REPORT

Water Supply Investigation

Proposed Residential Development, Fergus Golf Club, 8243 and 8282 Wellington Road 19, Fergus, Ontario

Submitted to:

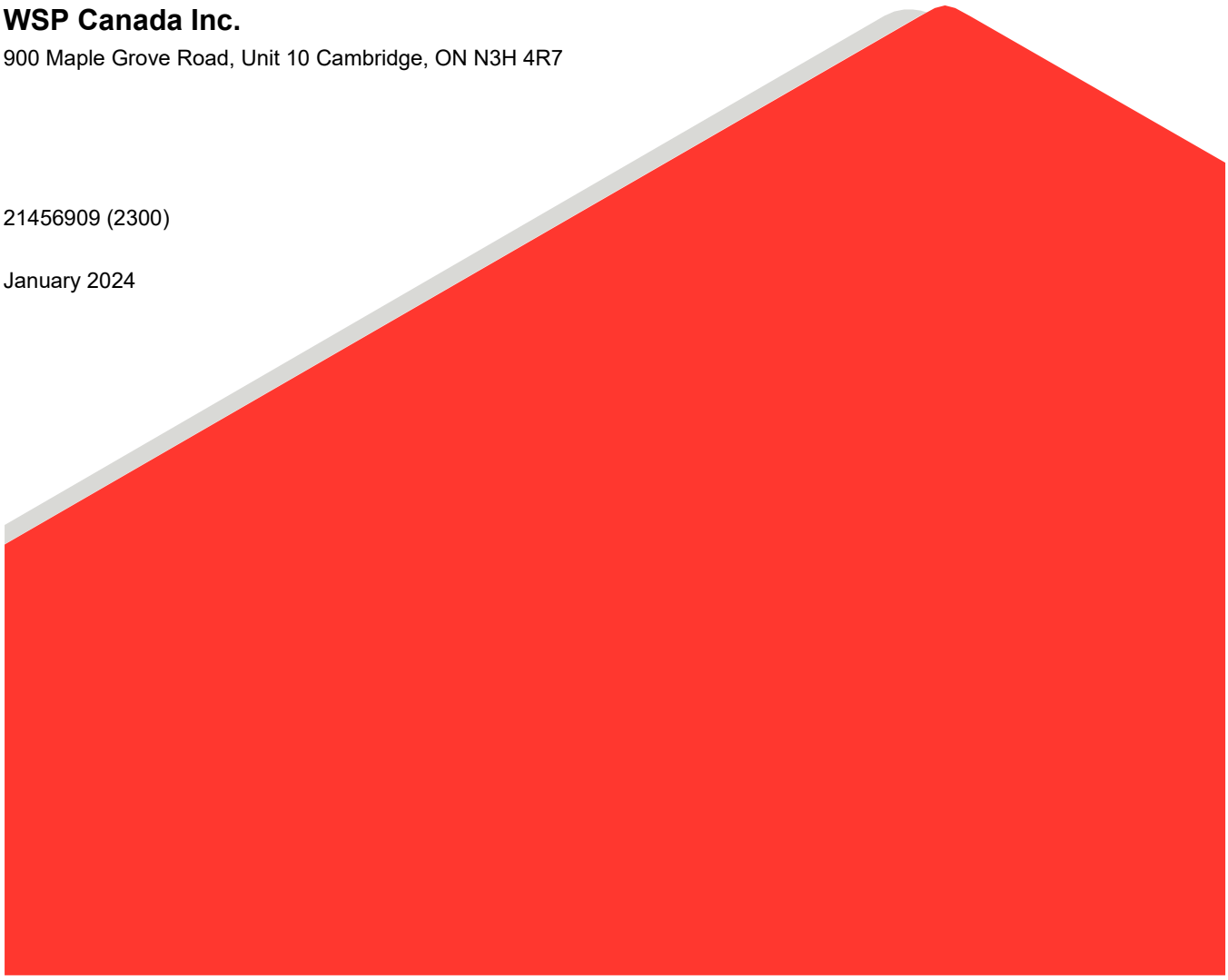
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1.0 INTRODUCTION

WSP Canada Inc. (WSP - formerly Golder Associates Ltd.) was retained by 883890 Ontario Limited c/o Fergus Development Inc. to carry out a water supply exploration investigation for a proposed residential development at 8243 and 8282 Wellington Road 19, the Township of Centre Wellington, Ontario (Figure 1). The purpose of this investigation is to assess the feasibility of a water supply for the proposed subdivision.

1.1 Scope of Work

The objective of the work was to evaluate a potential source of potable water supply for the proposed residential land development in Centre Wellington. This assessment includes a desktop study and field investigation. The scope of work included:

- Desktop background study;
- Identify locations for drilling;
- Conduct preliminary potential contaminant source identification;
- Conduct service locates;
- Drill and install monitoring wells (MW101, MW102 and MW103);
- Install mini-piezometers (MP-1, MP-2) and staff gauges (SG-1, SG-2);
- Construct a municipal grade test well (PW21-1);
- Conduct a variable rate step test and 72-hour constant rate pumping test;
- Conduct a water quality assessment at the test well;
- Prepare a hydrogeological assessment and feasibility assessment of the groundwater resource; and
- Delineate the zone of influence.

Key reports and data included in the study are listed as follows:

- Quaternary geology, bedrock geology, topography and physiography mapping;
- Ministry of the Environment, Conservation and Parks (MECP) Water Well Records;
- MECP Permits to Take Water (PTTW);
- Aerial photography;
- Source Water Protection Assessment Report;
- Source Protection Plan;
- Centre Wellington Tier 3 Water Budget Study and Risk Assessment;
- Fairview Golf Club Hydrogeological Investigation (Franklin Geotechnical Limited, 1990);
- Fairview Golf and Country Club Well Testing Program (Morrison Environmental Limited, 1999); and

- Fergus Golf Club Hydrogeological Report in Support of Permit to Take Water Application (R.J. Burnside & Associates Limited, 2011).

1.2 Water Supply Feasibility Assessment Approach

The feasibility of water servicing using a groundwater supply considers the following factors:

- **Aquifer Presence:** The likelihood of aquifer(s) being present across the entire proposed development area must be evaluated on the basis of on- and off-Site data. Provided that aquifer(s) are likely to be present, then the following must also be evaluated.
- **Water Quantity:** The probability of obtaining adequate quantities of potable water for a water supply must be evaluated based on existing water supplies in the area and field testing. In addition, consideration must be given to whether such a taking would cause adverse interference at other nearby wells or environmental features.
- **Water Quality:** As the water will be intended for human consumption it should not contain any disease-causing organisms or unacceptable concentrations of certain chemical parameters. Aesthetic considerations also provide a basis for drinking water objectives since the water should be pleasant to drink. Specifically, the water supply aquifer's ability to meet Ontario Drinking Water Quality Standards, Objectives and Guidelines (ODWQS) (either via raw water or through acceptable treatment technologies) must be considered. In addition, the water supply must be evaluated to determine if it is groundwater under the direct influence of surface water (GUDI), an assessment of whether pumping of the aquifer will induce the flow of water from a surface water body into the aquifer.
- **Source Water Protection:** Determine if the proposed water taking is located within existing wellhead protection areas (WHPA) delineated for municipal water supplies (i.e., Township of Centre Wellington) Under the Clean Water Act (2006) and whether or not this water supply would be identified as a threat.

1.3 Existing Land Use

The existing golf course (the "Site") consists of two parcels; the northwest parcel (the "NW Site") is situated on the northwest side of Wellington Road 19, and the southeast parcel (the "SE Site") is situated on the southeast side of Wellington Road 19, referred to as the Lake Belwood Golf Club (NW Site) and the Fairview Golf Club (SE Site), as shown on Figure 1. The NW Site is located on Part of Lots 10 and 11, Concession 3, Township of Centre Wellington (former Township of Garafraxa) and the SE Site is located on Part of Lots 9 and 10, Concession 3, Township of Centre Wellington (former Township of Garafraxa). The SE Site is being proposed for residential redevelopment while the NW Site will remain as a golf course and will incorporate the communal servicing infrastructure required to service both the golf course and proposed development.

The Site is located approximately 2 km northeast of the Town of Fergus and adjacent to Lake Belwood, a reservoir on the Grand River. The NW Site area totals approximately 42.35 ha and the SE Site area totals approximately 39.85 ha. Both sites are active golf courses (18 holes at NW Site and 9 holes at SE Site) with fairways, greens, wooded areas, wetlands and ponds, and the club house located on the NW Site. The surrounding land is mainly agricultural and rural residential. An existing residential development and seasonal cottages are present between the east side of the SE Site and Lake Belwood.

1.4 Proposed Development

Fergus Development Inc. has provided a proposed residential redevelopment layout consisting of 118 freehold lots (0.5+ acres) proposed for the SE Site. The redevelopment of the SE Site will also include open space, stormwater management pond, and natural features. Private communal water and wastewater will occur on the NW Site.

TYLin has estimated the required average day water taking for the proposed development, clubhouse and maintenance building to be 162 m^3/d (1.88 L/s) and the maximum day water taking to be 470 m^3/d (5.44 L/s). A summary of the design flows is included in the Water Servicing Study (TYLin, 2023). The water treatment plant design will include softening membranes to reduce water hardness. The softening membranes typically have a 70% to 75% recovery rate, requiring a higher well draw. As such TYLin has estimated the required maximum day water taking to be 674 m^3/d (7.8 L/s).

A test well referred to as PW21-1 has been constructed on the NW Site that has the potential to provide the required water supply (as described in this report). Testing of the well is required to assess the water quantity, water quality and potential impacts to surrounding features (e.g., natural environment and private wells).

1.5 Site Selection

A summary of the findings from the background review is presented in Section 3.0. Based on that review it was determined that a well in the bedrock aquifer was the most feasible source for a water supply. The location selected for testing was chosen to maximize distance from private wells, maximize distance from Lake Belwood, be outside of existing WHPAs and be away from potential contaminant sources. To achieve these objectives, a site in the northwest corner of the NW Site was selected for drilling a test well (referred to as PW21-1). Details on the drilling and testing are included in the sections below.

2.0 FIELD PROGRAM OVERVIEW

Note that all of the field work for this investigation was conducted by Golder Associates Ltd. (now WSP Canada Inc.).

2.1 Test Well Drilling and Monitoring Well Construction

The new supply test well (PW21-1) was constructed on the NW Site (Figure 2) in May 2021. The as-built log for PW21-1 is included in Appendix A. The well is completed to a depth of approximately 91.4 m within the bedrock aquifer. The bedrock is overlain by approximately 29.9 m of sandy to gravelly silt till. The well is completed with a 168 mm outside diameter (OD) steel casing set through the overburden to a depth of 32.9 m below ground surface (bgs) and an open 152 mm diameter hole through the bedrock. The bottom of the hole was sealed with bentonite and capped with cement to a depth of 84.1 m bgs to reduce the potential for poor water quality from the deeper bedrock, which was noted in some surrounding wells.

Three bedrock monitoring wells were also constructed on the NW Site to characterize the geology and allow for groundwater level monitoring. The monitoring well (MW101 through MW103) locations are shown on Figure 2 and as completed logs included in Appendix A. The monitoring wells were constructed with a nominal 152 mm diameter casing through the overburden (silt till) and a nominal 152 mm diameter open hole through the bedrock to a depth of 61.0 m.

All of the well drilling was completed by Well Initiatives using conventional rotary drilling equipment. The wells are constructed to Ontario Regulation 903 standards.

In addition, a number of shallow overburden monitoring wells have also been constructed on the NW Site as part of other investigations.

In August 2021, a mini-piezometer and staff gauge were installed in the pond east of PW21-1 (MP-1, SG-1) and the pond north of the North Irrigation Well (MP-2, SG-2), as shown on Figure 2.

2.2 Aquifer Testing

The aquifer testing at PW21-1 was conducted by Well Initiatives. Testing at PW21-1 consisted of a variable stepped rate pumping test completed on August 30, 2021 using three pumping steps of one hour each at 3.2 L/s, 6.3 L/s and 9.5 L/s. Following the step pumping test, a constant rate pumping test of 72 hours duration was completed from August 31, 2021 to September 3, 2021 at a rate of 8.8 L/s. The pumping rate was monitored by a flow meter on the discharge line. The pumping test was conducted at a higher rate than the required 7.8 L/s as an earlier development proposal contemplated more lots.

The pumping test was registered under the Environmental Activity and Sector Registry under Registration Number R-011-4136628634.

A notification letter was delivered to the private well owners within approximately 500 m to 1000 m of PW21-1 one week prior to the pumping test.

Pumped groundwater from PW21-1 was discharged to the on-Site pond beside the North Irrigation Well approximately 300 m southeast of PW21-1. The water was discharged using appropriate flow dissipation measures to prevent erosion or scouring. The water pumped into the pond was similar to the groundwater currently pumped into the pond from the North Irrigation Well.

