/20	TW19-1 R2 Jun 1/20	Ontario Drinking Water Standard	Type of Std.
Microbiological Parameters		Escherichia coli	CFU/100mL	ND	ND	3	ND	0	MAC
		Fecal Coliform	CFU/100mL	ND	ND	3	ND	0	MAC
		Total coliforms	CFU/100mL	ND	ND	3	ND	0	MAC
		Heterotrophic Plate Count	CFU/1mL	<10	<10	<1	150	-	-
General Inorganics		Alkalinity (as CaCO ₃)	mg/L	338	326	297	-	30-500	OG
		Ammonia as N (NH ₃)	mg/L	0.44	0.44	0.38	0.39	-	-
		Dissolved Organic Carbon (DOC)	mg/L	1.5	2.1	12.0	24.4	5	AO
		Colour	TCU	11	10	12	6	5	AO
		Electrical Conductivity	uS/cm	957	904	884	-	-	-
		Total Hardness (as CaCO ₃)	mg/L	123	135	144	-	80-100	OG
		pH	pH units	8.4	8.3	8.3	-	6.5-8.5	OG
		Phenols	mg/L	<0.001	<0.001	<0.001	-	-	-
		Total Dissolved Solids (TDS)	mg/L	548	552	448	-	500	AO
		Sulphide (S ₂)	mg/L	3.00	2.30	1.94	1.51	0.05	AO
		Tannins and Lignins	mg phenol/L	0.7	0.6	0.4	0.4	-	-
		Total Kjeldahl Nitrogen (TKN)	mg/L	0.8	0.7	0.4	0.4	-	-
		Organic Nitrogen (TKN - NH ₃)	mg/L	0.4	0.3	0	0	0.15	OG
		Turbidity	NTU	1.3	1.4	1.2	4.2	5	AO
Anions		Chloride (Cl)	mg/L	113	105	112	-	250	AO
		Fluoride (F)	mg/L	1.1	1.0	0.9	-	1.5	MAC
		Nitrate as N (NO ₃)	mg/L	<0.1	<0.1	<0.1	-	10	MAC
		Nitrite as N (NO ₂)	mg/L	<0.05	<0.005	<0.05	-	0.1	MAC
		Sulphate (SO ₄)	mg/L	16	20	30	-	500	AO
Metals		Calcium (Ca)	mg/L	25.7	29.2	30.7	-	-	-
		Iron (Fe)	mg/L	<0.1	<0.1	<0.1	-	0.3	AO
		Magnesium (Mg)	mg/L	14.3	15.0	16.3	-	-	-
		Manganese (Mn)	mg/L	<0.005	<0.005	<0.005	-	0.05	AO
		Potassium (K)	mg/L	8.1	8.0	7.1	-	-	-
		Sodium (Na)	mg/L	156	142	106	-	200	AO

Bolded = Exceeds Ontario Drinking Water Standards

* Sample collected from outdoor tap

MAC = Maximum acceptable concentration

AO = Aesthetic objective

NR = Not Reportable

ND = Not Detectable

OG = Operational guideline

Date: June 2020

Project: 64853.01

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

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

Client PO:
Project: 64853.01
Custody: 10163

Report Date: 18-Jun-2019
Order Date: 13-Jun-2019

Order #: 1924467

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

Paracel ID	Client ID
1924467-01	19-1 4h
1924467-02	19-2 8h

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

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

Client PO:

Report Date: 18-Jun-2019

Order Date: 13-Jun-2019

Project Description: **64853.01**

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	13-Jun-19	14-Jun-19
Ammonia, as N	EPA 351.2 - Auto Colour	13-Jun-19	13-Jun-19
Anions	EPA 300.1 - IC	14-Jun-19	14-Jun-19
Colour	SM2120 - Spectrophotometric	13-Jun-19	13-Jun-19
Conductivity	EPA 9050A- probe @25 °C	13-Jun-19	14-Jun-19
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	14-Jun-19	14-Jun-19
E. coli	MOE E3407	13-Jun-19	13-Jun-19
Fecal Coliform	SM 9222D	13-Jun-19	13-Jun-19
Heterotrophic Plate Count	SM 9215C	13-Jun-19	13-Jun-19
Metals, ICP-MS	EPA 200.8 - ICP-MS	14-Jun-19	14-Jun-19
pH	EPA 150.1 - pH probe @25 °C	13-Jun-19	14-Jun-19
Phenolics	EPA 420.2 - Auto Colour, 4AAP	14-Jun-19	14-Jun-19
Subdivision Package	Hardness as CaCO ₃	14-Jun-19	14-Jun-19
Sulphide	SM 4500SE - Colourimetric	18-Jun-19	18-Jun-19
Tannin/Lignin	SM 5550B - Colourimetric	13-Jun-19	14-Jun-19
Total Coliform	MOE E3407	13-Jun-19	13-Jun-19
Total Dissolved Solids	SM 2540C - gravimetric, filtration	13-Jun-19	14-Jun-19
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	15-Jun-19	17-Jun-19
Turbidity	SM 2130B - Turbidity meter	13-Jun-19	13-Jun-19