Continuous groundwater level monitoring (i.e., monitoring by dataloggers, supplemented by manual water level readings) was carried out in a network of monitoring wells (as shown on Figure 2) prior to, during and following the test. Recovery was measured until one week post-test. The monitoring network included:

Bedrock Wells

- PW21-1 (pumping well);
- MW101, MW102 and MW103 (dedicated monitoring wells); and
- Clubhouse Well, South Irrigation Well and Old Clubhouse Well.

Overburden Wells

- BH21-10, BH21-13 and BH21-14.

Surface Water

- On-Site pond near PW21-1 (MP-1, SG-1); and
- On-Site pond near North Irrigation Well (MP-2, SG-2).

The North Irrigation Well was not accessible for monitoring and a pressure transducer datalogger could not be installed in the Clubhouse Well.

Additional monitoring included:

- Continuous monitoring of discharge quantity;
- Daily visual monitoring of the discharge for suspended sediment in the groundwater; and
- Daily visual monitoring of the discharge point to the on-Site pond for erosion.

The following mitigation measures were also in place during the testing, however they were not required.

- In the unlikely event that the aquifer test negatively impacts any nearby private wells, the pumping rate would be reduced or a temporary water supply would be provided to the impacted parties for the duration of the test; and
- In the event that erosion or scouring was observed at the discharge point, the flow dissipation system would be modified and the affected area rehabilitated.

2.3 Water Quality Testing

Water quality samples were obtained from PW21-1 periodically during the 72-hour test (at hours 1, 24 and 72) and analyzed for general chemistry parameters and bacteria. A sample was also collected at the end of the test to undergo a comprehensive analytical suite designed to assess the ODWQS parameters. The water samples were collected in laboratory prepared bottles and submitted to Bureau Veritas Laboratories.

Water quality samples were also collected for microscopic particulate analysis (MPA) from PW21-1 at the end of the constant rate test and submitted for analysis at Hyperion Research Limited to aid in the GUDI assessment.

3.0 SITE SETTING

3.1 Topography

The ground surface at the Site is gently undulating, with elevations ranging from approximately 424 metres above sea level (masl) to 437 masl (Figure 3) (Grand River Conservation Authority, 2021a). The ground surface at the NW Site generally slopes to the north from a high elevation of 433 masl near the southwestern part of the NW Site to a low elevation of 424 masl along a tributary to Irvine Creek at the north side of the NW Site. There is a high ground elevation of 437 masl in the southern part of the SE Site. The SE Site is like a trough with ground elevations around 430 masl on the east and west side of the SE Site and a low along the middle of the SE Site at 426 masl.

3.2 Drainage

The Site is located within the Grand River Watershed. The Grand River flows in a southwest direction in the area flowing through the Lake Belwood reservoir located approximately 1.2 km southeast of PW21-1.

Locally the NW Site and the majority of the SE Site is within the Irvine Creek Subwatershed. Irvine Creek and its tributaries generally flow in a southwest direction and discharge into the Grand River in Elora. At its closest point, Irvine Creek is located approximately 250 m from PW21-1 (Figure 3). The NW Site is drained by a tributary of Irvine Creek and the SE Site is drained by Black Drain. The Black Drain flows in a southwest direction through the low portion of the SE Site (Figure 3) and discharges into Irvine Creek approximately 2.5 km west of the SE Site.

3.3 Physiography

The Site is situated within the physiographic region described as the Guelph Drumlin Field (Chapman and Putnam, 1984). Chapman and Putnam (1984) describe the general landform pattern consisting of drumlins, or

groups of drumlins, fringed by gravel terraces and separated by swampy valleys in which flow tributaries of the Grand River. Locally Irvine Creek and Black Drain are situated within spillways separated by a drumlinized till plain (Figure 3).

3.4 Geology

3.4.1 Overburden Geology

The surficial soils mapped in the area by the Ontario Geological Survey (OGS-GSC, 2020) are shown on Figure 4. The surficial soils in the area of PW21-1 consist of ablation till with surrounding surficial soils including fine-grained till, outwash sand and gravel and glaciofluvial outwash sand. The ablation till is a sandy silt till referred to as the Port Stanley Till and the fine-grained till is a silt till to clayey silt till referred to as the Tavistock Till, which likely form an aquitard in the area.

Three hydrostratigraphic cross-sections are provided on Figures 6, 7 and 8, with the alignments of the sections shown on Figure 5. The overburden is approximately 23 m to 33 m thick at the Site and surrounding area and is predominately characterized by a mix of fine-grained till with occasional discontinuous layers of sand (usually found directly above bedrock surface). Based on the MECP water well records, a bedrock valley is interpreted to exist across the SE Site. The valley is estimated to trend in a northeast-southwest direction. Based on water well record 6706408 the valley is at least 79 m deep and appears to be filled with till.

3.4.2 Bedrock Geology

The bedrock surface elevation is generally around 400 masl and consists of limestone, dolostone and shale. The bedrock that subcrops beneath the overburden does not outcrop at the Site. The bedrock formations underlying the Site comprise one of the most extensive bedrock aquifers in Ontario and are the main source of drinking water supplies for a number of nearby municipalities. The Ontario Geological Survey (OGS) has mapped the Silurian carbonate strata along the Niagara Escarpment region and has revised the framework for stratigraphy of this area. Based on the revised stratigraphic framework described by the OGS (Brunton, 2008, 2009), a brief description of the bedrock formations estimated to be present is provided below (from oldest to youngest).

- **Gasport Formation:** The Gasport Formation is a cross-bedded crinoidal grainstone-packstone with sequences of reef mound and coquina (shell bed) lithofacies (Brunton, 2008, 2009). This unit has commonly been referred to as the Amabel Formation in previous studies in the area;
- **Goat Island Formation:** The Goat Island Formation consists of two members; the lower Niagara Falls Member and the upper Ancaster Member. The Niagara Falls Member is a finely crystalline and cross laminated crinoidal grainstone with small reef mounds while the Ancaster Member is a chert rich, finely crystalline dolostone that is medium to ash grey in colour;
- **Eramosa Formation:** The Eramosa Formation consists of three members including, from oldest to youngest, the Vinemount Member, the Reformatory Quarry Member and the Stone Road Member. It is unknown whether all of the members of the Eramosa Formation are present at the Site; and
- **Guelph Formation:** The Guelph Formation consists of medium to thickly bedded crinoidal grainstones and wackestones and reefal complexes (Brunton, 2008, 2009). The Guelph Formation is cream coloured and is the uppermost bedrock unit.

3.5 Hydrostratigraphy

The conceptual model for the Site includes an approximately 30 m thick overburden (till) aquitard overlying a bedrock aquifer. Within the upper overburden aquitard there are confined and laterally discontinuous layers of sand or water bearing horizons that exist locally. Overlying the till are unconfined and laterally discontinuous outwash deposits north of the NW Site and within the SE Site. There are also some more permeable layers near the bedrock contact throughout the area. These shallow and deep overburden units are sometimes used for individual private water supplies.

The bedrock is considered an aquifer (formerly referred to as the Guelph-Amabel Aquifer) with zones of varying permeability depending on the rock properties and rock features. Bedrock aquifers typically yield water from water producing features such as fractures and fissures within the bedrock. The production of water depends on the number of fractures, size of the fractures and interconnectivity of the fractures.

Groundwater flow in the bedrock aquifer is interpreted to be in a southerly to southwesterly direction toward the Grand River.

There is an existing pumping well on the NW Site that is used for golf course irrigation purposes (Figure 1). Testing of the well by others in 1999 indicated a bedrock transmissivity of 38 m^2/d and a storage coefficient ranging from 0.00015 to 0.00004 (Morrison, 1999).

3.6 Local Water Users

A review of the MECP Water Well Records database indicates that there are 30 well records nominally within 1 km of PW21-1 (as shown on Figure 5). A table summarizing the water well records is included in Appendix B. Of the 30 well records, 29 have water supply (e.g., domestic or stock watering) as their designated use. The remaining well has an unknown use listed. Of the 29 water supply wells, 28 (97%) are completed in the bedrock and 1 (3%) is completed in the deep overburden.

Analysis of the well records indicates that bedrock well use dominates around the Site with most well completions occurring between elevations 375 masl and 400 masl as shown on Figures 6, 7 and 8.

Based on the recorded information, private water wells generally utilize three zones around the Site as follows:

i) shallow overburden water wells (dug wells not included in MECP Well Record database) – shallow overburden wells are inferred to utilize various shallow, thin coarse-textured units or the glacial till unit for water supply. The coarse-textured units are inferred to be laterally discontinuous;

ii) upper bedrock aquifer – most of the private water supply wells are completed in the upper bedrock with well completions occurring between elevations 375 masl and 400 masl as shown on Figures 6, 7 and 8; and

iii) lower bedrock aquifer – some private wells are completed in the bedrock below elevation 375 masl. Most of the wells completed in this aquifer are open across both the upper and lower aquifers.

The presence of fresh water was reported on the well records.

There are four existing bedrock wells on the NW Site and SE Site that are used by Fergus Golf Club as shown on Figure 1. The North Irrigation Well (MOE#6712549) and Clubhouse Well (MOE#6714026) are located on the NW Site and completed in the bedrock to depths of 86.0 m and 74.7 m, respectively. The South Irrigation Well

(MOE#6713016) and Old Clubhouse Well (possibly MOE#6706408) are located on the SE Site and completed in the bedrock to depths of 94.5 m and 108.5 m, respectively

3.7 Permitted Water Users

A PTTW is required for water takings greater than 50,000 L/d. A review of the MECP PTTW database identified the following PTTWs within 3 km of the Site (including two permits issued to Fergus Golf Club). A summary of the permits is included in Table 1, below. PTTW 4856-9KBH5A was issued to the Township of Centre Wellington for municipal water supply in Elora and Fergus. The permit allows for a groundwater taking from nine wells. The closest municipal wells to the Site are F4 and F6 which are located approximately 2.8 km southwest of the Site. A PTTW was also issued to Highland Pines Campground to allow for a groundwater taking from six wells. The Highland Pines Campground is located approximately 2 km northeast of the Site.

Table 1: Permits to Take Water

Permit Number	Permit Owner	Source	Use
5817-8JQN3B	Fergus Golf Club	Groundwater (1 well) and Surface Water (1 pond)	Golf Course Irrigation
2633-9XARF2	Fergus Golf Club	Groundwater (1 well) and Surface Water (1 pond)	Golf course Irrigation
4856-9KBH5A	The Corporation of the Township of Centre Wellington	Groundwater (9 wells)	Municipal (closest wells are F4 and F6)
3657-BSEJSA	Highland Pines Campground Limited	Groundwater (6 wells)	Campground

4.0 WATER SUPPLY POTENTIAL

The water supply potential has been assessed with test well construction, monitoring well construction and aquifer testing at the Site. The drilling at PW21-1 identified fractured dolostone capable of producing high well yields. Preliminary estimates of flow during drilling indicated the well could pump at a rate of approximately 7.5 L/s or more.

4.1 Stepped Rate Pumping Test

The results of the stepped rate pumping test are shown in Table 2 and presented graphically in Appendix C. Prior to the testing the static water level in the well was measured at 9.5 m bgs. The specific capacity ranged from 0.8 L/s/m to 1.3 L/s/m and declined as the pumping rate increased due to well losses.

Table 2: Stepped Rate Pumping Test Summary

Pumping Rate (L/s)	Drawdown at PW21-1 (m)	Specific Capacity (L/s/m)
3.2	2.40	1.3
6.3	5.65	1.1
9.5	11.57	0.8

4.2 Constant Rate Pumping Test

The pumping test was carried out to pump the well at a rate with the pumping water level remaining above the overburden/bedrock contact at 29.9 m bgs. Based on the results of the step pumping test, a pumping rate greater than 9.5 L/s was possible, however, it was found that the well was pumping some sand at 9.5 L/s. This could potentially be from within fractures connected to the overburden. The test at PW21-1 was therefore conducted at a rate of 8.8 L/s for 72 hours to avoid pumping sand, to estimate the long-term potential production rate from the well and to investigate potential environmental impacts. This testing rate is higher than the estimated rate of 7.8 L/s required for the proposed redevelopment.

Hydrographs for the monitoring wells screened in the bedrock, the overburden and surface water are shown on Figures D1, D2 and D3 in Appendix D, respectively and a table of observed drawdown is included in Table 3. The hydrographs show the water level measured in the well along with the pumping rate at PW21-1 and daily precipitation. Figure D4 presents the drawdown versus elapsed time for these same key bedrock wells and a graph of observed drawdown versus distance from the pumping well is included on Figure D5.

Table 3: Drawdown Observed at the End of the Pumping Test

Monitoring Location	Distance from PW21-1 (m)	Open Interval (m below ground surface)	Drawdown (m)
PW21-1	0	32.9 – 84.1	12.8
MW101	640	33.8 – 61.0	1.9
MW102	562	30.6 – 61.0	2.5
MW103	413	30.8 -61.0	2.8
Clubhouse Well	487	32.9 – 74.7	1.3
South Irrigation Well	821	28.0 – 94.5	0.4
Old Clubhouse Well	1,095	79.2 – 108.5	0.3
BH21-10	497	3.0 – 6.1	less than 0.1
BH21-13	261	5.8 – 7.3	0.2 (may be natural fluctuation)
BH21-14	257	1.5 – 3.0	less than 0.1
MP-1	144	0.1 – 0.8	less than 0.1
SG-1	143	N/A	less than 0.1
MP-2	319	0.6 – 1.2	less than 0.1
SG-2	321	N/A	less than 0.1

The following summarizes the observed water level responses from the 72-hour pumping test:

PW21-1 Response

- Drawdown occurred rapidly at the start of the test;
- The total drawdown at the end of the test was 12.8 m; and

- At the end of the test, the water level was declining approximately 2.2 m per log cycle.

Bedrock Aquifer Response

- A definitive response to pumping was observed in the monitoring wells within 700 m of PW21-1;
- Drawdown in the bedrock monitoring wells ranged from 0.3 m (Old Clubhouse Well) to 2.8 m (MW103); and
- The drawdown cone in the bedrock is estimated to extend approximately 1 km from PW21-1 with approximately 0.4 m of drawdown estimated at that distance (Figure D5 and Figure 9).

Overburden Response

- A clear response to pumping was not observed in the overburden monitoring wells; and
- The water level in BH21-13 declined approximately 0.2 m during the test but did not recover at the end of the test. The changes in water level may be due to natural fluctuation within the till.

Surface Water Response

- Water levels at MP-1 and SG-1 remained constant during the test and were not influenced by pumping at PW21-1;
- Water levels at MP-2 and SG-2 increased during the test due to the discharge into the pond from PW21-1; and
- The vertical gradients at both locations did not change during the test.

4.2.1 Estimate of Aquifer Parameters

As shown on Figure D6 in Appendix D, the hydrographs of most monitoring wells and the pumping well located within the bedrock aquifer plot along a similar slope on the semi-log plot. Based on the slope of this line (approximately of 2.22 m per log cycle t/r^2), the bulk transmissivity of the bedrock aquifer can be estimated using the Cooper-Jacob (1946) approximation as follows:

$$T = \left(\frac{2.303}{4\pi}\right) \times \left(\frac{Q}{\Delta S}\right)$$

Where: Q = pumping rate (m^3/day)

ΔS = slope of the observed drawdown hydrograph per log cycle

Using an average pumping rate of 763 m^3/day (8.8 L/s) based on a fit to the drawdown data while PW21-1 was pumping at this rate, the average bulk transmissivity of the bedrock aquifer is interpreted to be approximately 63 m^2/day.

Based on the slope of the hydrographs in the composite plot, the storativity (S) of the bedrock aquifer can be estimated as follows:

$$S = 2.2459T\left(\frac{t}{r^2}\right)$$

Where T = transmissivity

t/r^2 = time/radius^2 value when observed drawdown = 0 m

Based on this calculation, the storativity of the bedrock aquifer is estimated to be approximately 9 x 10^{-3}.

4.3 Water Quality

4.3.1 General Chemistry Trends During Pumping Test

During the pumping test, water samples were collected for general chemistry analysis after 1 hour, 24 hours and 72 hours of pumping to analyze for water quality trends with extended pumping. A summary of the water quality results is included in Table E1 of Appendix E. Laboratory certificates of analysis are included in Appendix E. For the parameters tested, aluminum, iron and manganese exceeded the ODWQS in the sample collected after 1 hour of pumping and the total dissolved solids (TDS) exceeded the ODWQS in the samples collected after 24 and 72 hours of pumping. Hardness exceeded the ODWQS in all three samples.

Chloride and nitrate concentrations were either low or not detected. These parameters are indicators of potential surface contamination (road salt or agricultural operations). The low concentrations indicate a low potential for surface contamination entering the bedrock aquifer. There were also no detections of total coliforms or Escherichia coli, which are also indicators of potential surface contamination.

Conductivity, TDS and some inorganics (sulphate, chloride) concentrations increased with pumping duration while some metals (aluminum, copper, iron, lead, manganese, nickel, silicon, sodium, titanium, vanadium, zinc) concentrations decreased with pumping duration.

4.3.2 Ontario Drinking Water Quality Standards

A sample collected at the end of the test underwent a comprehensive analytical suite designed to assess the ODWQS parameters. A summary of the water quality results for the ODWQS is included in Table E2 of Appendix E. Laboratory certificates of analysis are included in Appendix E. With the exception of TDS and hardness, all of the concentrations of the parameters were below the ODWQS limits. TDS was measured at 550 mg/L (aesthetic objective is 500 mg/L) and hardness was measured at 380 mg/L (operational guideline is 80-100 mg/L). The Technical Support Document (MOE, 2006) indicates that total dissolved solids refers to the inorganic substances dissolved in water (principal constituents include chloride, sulphates, calcium, magnesium and bicarbonates). Elevated TDS can create highly mineralized water with excessive hardness, taste and mineral deposition. Water supplies with a hardness greater than 200 mg/L are considered poor but tolerable and hardness in excess of 500 mg/L is unacceptable for most domestic purposes.

4.3.3 Micro Particulate Analysis

The results of the microscopic particulate analysis (MPA) from PW21-1 at the end of the test are included in Appendix E. There were no detections of diatoms, algae, insect/larvae, rotifers, plant debris, nematodes, pollen, crustacea, spores, giardia or cryptosporidium in the groundwater sampled from PW21-1. For comparison, analysis of a sample from the nearby pond indicates the detection of spores (2,700 CFU/100 mL), rotifers, diatoms, blue green algae and other photosynthetic pigment bearing organisms. Based on this sample, the risk of surface water contamination is low.

5.0 WATER SUPPLY POTENTIAL

5.1 Aquifer Presence

The overburden is mainly glacial till, which is not suitable for a municipal water supply. Any coarse-grained layers within the overburden may be suitable for individual water supplies but do not appear to be laterally continuous

and are not suitable for a municipal water supply. The buried bedrock valley at the Site appears to be infilled with glacial till and as such is not considered to be a viable water supply target.

The majority of private wells in the area are completed in the bedrock. It is inferred that the bedrock underlying the Site is part of a regional bedrock aquifer that should be considered the target aquifer for a large capacity water supply well. The drilling and testing at the Site has confirmed that the bedrock aquifer is suitable for a water supply well.

5.2 Water Quantity

Water quantity from a well in a bedrock aquifer is often dependant on the number and size of fractures intercepted by the well. PW21-1 has demonstrated the ability to yield 8.8 L/s for a period of 72 hours while recording drawdown within the well of 12.8 m. The available drawdown (to the top of the bedrock) is approximately 20.4 m.

At the proposed rate of 7.8 L/s, it is estimated that the drawdown in PW21-1 would decrease to approximately 11.3 m or 55% of the available drawdown after 72 hours of pumping. Extrapolation of the drawdown versus time for PW21-1 indicates that it would take approximately 20 years of continuous pumping at 8.8 L/s to reach the available drawdown of 20 m. However, that scenario assumes the well is pumping constantly and there is no recharge to the aquifer. As such, under normal expected operation (i.e., the well operates on demand), recharge to the aquifer (under normal meteorological conditions) and pumping at 7.8 L/s (proposed pumping rate), there is a suitable water supply at this location.

The pumping cone of influence is estimated to extend 600 m from PW21-1 when pumping at 7.8 L/s. There are approximately five private residences within 600 m of PW21-1. The closest private residence is located approximately 390 m west of PW21-1. The anticipated interference at this location will be less than 1 m. Based on a review of water well records in the area, the available drawdown in surrounding wells (static water level to pump intake) ranges from approximately 16 m to 40 m. As such the interference with the private wells would account for less than 6% of the available drawdown and not create significant interference with the normal use of the wells.

There are no anticipated impacts to surface water features from the use of PW21-1 due to the thick low-permeability overburden (glacial till).

5.3 Water Quality

Water quality testing indicates that with the exception of TDS and hardness, all of the parameters meet the ODWQS. If required, water treatment will be designed by another consultant.

5.4 GUDI Assessment

The following provide an assessment to determine the GUDI status of the well.

Under the MOE 2001 Terms of Reference, communal wells are “flagged” as potentially GUDI if a number of conditions are met. The following table summarizes the status of PW21-1 in relation to these conditions.

Table 4: GUDI Assessment Based on MOE 2001 Terms of Reference

Condition	Summary of Condition	PW21-1 Status
i	*Regularly contain Total Coliforms and/or periodically contain E. coli; or*	Four samples were collected during a 72-hour pumping test at PW21-1; neither total coliforms nor E. coli were detected during sampling.
ii	*are located within approximately 50 days horizontal saturated travel time from surface water or are within 100 m (overburden wells) or 500 m (bedrock wells) of surface water (whichever is greater) and meet one or more of the following criteria:*	On-Site ponds and Irvine Creek are located within 500 m of PW21-1 (Figure 1).
ii a)	*Wells may be drawing water from an unconfined aquifer;*	The regional hydrogeologic system consists of a bedrock aquifer overlain by a silt till aquitard. PW21-1 draws water from the bedrock aquifer. In the vicinity of the PW21-1, the bedrock aquifer is encountered at a depth of approximately 30 m. PW21-1 does not draw water from an unconfined aquifer.
ii b)	*Wells may be drawing water from formations within approximately 15 m of surface;*	The well casing of PW21-1 extends to a depth of 32.9 m below ground surface. Water from this well is therefore drawn from formations deeper than 15 m of surface.
ii c)	*Wells are part of an enhanced recharge/infiltration project;*	No recharge/infiltration project exists at the site.
ii d)	*When the well is pumped, water levels in surface water rapidly change or hydraulic gradients beside the surface water significantly increase in a downward direction;*	Gradients beside surface water did not change during the pumping test at PW21-1.
ii e)	*Chemical water quality parameters (such as temperature, conductivity, turbidity, total dissolved solids, pH, colour, oxygen) are more consistent with nearby surface water than local groundwater and/or if they fluctuate significantly and rapidly in response to climatological or surface water conditions.*	The samples analyzed for water quality during the 72-hour pumping test at PW21-1 are consistent with groundwater from a bedrock aquifer.

In summary, based on the above conditions, PW21-1 should not be “flagged” as potentially GUDI under the MOE 2001 Terms of Reference.

Under the Draft Terms of Reference for Determination of Minimum Treatment for Municipal Residential Drinking Water Systems Using Subsurface Raw Water Supplies (MOE, 2019) the need for disinfection of protozoan pathogens is based on the presence of Giardia, Cryptosporidium and fecal contamination. There were no detections of Giardia, Cryptosporidium, E. coli or total coliforms in samples collected during the pumping test.

5.5 Source Water Protection

Under the Clean Water Act (2006) WHPAs were developed and included in the Assessment Reports to identify the time-of-travel capture zones for municipal water supplies. These WHPAs form part of the Source Protection Plans that are used to protect sources of municipal drinking water. The Site is within the Grand River Source Protection Area within the Lake Erie Source Protection Region (LESPR). To support the development of these plans, the horizontal movement of groundwater to the municipal wells is categorized into groundwater time-of-travel zones delineated around each well or group of wells including WHPA-A (100 m radius), WHPA-B (2 year time-of-travel), WHPA-C (5 year time-of-travel) and WHPA-D (25 year time-of-travel).

The WHPA for the Fergus municipal wells (Lake Erie Region Source Protection Committee, 2021a) extends through the Site as shown on Figure 9. PW21-1 lies within WHPA-D (25-year time-of-travel) of the capture zone.

In addition to the delineation of the WHPAs, the vulnerability of municipal wells and intakes to contamination from surrounding land-use activities is also assessed. This is assessed using the intrinsic vulnerability, which is based on an evaluation of the geologic and hydrogeological characteristics of the sediments overlying the aquifer of interest. The intrinsic vulnerability is ranked as high, medium or low, with low providing the most protection to an aquifer. PW21-1 lies within a low vulnerability zone (see Figure 9). There is some medium vulnerability by Lake Belwood, which is due to the higher permeable sediments at surface and thinning of the overburden toward Lake Belwood.

The WHPAs are combined with the intrinsic vulnerability to determine a WHPA vulnerability, which is the basis for the threat analysis. WHPA vulnerability ranges from 2 to 10 with 10 being the most vulnerable. Where the WHPAs are present at the Site, the WHPA vulnerability is 2 with the exception of the small portion by Lake Belwood where the WHPA vulnerability is 4 (i.e., the area where the intrinsic vulnerability is shown as medium on Figure 9). Significant groundwater recharge areas (SGRA) are also evaluated and, in the area of the Site, the vulnerability is 2 (for the SE Site and part of the NW Site). Based on the Source Protection Plan (Lake Erie Region Source Protection Committee, 2021b) there are no significant threats identified at the Site.

The Site does not fall within an Issue Contributing Area and therefore there are no threats related to specific issues.