Certificate of Analysis

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

Client PO:

Report Date: 18-Jun-2019

Order Date: 13-Jun-2019

Project Description: **64853.01**

Client ID:	19-1 4h	19-2 8h	-	-
Sample Date:	12-Jun-19 12:00	12-Jun-19 16:00	-	-
Sample ID:	1924467-01	1924467-02	-	-
MDL/Units	Drinking Water	Drinking Water	-	-

Microbiological Parameters

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

General Inorganics

Alkalinity, total	5 mg/L	338	326	-	-
Ammonia as N	0.01 mg/L	0.44	0.44	-	-
Dissolved Organic Carbon	0.5 mg/L	1.5	2.1	-	-
Colour	2 TCU	11	10	-	-
Conductivity	5 uS/cm	957	904	-	-
Hardness	mg/L	123	135	-	-
pH	0.1 pH Units	8.4	8.3	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	548	552	-	-
Sulphide	0.02 mg/L	3.00	2.30	-	-
Tannin & Lignin	0.1 mg/L	0.7	0.6	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.8	0.7	-	-
Turbidity	0.1 NTU	1.3	1.4	-	-

Anions

Chloride	1 mg/L	113	105	-	-
Fluoride	0.1 mg/L	1.1	1.0	-	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	16	20	-	-

Metals

Calcium	0.1 mg/L	25.7	29.2	-	-
Iron	0.1 mg/L	<0.1	<0.1	-	-
Magnesium	0.2 mg/L	14.3	15.0	-	-
Manganese	0.005 mg/L	<0.005	<0.005	-	-
Potassium	0.1 mg/L	8.1	8.0	-	-
Sodium	0.2 mg/L	156	142	-	-

Certificate of Analysis

Client: GEMTEC Consulting Engineers and Scientists Limited

Client PO:

Report Date: 18-Jun-2019

Order Date: 13-Jun-2019

Project Description: 64853.01

Method Quality Control: Blank

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

Certificate of Analysis

Client: GEMTEC Consulting Engineers and Scientists Limited

Client PO:

Report Date: 18-Jun-2019

Order Date: 13-Jun-2019

Project Description: 64853.01

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	28.3	1	mg/L	28.4			0.4	10	
Fluoride	0.72	0.1	mg/L	0.74			2.8	10	
Nitrate as N	0.34	0.1	mg/L	0.35			1.5	10	
Nitrite as N	ND	0.05	mg/L	ND				10	
Sulphate	27.0	1	mg/L	27.1			0.5	10	
General Inorganics									
Alkalinity, total	90.6	5	mg/L	91.1			0.6	14	
Ammonia as N	0.338	0.01	mg/L	0.344			2.0	17.7	
Dissolved Organic Carbon	52.9	0.5	mg/L	53.8			1.7	37	
Colour	6	2	TCU	6			0.0	12	
Conductivity	322	5	uS/cm	314			2.8	5	
pH	7.7	0.1	pH Units	7.6			0.8	10	
Phenolics	ND	0.001	mg/L	ND				10	
Total Dissolved Solids	166	10	mg/L	190			13.5	10	
Sulphide	ND	0.02	mg/L	ND				10	
Tannin & Lignin	ND	0.1	mg/L	ND			0.0	11	
Total Kjeldahl Nitrogen	0.17	0.1	mg/L	0.15			9.0	16	QR-01
Turbidity	0.3	0.1	NTU	0.2			3.9	10	
Metals									
Calcium	116	0.1	mg/L	114			2.6	20	
Iron	4.3	0.1	mg/L	4.1			6.2	20	
Magnesium	39.6	0.2	mg/L	37.6			5.3	20	
Manganese	0.113	0.005	mg/L	0.108			4.7	20	
Potassium	6.2	0.1	mg/L	5.9			3.8	20	
Sodium	109	0.2	mg/L	103			5.2	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND				30	
Fecal Coliforms	ND	1	CFU/100 mL	ND				30	
Total Coliforms	ND	1	CFU/100 mL	ND				30	
Heterotrophic Plate Count	30	10	CFU/mL	40			29.0	30	

Certificate of Analysis

Report Date: 18-Jun-2019

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 13-Jun-2019

Client PO:

Project Description: 64853.01

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	38.4	1	mg/L	28.4	100	77-123			
Fluoride	1.75	0.1	mg/L	0.74	102	79-121			
Nitrate as N	1.53	0.1	mg/L	0.35	118	79-120			
Nitrite as N	0.883	0.05	mg/L	ND	88.3	84-117			
Sulphate	37.7	1	mg/L	27.1	106	74-126			
General Inorganics									
Ammonia as N	0.571	0.01	mg/L	0.344	90.9	81-124			
Dissolved Organic Carbon	61.3	0.5	mg/L	53.8	75.3	60-133			
Phenolics	0.021	0.001	mg/L	ND	84.1	69-132			
Total Dissolved Solids	104	10	mg/L		104	75-125			
Sulphide	0.51	0.02	mg/L	ND	101	79-115			
Tannin & Lignin	0.8	0.1	mg/L	ND	84.1	71-113			
Total Kjeldahl Nitrogen	2.42	0.1	mg/L	0.15	113	81-126			
Metals									
Calcium	18300		ug/L	7300	110	80-120			
Iron	6520		ug/L	4080	97.5	80-120			
Magnesium	47700		ug/L	37600	101	80-120			
Manganese	157		ug/L	108	97.9	80-120			
Potassium	17500		ug/L	5930	116	80-120			
Sodium	110000		ug/L	103000	69.0	80-120			QM-07

Certificate of Analysis

Client: GEMTEC Consulting Engineers and Scientists Limited

Client PO:

Report Date: 18-Jun-2019

Order Date: 13-Jun-2019

Project Description: 64853.01

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match -

Applies to samples: 19-1 4h, 19-2 8h

Sample Qualifiers :

QC Qualifiers :

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

QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

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.

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

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

Client PO:
Project: 64853.01
Custody: 11437

Report Date: 19-May-2020
Order Date: 11-May-2020

Order #: 2020119

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

Paracel ID	Client ID
2020119-01	TW19-1 R1

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	15-May-20	15-May-20
Ammonia, as N	EPA 351.2 - Auto Colour	15-May-20	15-May-20
Anions	EPA 300.1 - IC	13-May-20	14-May-20
Colour	SM2120 - Spectrophotometric	13-May-20	13-May-20
Conductivity	EPA 9050A- probe @25 °C	15-May-20	15-May-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	14-May-20	14-May-20
E. coli	MOE E3407	12-May-20	12-May-20
Fecal Coliform	SM 9222D	12-May-20	12-May-20
Heterotrophic Plate Count	SM 9215C	12-May-20	12-May-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	15-May-20	15-May-20
pH	EPA 150.1 - pH probe @25 °C	15-May-20	15-May-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	14-May-20	14-May-20
Hardness	Hardness as CaCO ₃	15-May-20	15-May-20
Sulphide	SM 4500SE - Colourimetric	19-May-20	19-May-20
Tannin/Lignin	SM 5550B - Colourimetric	14-May-20	14-May-20
Total Coliform	MOE E3407	12-May-20	12-May-20
Total Dissolved Solids	SM 2540C - gravimetric, filtration	12-May-20	13-May-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	14-May-20	19-May-20
Turbidity	SM 2130B - Turbidity meter	13-May-20	13-May-20

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Client ID:	TW19-1 R1	-	-	-
Sample Date:	11-May-20 15:15	-	-	-
Sample ID:	2020119-01	-	-	-
MDL/Units	Drinking Water	-	-	-

Microbiological Parameters

E. coli	1 CFU/100 mL	3 [1]	-	-	-
Fecal Coliforms	1 CFU/100 mL	3 [1]	-	-	-
Total Coliforms	1 CFU/100 mL	3 [1]	-	-	-
Heterotrophic Plate Count	10 CFU/mL	ND [1]	-	-	-

General Inorganics

Alkalinity, total	5 mg/L	297	-	-	-
Ammonia as N	0.01 mg/L	0.38	-	-	-
Dissolved Organic Carbon	0.5 mg/L	12.0	-	-	-
Colour	2 TCU	12	-	-	-
Conductivity	5 uS/cm	884	-	-	-
Hardness	mg/L	144	-	-	-
pH	0.1 pH Units	8.3	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Total Dissolved Solids	10 mg/L	448	-	-	-
Sulphide	0.02 mg/L	1.94	-	-	-
Tannin & Lignin	0.1 mg/L	0.4	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.4	-	-	-
Turbidity	0.1 NTU	1.2	-	-	-