To protect sources of municipal drinking water with respect to water quantity, draft Wellhead Protection Area Quantity zones (WHPA-Q) were delineated by Matrix Solutions for the Lake Erie Source Protection Region (Grand River Conservation Authority, 2021b) for Elora and Fergus. The WHPA-Q zone is included on the GRCA Grand River Information Network (GRIN) mapping but is considered draft. The WHPA-Q in the area of the Site is shown on Figure 9 and extends through a small portion of the western edge of the NW Site and the SE Site. PW21-1 is located outside of the WHPA-Q zone.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The hydrogeological assessment provided herein concludes that a water supply is considered to be feasible at the Site. The following conclusions are provided:

- The bedrock aquifer is the primary target for water supply development;
- PW21-1 was constructed in the bedrock aquifer for testing as potential water supply;
- PW21-1 had a tested yield of 8.8 L/s and can meet the maximum day demand of 7.8 L/s;

- Groundwater quality at PW21-1 met the ODWQS with the exceptions of hardness and TDS; and
- PW21-1 is not considered a GUDI well.

The following recommendations are provided.

- A second well should be constructed to provide a back-up water supply. The back-up water supply should be situated at least 100 m away from agricultural land and dispersal beds, and approximately 200 m away from private water supplies. One such location is shown on Figure 9 northeast of PW21-1; and
- A private well survey should be conducted in the area within 1 km of PW21-1 (the approximate area of influence) to obtain information on the wells and usage of the wells.

7.0 REPORT LIMITATIONS

7.1 General Limitations

This hydrogeological assessment was prepared for 883890 Ontario Limited c/o Fergus Development Inc., and their agents to confirm a water supply feasibility for the proposed redevelopment at the existing Fergus Golf Club. The factual information, descriptions, interpretations, comments, recommendations and electronic files contained herein are specific to the project described in this report and do not apply to any other project or site. This report is based on borehole drilling, pumping tests and water quality analyses collected during this investigation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the sole responsibilities of such third parties. Under no circumstances may this information be used for any other purposes than those specified in the scope of work unless explicitly stipulated in the text of this report or formally authorized by WSP. This report must be read in its entirety as some sections could be falsely interpreted when taken individually or out-of-context. As well, the final version of this report and its content supersedes any other text, opinion or preliminary version produced by WSP.

WSP shall not be held responsible for damages resulting from unpredictable or unknown underground conditions, from erroneous information provided by and/or obtained from other sources than WSP, and from ulterior changes in the Site conditions unless WSP has been notified by the client of any occurrence, activity, information or discovery, past or future, susceptible of modifying the underground conditions described herein, and have had the opportunity of revising its interpretations, comments and recommendations. Furthermore, WSP shall not be held responsible for damages resulting from any future modification to the applicable regulations, standards and criteria, for any use of this report and its content by a third party, and/or for its use for other purposes than those intended. WSP shall not be held responsible for any decrease, real or perceived, of a property's value or any failure to complete a transaction, as a consequence of this report.

8.0 CLOSURE

We trust this report meets your current requirements. Should you have any questions please do not hesitate to contact the undersigned.

9.0 REFERENCES

Brunton, F.R., 2009. Update of Revisions to the Early Silurian Stratigraphy of the Niagara Escarpment: Integration of Sequence Stratigraphy, Sedimentology and Hydrogeology to Delineate Hydrogeologic Units. In Summary of Field Work and Other Activities 2009, Ontario Geological Survey, Open File Report 6240, p.25-1 to 25-20.

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Signature Page

WSP Canada Inc.



Greg Padusenko, M.Sc., P.Eng., P.Geo.
Sr. Hydrogeologist



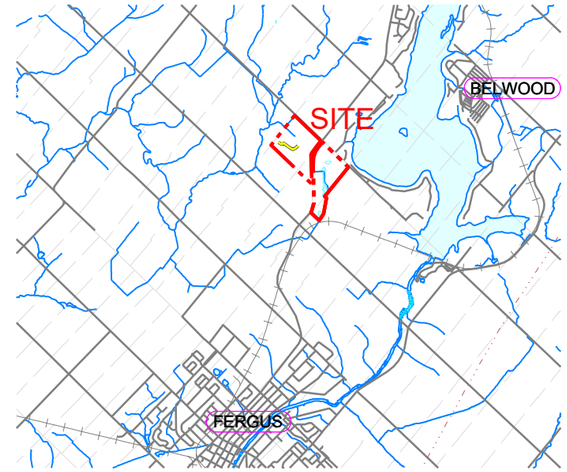
John Piersol, M.Sc., P.Geo.
Sr. Hydrogeologist

GRP/JAP/cg

Figures



REGIONAL KEY PLAN 1:100,000



PLAN LEGEND

- PROPERTY BOUNDARY
- EXISTING PRODUCTION WELL
- BEDROCK TEST WELL

REFERENCES & DISCLAIMERS

BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE; GIS USER COMMUNITY.

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CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
SITE LOCATION PLAN

CONSULTANT

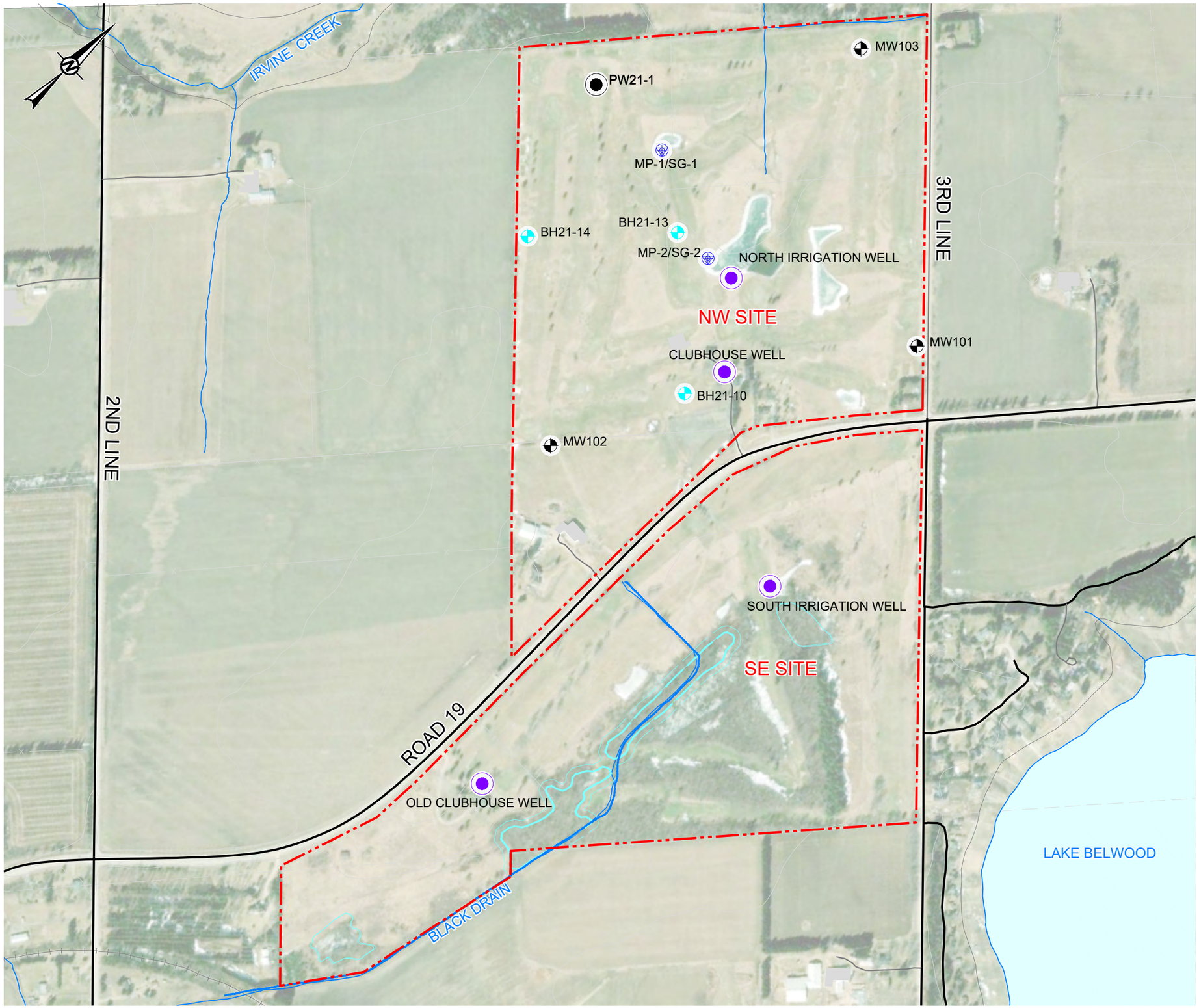
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APPROVED	JAP

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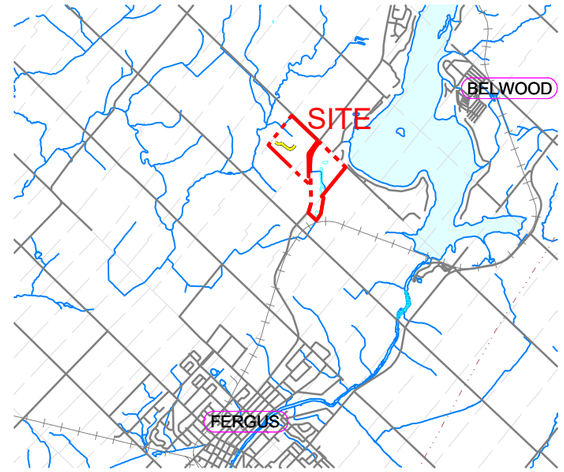
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REGIONAL KEY PLAN 1:100,000



PLAN LEGEND

- PROPERTY BOUNDARY
- EXISTING PRODUCTION WELL
- BEDROCK TEST WELL
- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- MINI-PIEZOMETER / STAFF GAUGE

REFERENCES & DISCLAIMERS

BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE; GIS USER COMMUNITY.

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CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
MONITORING LOCATIONS

CONSULTANT

wsp

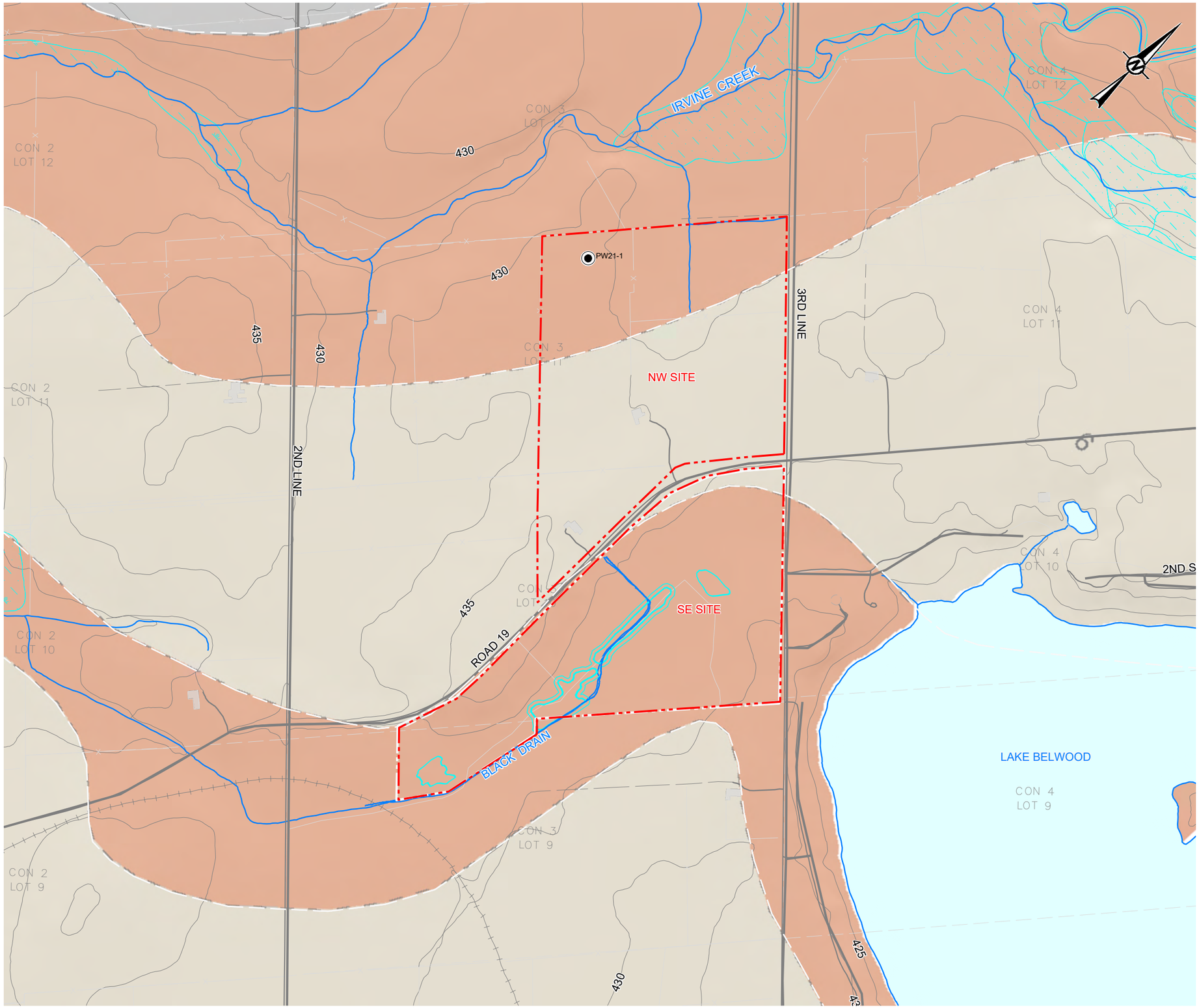
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SPILLWAY