Anions

Chloride	1 mg/L	112	-	-	-
Fluoride	0.1 mg/L	0.9	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Sulphate	1 mg/L	30	-	-	-

Metals

Calcium	0.1 mg/L	30.7	-	-	-
Iron	0.1 mg/L	<0.1	-	-	-
Magnesium	0.2 mg/L	16.3	-	-	-
Manganese	0.005 mg/L	<0.005	-	-	-
Potassium	0.1 mg/L	7.1	-	-	-
Sodium	0.2 mg/L	106	-	-	-

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%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						
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						

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	6.91	1	mg/L	6.90			0.1	10	
Fluoride	0.62	0.1	mg/L	0.67			8.1	10	
Nitrate as N	0.17	0.1	mg/L	0.17			1.9	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	31.5	1	mg/L	31.7			0.7	10	
General Inorganics									
Alkalinity, total	298	5	mg/L	297			0.4	14	
Ammonia as N	0.381	0.01	mg/L	0.376			1.4	17.7	
Dissolved Organic Carbon	13.1	0.5	mg/L	12.0			8.4	37	
Colour	12	2	TCU	12			0.0	12	
Conductivity	877	5	uS/cm	884			0.7	5	
pH	8.3	0.1	pH Units	8.3			0.0	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	172	10	mg/L	186			7.8	10	
Sulphide	1.94	0.10	mg/L	1.94			0.0	10	
Tannin & Lignin	0.3	0.1	mg/L	0.2			8.4	11	
Total Kjeldahl Nitrogen	0.36	0.1	mg/L	0.41			13.9	16	
Turbidity	0.3	0.1	NTU	0.3			7.1	10	
Metals									
Calcium	30.5	0.1	mg/L	30.7			0.6	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Magnesium	15.8	0.2	mg/L	16.3			2.8	20	
Manganese	ND	0.005	mg/L	ND			NC	20	
Potassium	7.1	0.1	mg/L	7.1			0.8	20	
Sodium	104	0.2	mg/L	106			1.7	20	

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	18.6	1	mg/L	6.90	117	77-123			
Fluoride	1.57	0.1	mg/L	0.67	90.6	79-121			
Nitrate as N	1.35	0.1	mg/L	0.17	118	79-120			
Nitrite as N	1.01	0.05	mg/L	ND	101	84-117			
Sulphate	42.9	1	mg/L	31.7	112	74-126			
General Inorganics									
Ammonia as N	0.660	0.01	mg/L	0.376	114	81-124			
Dissolved Organic Carbon	20.9	0.5	mg/L	12.0	88.8	60-133			
Phenolics	0.023	0.001	mg/L	ND	92.0	69-132			
Total Dissolved Solids	76.0	10	mg/L	ND	76.0	75-125			
Sulphide	0.50	0.02	mg/L	ND	101	79-115			
Tannin & Lignin	1.1	0.1	mg/L	0.2	85.5	71-113			
Total Kjeldahl Nitrogen	2.17	0.1	mg/L	0.41	87.8	81-126			
Metals									
Calcium	9090	0.1	mg/L	ND	90.9	80-120			
Iron	2390	0.1	mg/L	4.4	95.3	80-120			
Magnesium	9530	0.2	mg/L	ND	95.3	80-120			
Manganese	66.7	0.005	mg/L	20.2	93.1	80-120			
Potassium	16000	0.1	mg/L	6190	98.4	80-120			
Sodium	8210	0.2	mg/L	ND	82.1	80-120			

Certificate of Analysis

Report Date: 19-May-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 11-May-2020

Client PO:

Project Description: 64853.01

Qualifier Notes:

Sample Qualifiers :

1 : Subcontracted analysis - Caduceon

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited

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

Client PO:
Project: 64853.01
Custody: 11397

Report Date: 4-Jun-2020
Order Date: 2-Jun-2020

Order #: 2023165

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

Paracel ID	Client ID
2023165-01	TW19-1 R2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 04-Jun-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Jun-2020

Client PO:

Project Description: 64853.01

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	4-Jun-20	4-Jun-20
Colour	SM2120 - Spectrophotometric	3-Jun-20	3-Jun-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	2-Jun-20	3-Jun-20
E. coli	MOE E3407	2-Jun-20	2-Jun-20
Fecal Coliform	SM 9222D	2-Jun-20	2-Jun-20
Heterotrophic Plate Count	SM 9215C	2-Jun-20	2-Jun-20
Sulphide	SM 4500SE - Colourimetric	4-Jun-20	4-Jun-20
Tannin/Lignin	SM 5550B - Colourimetric	4-Jun-20	4-Jun-20
Total Coliform	MOE E3407	2-Jun-20	2-Jun-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	3-Jun-20	4-Jun-20
Turbidity	SM 2130B - Turbidity meter	3-Jun-20	3-Jun-20