DRUMLINIZED TILL PLAIN

WETLAND

MNR MAPPED WETLAND

PLAN LEGEND

PROPERTY BOUNDARY

BEDROCK TEST WELL

REFERENCES & DISCLAIMERS

QUATERNARY MAPPING ONTARIO GEOLOGICAL SURVEY, QUEEN'S PRINTER 2006

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CLIENT

883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT

FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE

PHYSIOGRAPHY AND DRAINAGE

CONSULTANT

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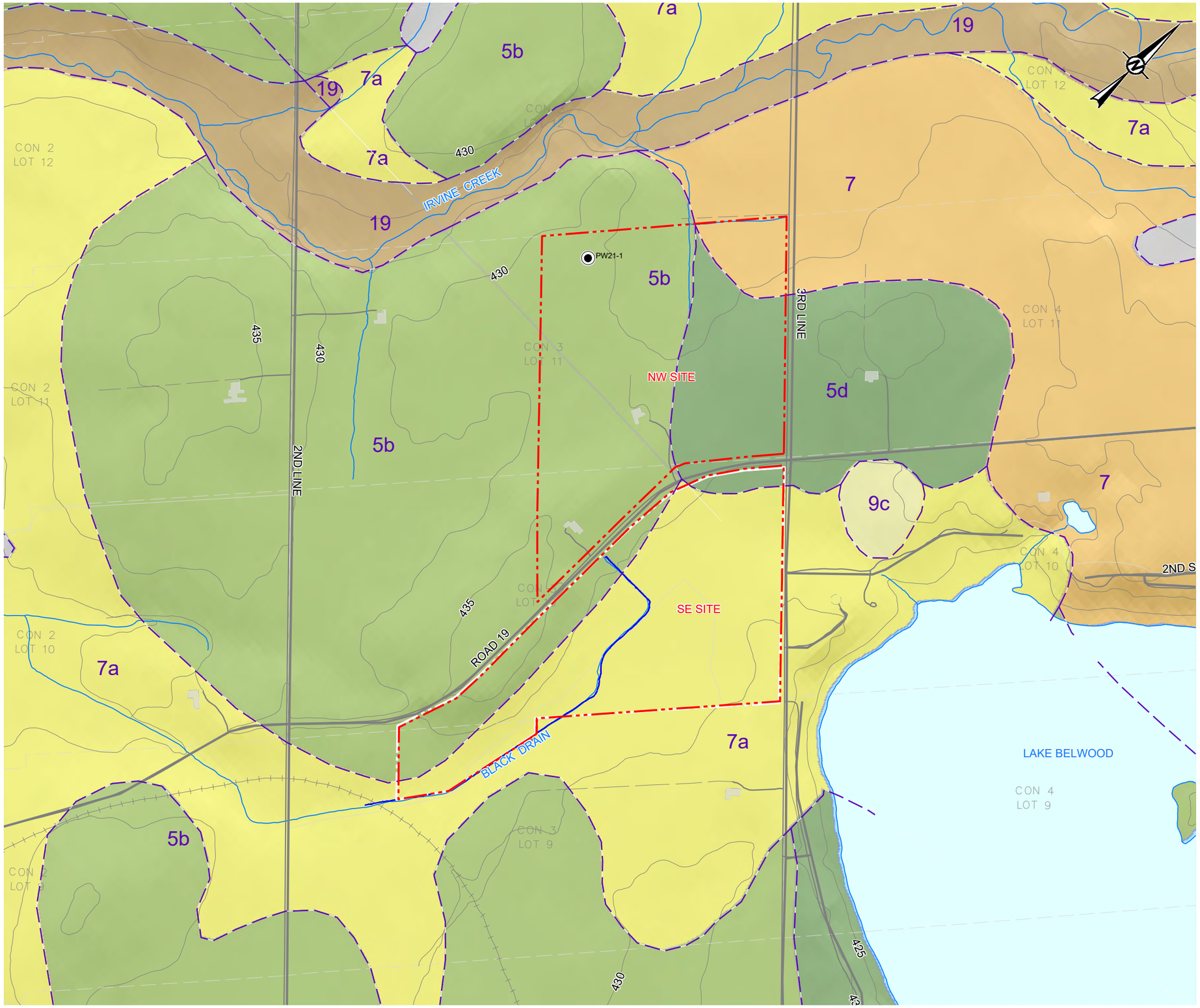
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	20	ORGANIC DEPOSITS
	19	FLUVIAL SILT, SAND, GRAVEL
	9c	GLACIOLACUSTRINE SILT & SAND DEPOSITS
	7	GLACIOFLUVIAL OUTWASH SAND & GRAVEL
	7a	DISTAL SAND & GRAVEL
	5d	FINE GRAINED TILL
	5b	ABLATION TILL

PLAN LEGEND

PROPERTY BOUNDARY

BEDROCK TEST WELL

REFERENCES & DISCLAIMERS

QUATERNARY MAPPING ONTARIO GEOLOGICAL SURVEY, QUEEN'S PRINTER 2016

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CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
QUATERNARY GEOLOGY MAP

CONSULTANT

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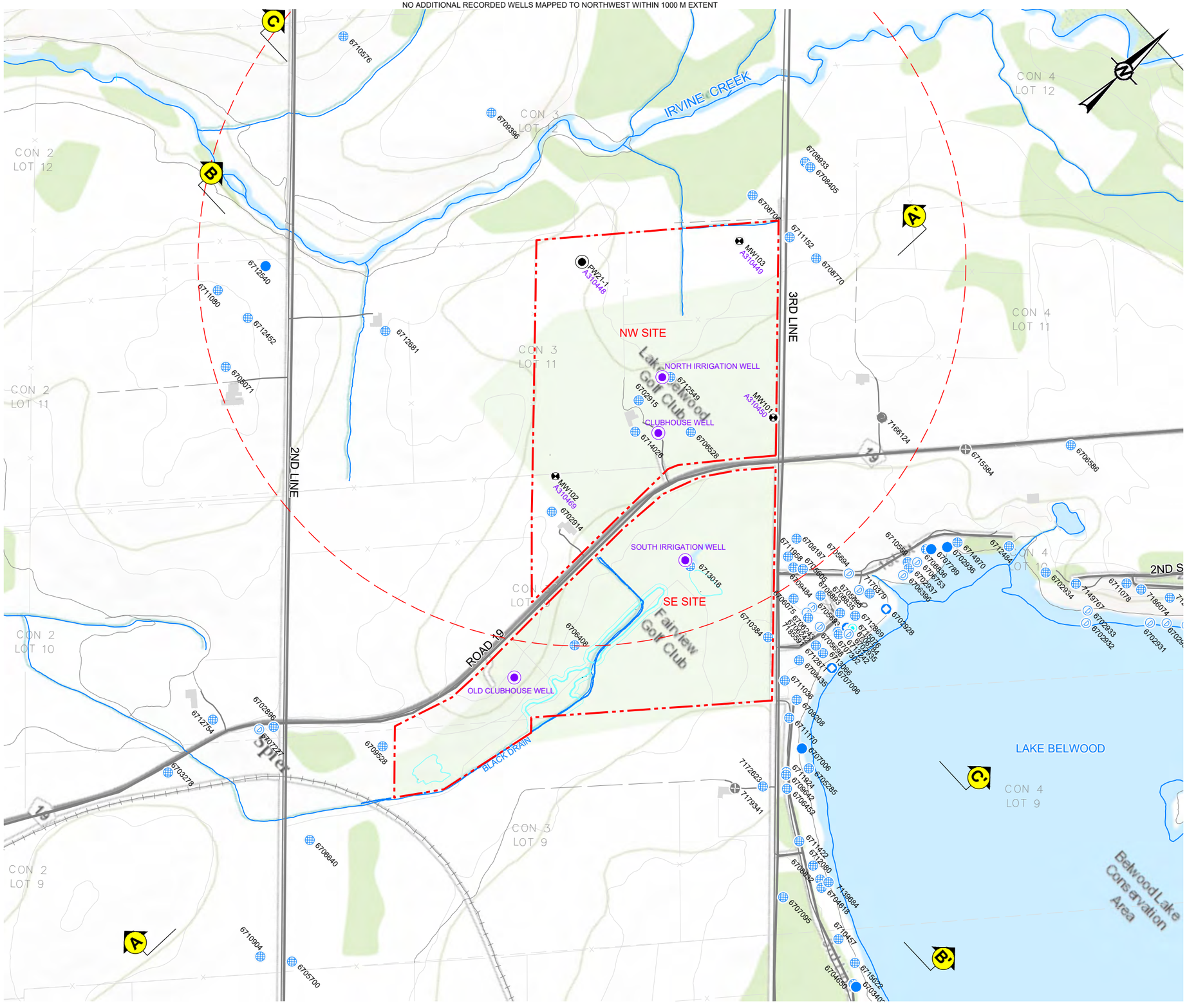
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NO ADDITIONAL RECORDED WELLS MAPPED TO NORTHWEST WITHIN 1000 M EXTENT



PLAN LEGEND

- PROPERTY BOUNDARY
- EXISTING PRODUCTION WELL
- BEDROCK TEST WELL WITH 1000 M OFFSET
- BEDROCK MONITORING WELL
- WETLAND
- MNR MAPPED WETLAND
- LINE OF SECTION

RECORDED MINISTRY WATER WELL WITH RECORD ID / TAG NUMBER

- SHALLOW DUG OR BORED <10 M
- DEEP BORED WELL >10 M
- DRILLED OVERBURDEN WELL
- TEST OR OBSERVATION WELL
- DRILLED BEDROCK WELL
- RECORD OF ABANDONMENT
- INFORMATION UNRECORDED
- TEMPORARY DEWATERING WELL

REFERENCES & DISCLAIMERS

MINISTRY OF ENVIRONMENT WATER WELL INFORMATION SYSTEM, QUEEN'S PRINTER. LOCATION AND ELEVATIONS OF MAPPED WELLS ARE SUBJECT TO REVISION BASED ON DRILL RECORD OR FIELD VERIFICATION.

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CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
MINISTRY RECORDED WELLS

CONSULTANT

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REVIEWED	GP
APPROVED	JAP

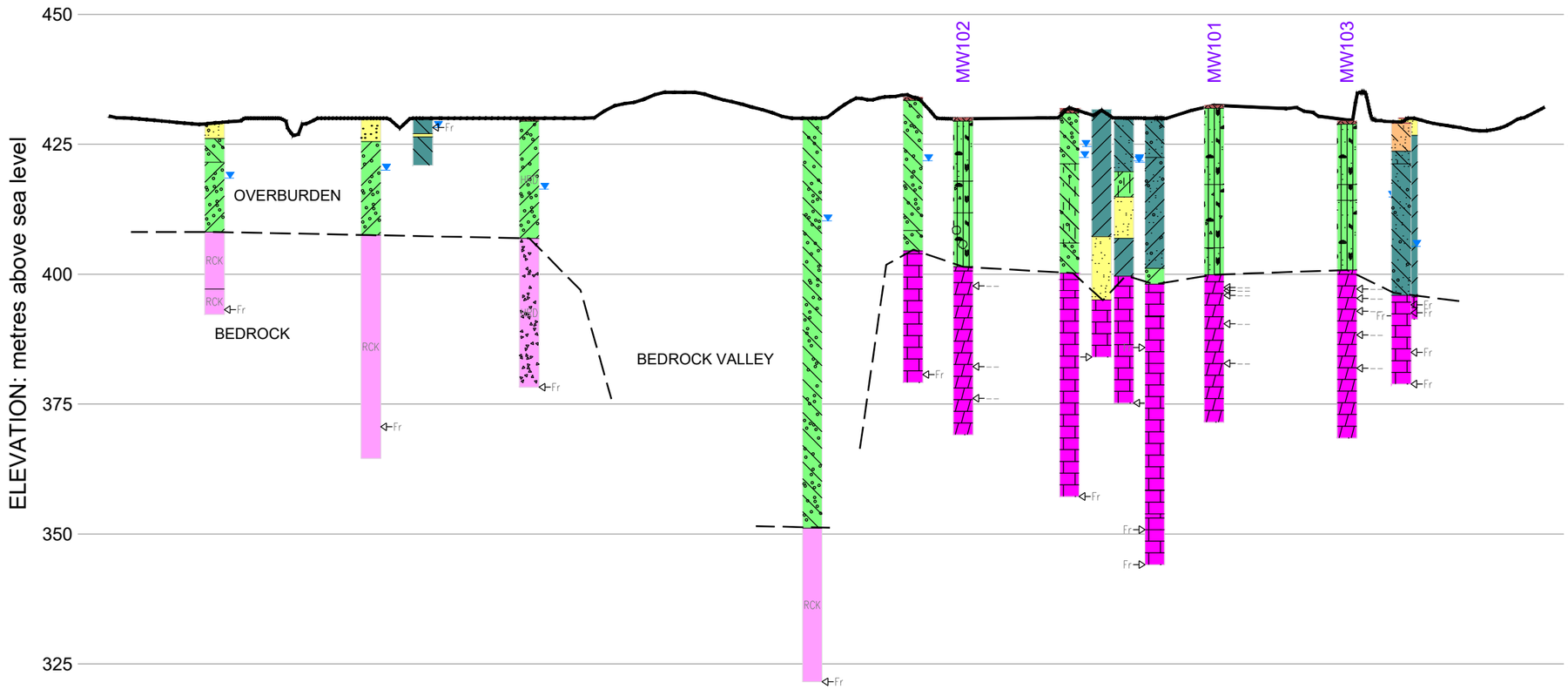
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PLAN LEGEND

- SHALLOW DUG OR BORED <10 M
- DEEP BORED WELL >10 M
- DRILLED OVERBURDEN WELL
- TEST OR OBSERVATION WELL
- DRILLED BEDROCK WELL
- BEDROCK TEST WELL
- EXISTING PRODUCTION WELL
- BEDROCK MONITORING WELL

SOIL PATTERN LEGEND AND GENERIC SHADING

- UNOXIDIZED CLAY BLUE, GREY WHITE, OR UNDEFINED
- OXIDIZED CLAY BROWN, RED, YELLOW
- SILT
- SAND
- GRAVEL
- STONES, PEBBLES
- BOULDER
- TILL
- LIMESTONE
- SHALE
- UNKNOWN
- PEAT/LOAM
- SANDS & GRAVELS
- GRANULAR TILL
- SILT
- SILT CLAYEY
- CLAY
- TILL
- LIMESTONES
- SHALES
- UNDIFFERENTIATED

WELL SYMBOLS

- 23453 MOE RECORDED PRIVATE WELL
- RECORDED STATIC WATER LEVEL
- WATER PRODUCING ZONE
- SCREEN

NOTES

MINISTRY OF ENVIRONMENT WATER WELL INFORMATION SYSTEM, QUEEN'S PRINTER. LOCATION AND ELEVATIONS OF FIELD VERIFIED WELLS ARE SUBJECT TO REVISION.

BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DETERMINED ONLY AT WELL AND TEST WELL LOCATIONS. BETWEEN THE WELLS AND TEST WELLS, BOUNDARIES ARE NOT PROVEN BUT ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

0 200 400 600 m
1:10000

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
AREA SECTION A - A'

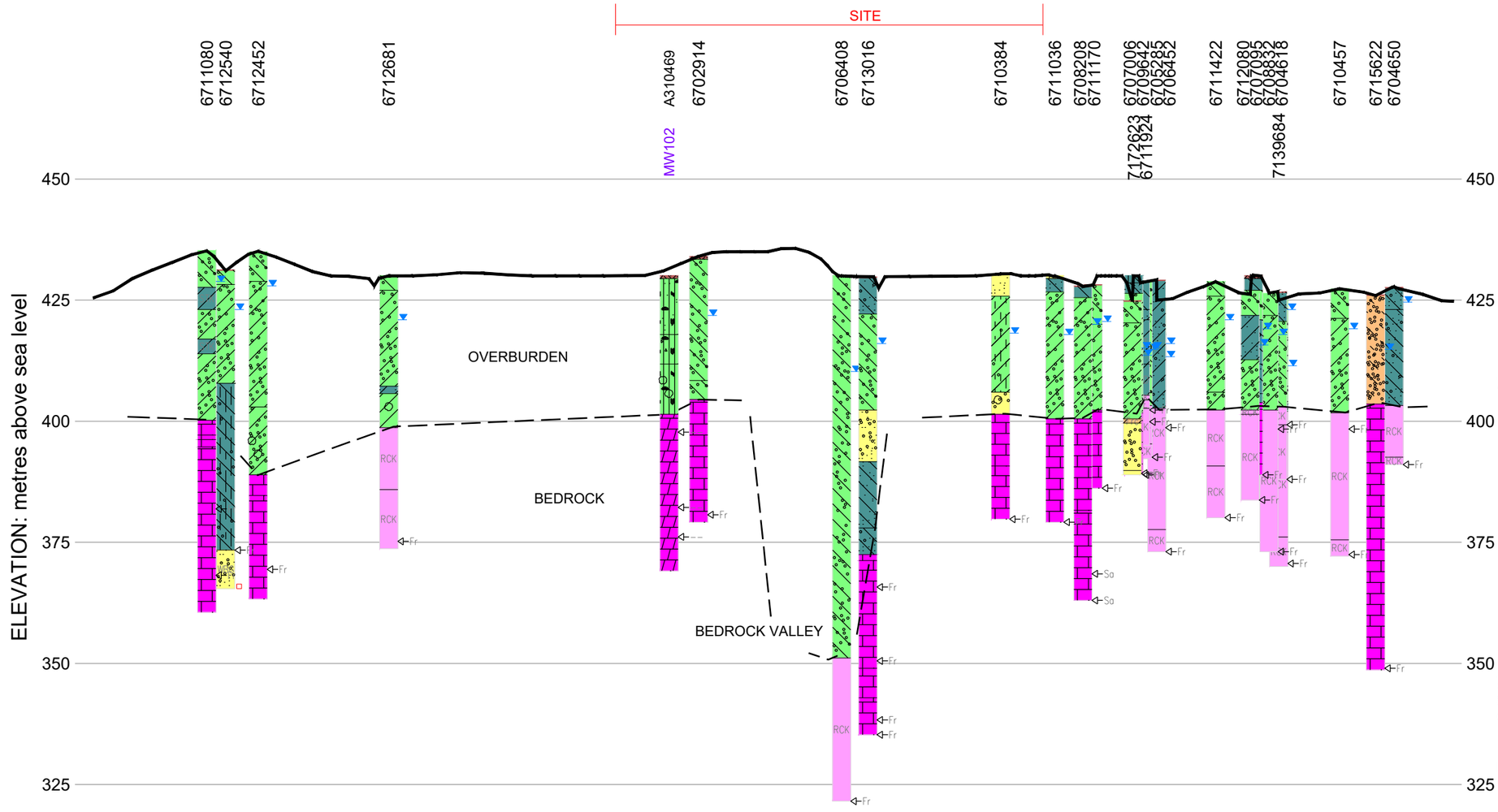
CONSULTANT

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0010	----	6

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
0 25 mm





PLAN LEGEND

- SHALLOW DUG OR BORED <10 M
- DEEP BORED WELL >10 M
- DRILLED OVERBURDEN WELL
- TEST OR OBSERVATION WELL
- DRILLED BEDROCK WELL
- BEDROCK TEST WELL
- EXISTING PRODUCTION WELL
- BEDROCK MONITORING WELL

SOIL PATTERN LEGEND AND GENERIC SHADING

- UNOXIDIZED CLAY BLUE, GREY WHITE, OR UNDEFINED
- OXIDIZED CLAY BROWN, RED, YELLOW
- SILT
- SAND
- GRAVEL
- STONES, PEBBLES
- BOULDER
- TILL
- LIMESTONE
- SHALE
- UNKNOWN
- PEAT/LOAM
- SANDS & GRAVELS
- GRANULAR TILL
- SILT
- SILT CLAYEY
- CLAY
- TILL
- LIMESTONES
- SHALES
- UNDIFFERENTIATED

WELL SYMBOLS

- 23453 MOE RECORDED PRIVATE WELL
- RECORDED STATIC WATER LEVEL
- WATER PRODUCING ZONE
- SCREEN

NOTES

MINISTRY OF ENVIRONMENT WATER WELL INFORMATION SYSTEM, QUEEN'S PRINTER. LOCATION AND ELEVATIONS OF FIELD VERIFIED WELLS ARE SUBJECT TO REVISION.

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0 200 400 600 m

1:10000

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
AREA SECTION B - B

CONSULTANT

wsp

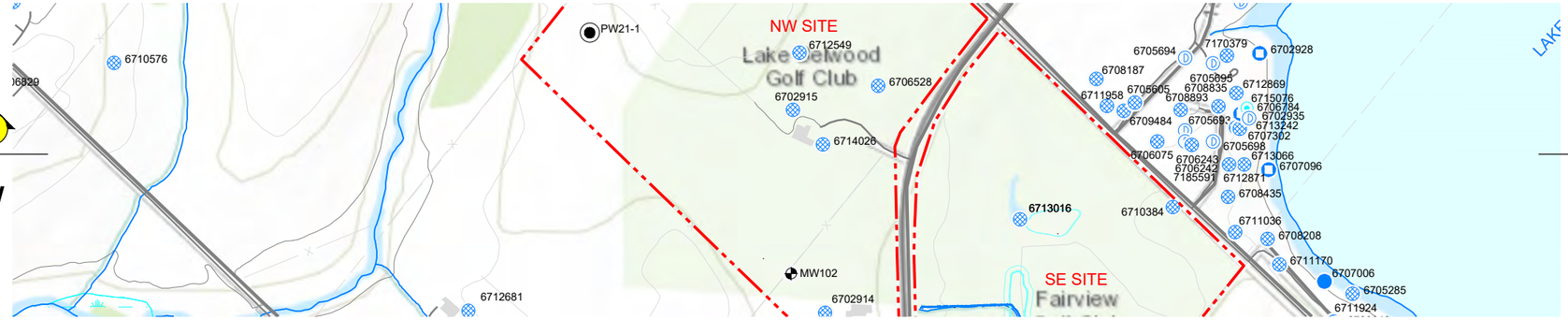
YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

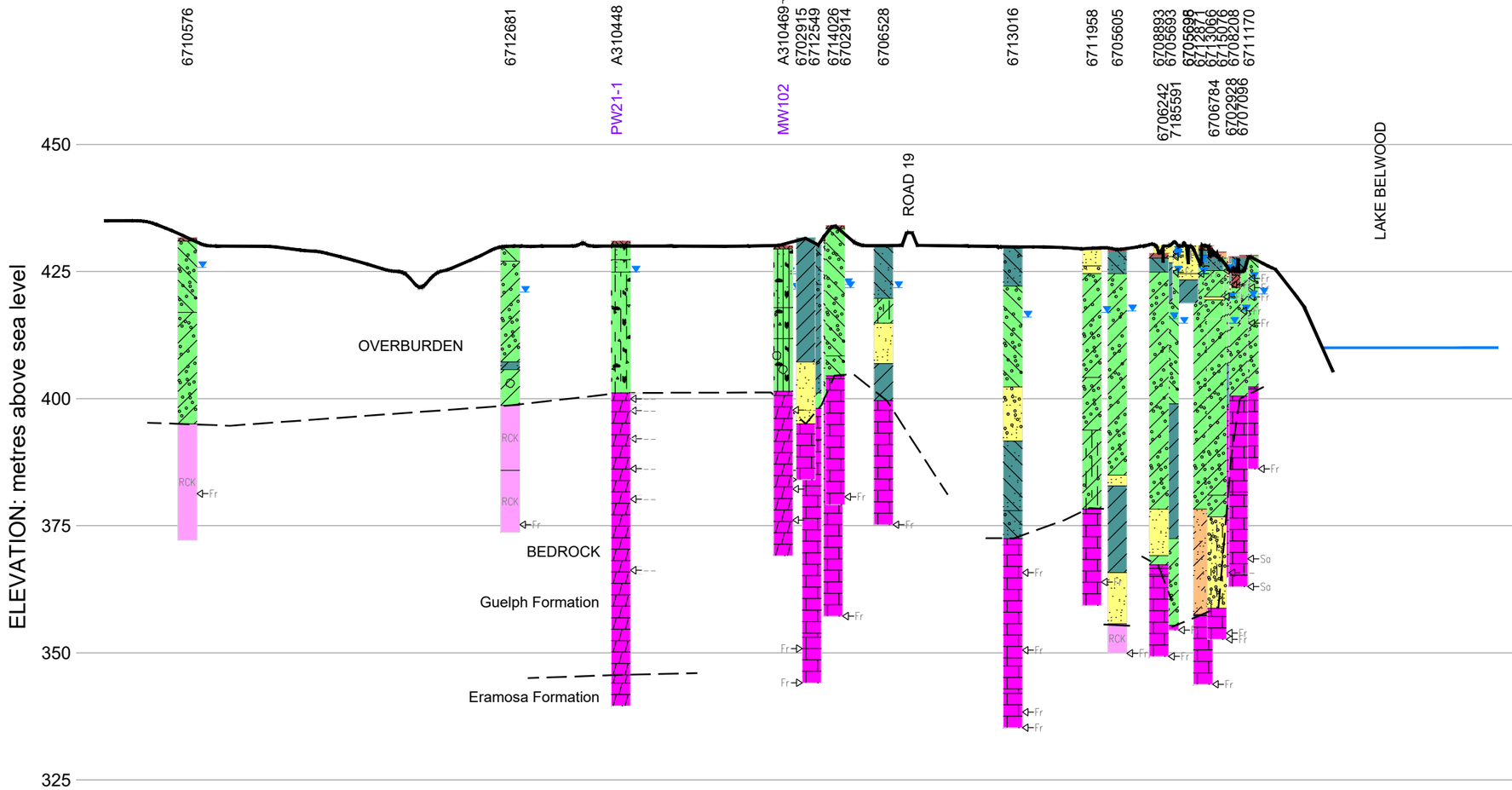
PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0010	----	7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