Certificate of Analysis

Report Date: 04-Jun-2020

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

Order Date: 2-Jun-2020

Client PO:

Project Description: **64853.01**

Client ID:	TW19-1 R2	-	-	-
Sample Date:	01-Jun-20 16:00	-	-	-
Sample ID:	2023165-01	-	-	-
MDL/Units	Drinking Water	-	-	-

Microbiological Parameters

E. coli	1 CFU/100 mL	ND [2]	-	-	-
Fecal Coliforms	1 CFU/100 mL	ND	-	-	-
Total Coliforms	1 CFU/100 mL	ND [2]	-	-	-
Heterotrophic Plate Count	10 CFU/mL	150	-	-	-

General Inorganics

Ammonia as N	0.01 mg/L	0.39	-	-	-
Dissolved Organic Carbon	0.5 mg/L	24.4	-	-	-
Colour	2 TCU	6	-	-	-
Sulphide	0.02 mg/L	1.51	-	-	-
Tannin & Lignin	0.1 mg/L	0.4	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.4	-	-	-
Turbidity	0.1 NTU	4.2	-	-	-

Certificate of Analysis

Report Date: 04-Jun-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Jun-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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General Inorganics

Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
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						

Microbiological Parameters

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

Certificate of Analysis

Report Date: 04-Jun-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Jun-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Ammonia as N	0.532	0.02	mg/L	0.579			8.4	17.7	
Dissolved Organic Carbon	9.7	0.5	mg/L	11.1			13.5	37	
Colour	ND	2	TCU	ND			NC	12	
Sulphide	1.51	0.04	mg/L	1.51			0.0	10	
Tannin & Lignin	0.4	0.1	mg/L	0.4			2.7	11	
Total Kjeldahl Nitrogen	0.38	0.1	mg/L	0.42			10.5	16	
Turbidity	0.6	0.1	NTU	0.5			7.3	10	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Heterotrophic Plate Count	10	10	CFU/mL	150			175.0	30	BAC04

Certificate of Analysis

Report Date: 04-Jun-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Jun-2020

Client PO:

Project Description: 64853.01

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Ammonia as N	0.250	0.01	mg/L	ND	99.9	81-124			
Dissolved Organic Carbon	20.6	0.5	mg/L	11.1	95.1	60-133			
Sulphide	0.51	0.02	mg/L	ND	103	79-115			
Tannin & Lignin	1.5	0.1	mg/L	0.4	109	71-113			
Total Kjeldahl Nitrogen	2.06	0.1	mg/L	0.42	81.8	81-126			

Certificate of Analysis

Report Date: 04-Jun-2020

Client: GEMTEC Consulting Engineers and Scientists Limited

Order Date: 2-Jun-2020

Client PO:

Project Description: 64853.01

Qualifier Notes:

Sample Qualifiers :

2 : A2C - Background counts greater than 200

QC Qualifiers :

BAC04 : Duplicate QC data falls within method prescribed 95% confidence limits.

BAC14 : A2C - Background counts greater than 200

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 G

Langelier Saturation Index (LSI)

Langelier Saturation Index Calculation

Project: 64853.01

Location: Part of Lots 13 and 14, Concession 3, Huntley, Ontario

Sample ID: TW19-1 8 hr

Well Tag: A260891

Inputs

pH =	8.3	
Total Dissolved Solids =	552	
Calcium (as CaCO ₃) =	144	Note: Ca (as CaCO ₃) = 2.5 x Ca
Alkalinity (as CaCO ₃) =	297	
Temperature (°C) =	10	Assumed average groundwater temperature

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 =	0.17
B =	2.38
C =	1.76
D =	2.47
pH _s =	7.63

LSI = 0.67

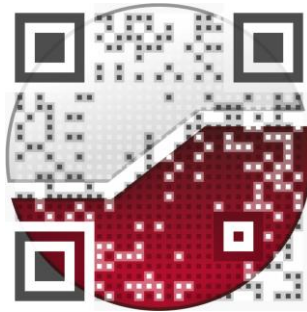
LSI Value

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

Indication

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

experience • knowledge • integrity



civil
geotechnical
environmental
field services
materials testing

civil
géotechnique
environnementale
surveillance de chantier
service de laboratoire des matériaux

expérience • connaissance • intégrité