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PLAN LEGEND

- SHALLOW DUG OR BORED <10 M
- DEEP BORED WELL >10 M
- DRILLED OVERBURDEN WELL
- TEST OR OBSERVATION WELL
- DRILLED BEDROCK WELL
- BEDROCK TEST WELL
- EXISTING PRODUCTION WELL
- BEDROCK MONITORING WELL

SOIL PATTERN LEGEND AND GENERIC SHADING

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- OXIDIZED CLAY BROWN, RED, YELLOW
- SILT
- SAND
- GRAVEL
- STONES, PEBBLES
- BOULDER
- TILL
- SHALE
- LIMESTONE
- CRYSTALLINE ROCK
- UNKNOWN
- PEAT/LOAM
- SANDS & GRAVELS
- GRANULAR TILL
- SILT
- SILT CLAYEY
- CLAY
- TILL
- LIMESTONES
- SHALES
- PRECAMBRIAN

23453 MOE RECORDED PRIVATE WELL

RECORDED STATIC WATER LEVEL — FLOWING WELL

WATER PRODUCING ZONE

SCREEN

NOTES

MINISTRY OF ENVIRONMENT WATER WELL INFORMATION SYSTEM, QUEEN'S PRINTER. LOCATION AND ELEVATIONS OF FIELD VERIFIED WELLS ARE SUBJECT TO REVISION.

BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DETERMINED ONLY AT WELL AND TEST WELL LOCATIONS. BETWEEN THE WELLS AND TEST WELLS, BOUNDARIES ARE NOT PROVEN BUT ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

0 200 400 600 m

1:10000

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
AREA SECTION C - C'

CONSULTANT

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

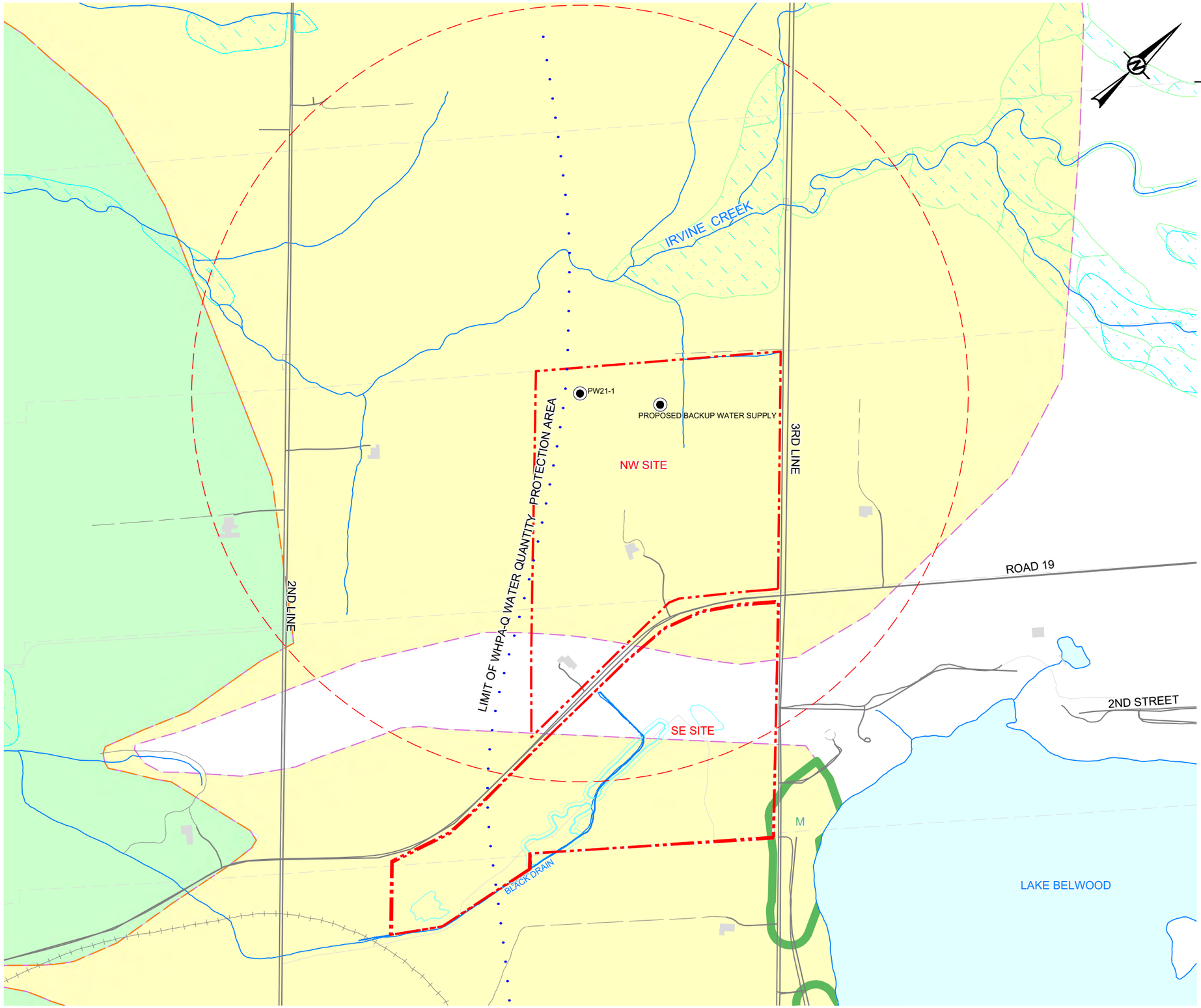
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

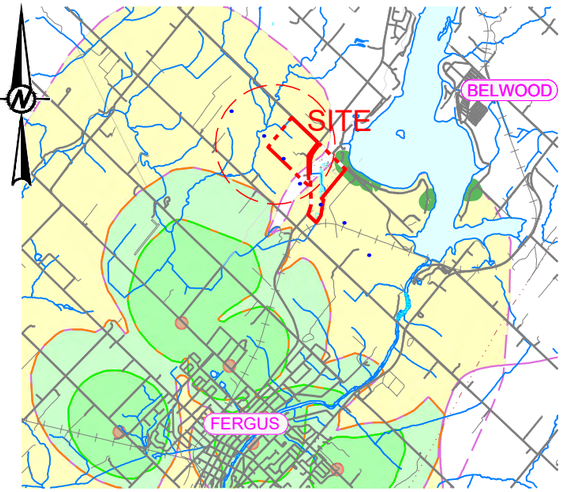
25 mm

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REGIONAL PLAN 1:100,000



PLAN LEGEND

- PROPERTY BOUNDARY WITH 500 m OFFSET
- APPROXIMATE ZONE OF INFLUENCE (PUMPING AT 8.8 l/s)
- WELLHEAD PROTECTION AREA A / MUNICIPAL WELL SITE
- WELLHEAD PROTECTION AREA B
- WELLHEAD PROTECTION AREA C
- WELLHEAD PROTECTION AREA D
- WATER QUANTITY PROECTION LIMIT
- AREA OF MEDIUM AQUIFER INTRINSIC VULNERABILITY (GRCA)

REFERENCES & DISCLAIMERS

WELLHEAD PROTECTION AREAS, GRAND VALLEY CONSERVATION AUTHORITY (GRCA); 2009

AQUIFER INTRINSIC SUSCEPTIBILITY, GRCA. AREAS OUTSIDE MAPPED MEDIUM VULNERABILITY LOCAL TO THE SITE PLAN AREA EXTENT ARE MAPPED LOW ISI OTHERWISE.

MAPPED FEATURES ARE APPROXIMATE AND NOT TO SCALE.

0 200 400 600 m

1:10000

PLOTTED 11X17" TABLOID PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

TITLE
WELLHEAD PROTECTION AREAS

CONSULTANT

wsp

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0010	----	9

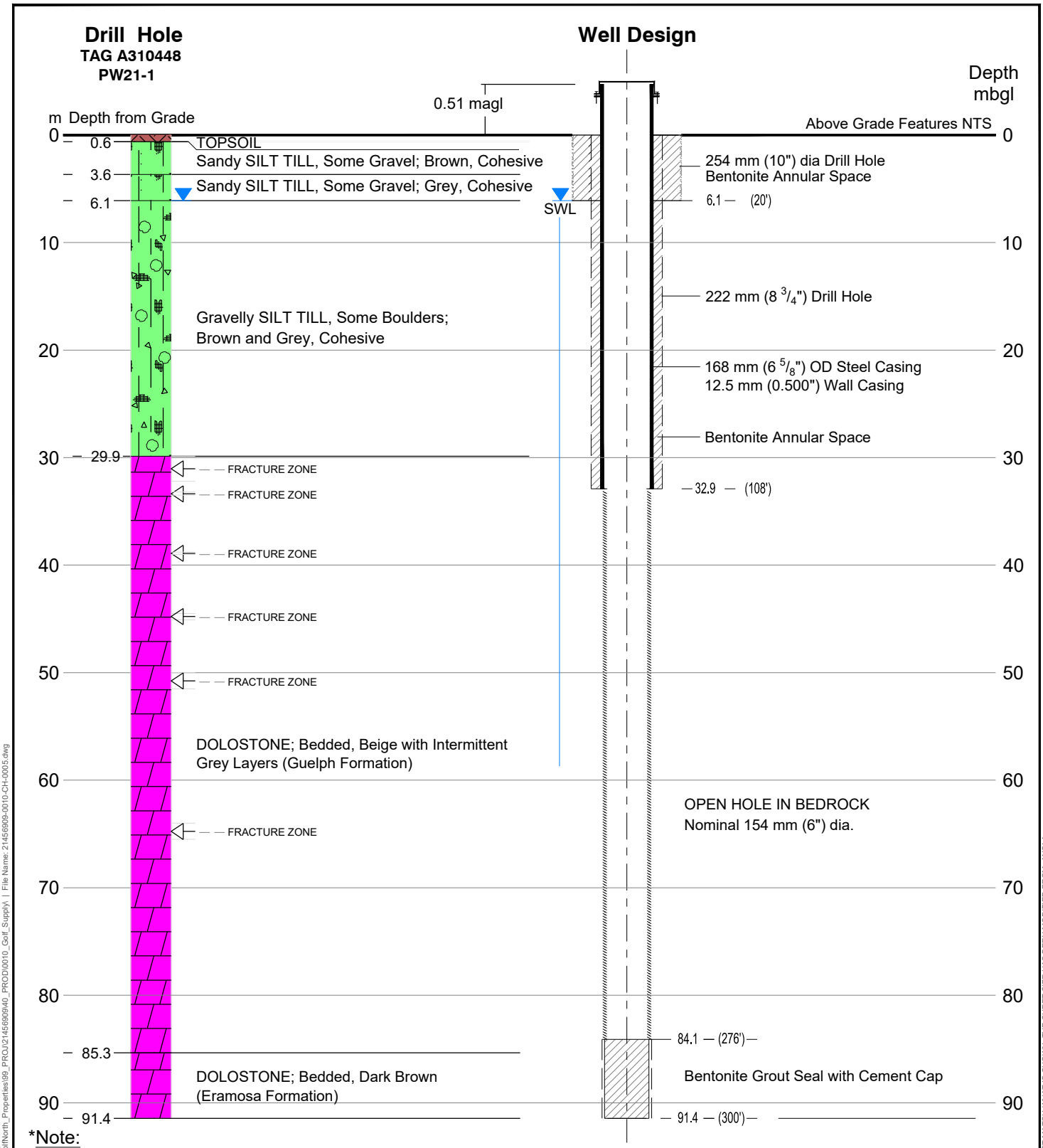
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

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APPENDIX A

As-Built Drawings



*Note:

Converted depths to feet nominal 1 foot integrals
Drilled by Well Initiatives Limited
Constructed 6th-12th May 2021
Constructed by Rotary Drill Methods

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

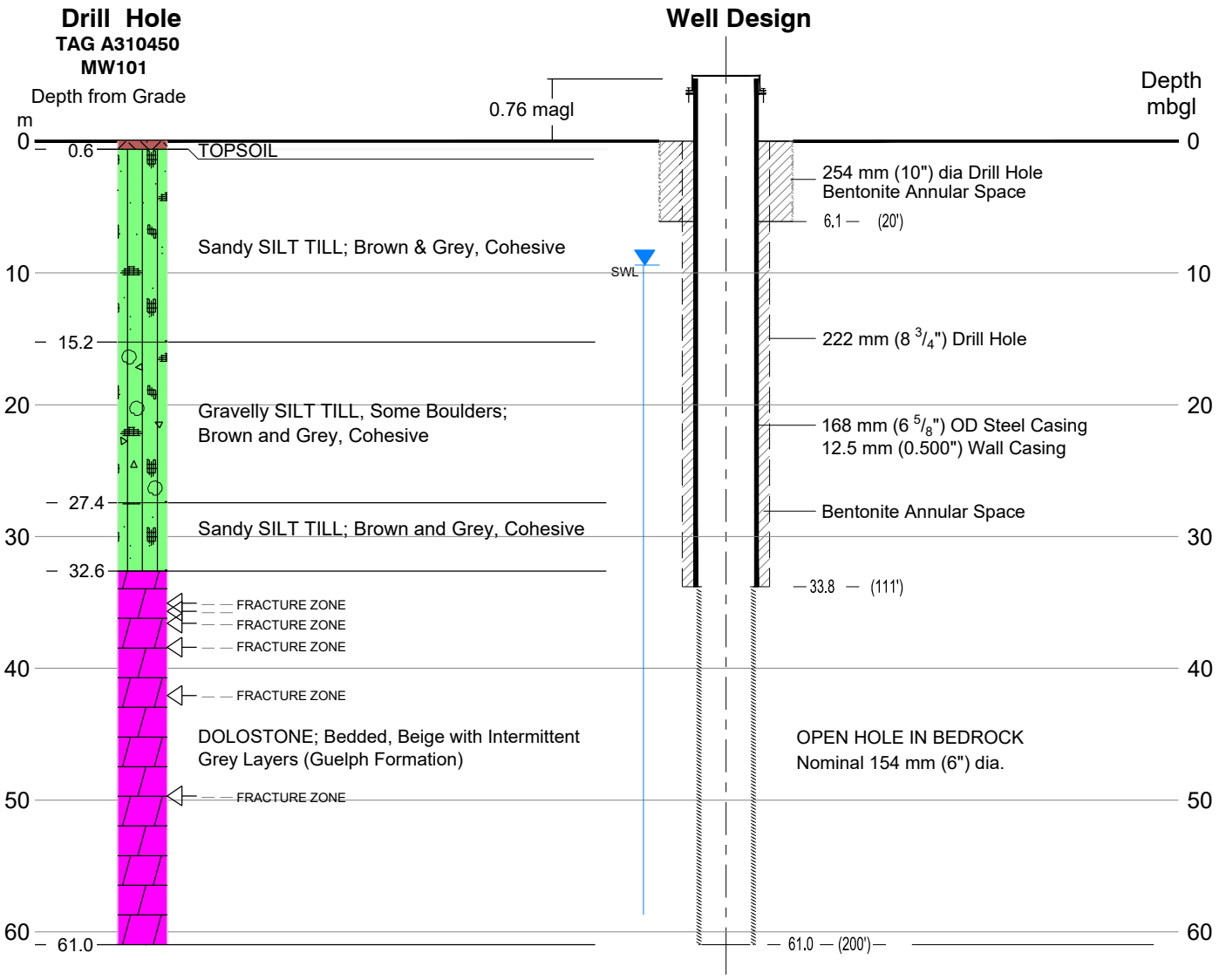
CONSULTANT
GOLDER

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

TITLE
PW21-1 AS-BUILT

PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0010	----	A1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
25 mm
0



*Note:

Converted depths to feet nominal 1 foot integrals
Drilled by Well Initiatives Limited
Constructed 17th-18th May 2021
Constructed by Rotary Drill Methods

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

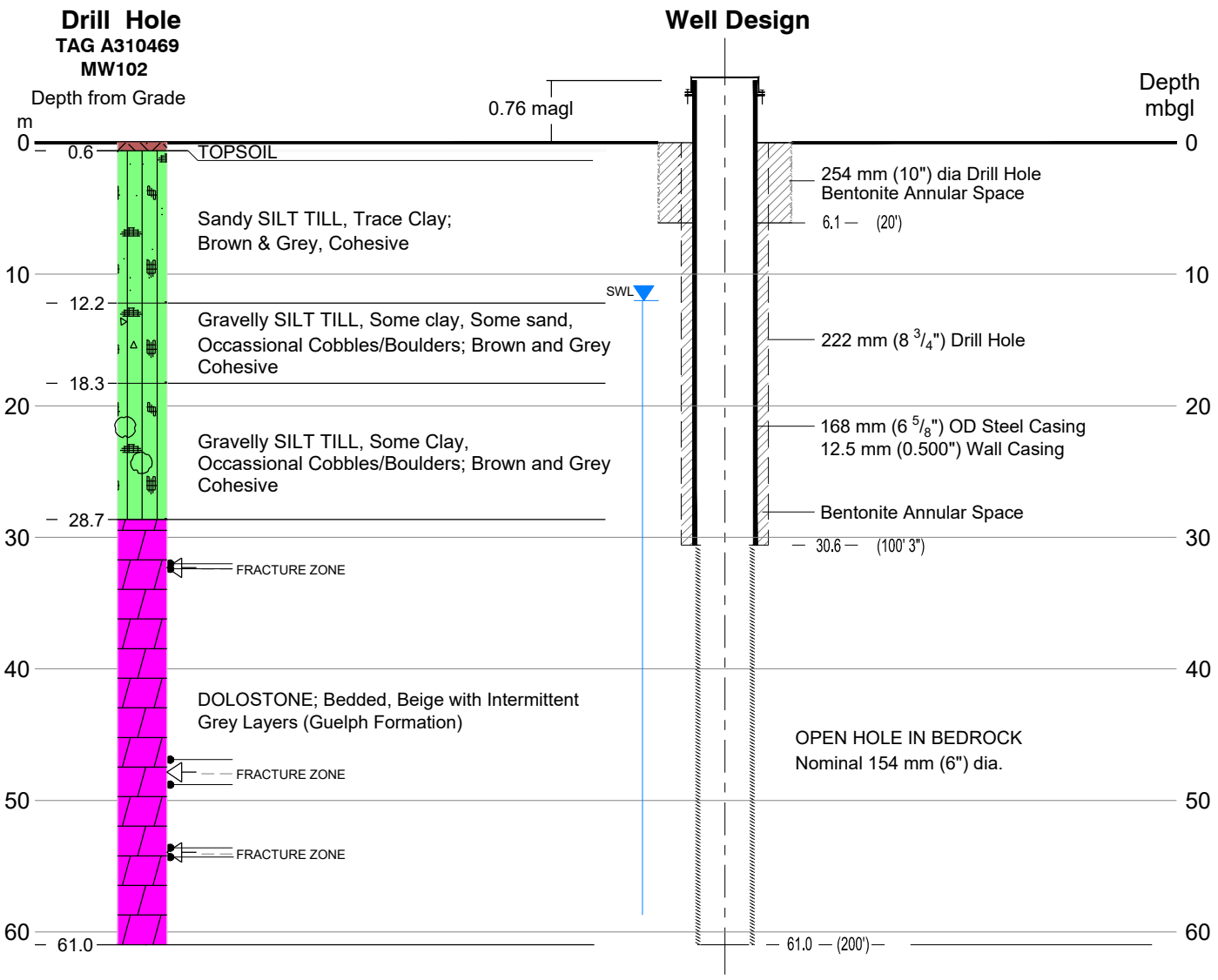
CONSULTANT
GOLDER

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

TITLE
MW101 AS-BUILT

PROJECT NO.	CONTROL	REV.	FIGURE
21456909	0010	----	A2

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
25 mm
0



*Note:

Converted depths to feet nominal 1 foot integrals
Drilled by Well Initiatives Limited
Constructed 25th-26th May 2021
Constructed by Rotary Drill Methods

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

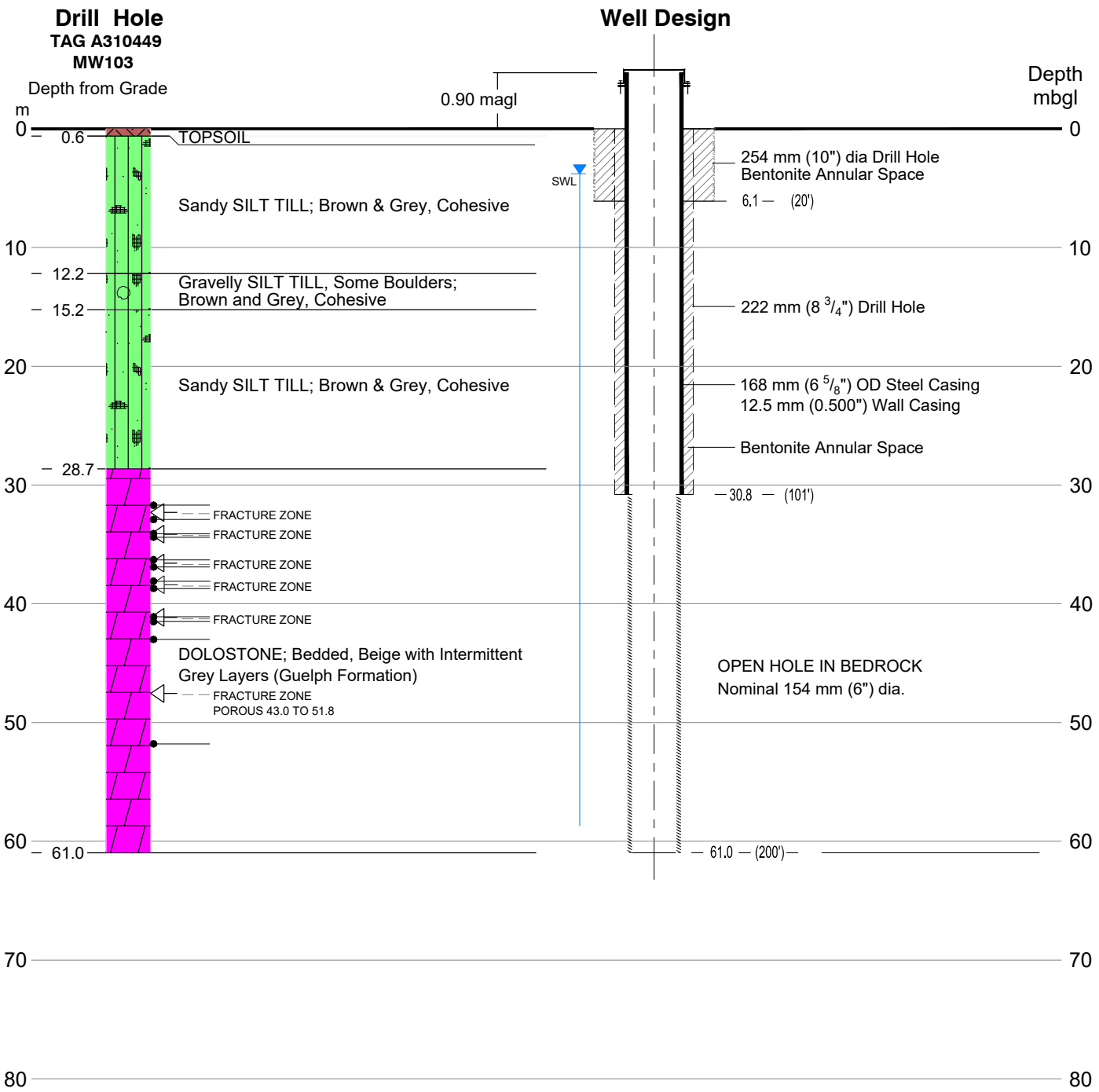
CONSULTANT
GOLDER

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

TITLE
MW102 AS-BUILT

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
25 mm
0



*Note:

Converted depths to feet nominal 1 foot integrals
Drilled by Well Initiatives Limited
Constructed 12th - 15th May 2021
Constructed by Rotary Drill Methods

CLIENT
883890 ONTARIO LIMITED
C/O FERGUS DEVELOPMENT INC.

PROJECT
FERGUS GOLF CLUB
WATER SUPPLY INVESTIGATION

CONSULTANT
GOLDER

YYYY-MM-DD	2022-01-13
DESIGNED	
PREPARED	JPR
REVIEWED	GP
APPROVED	JAP

TITLE
MW103 AS-BUILT

PROJECT NO.	CONTROL	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
25 mm
0

APPENDIX B

Water Well Records

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6702914	3 10	Dec-67	551217 4844015	433.7	53.3	Fr			12.2	45	90	18.3	2406 CT	WS ST	**MOE# 6702914** 0.0 TPSL 0.6 BRWN CLAY STNS 25.6 BRWN CLAY GRVL 29.6 BRWN LMSN 54.9
6702915	3 11	Dec-51	551159 4844378	429.8	47.5	Fr			7.0	45	30	9.1	2521 CT	WS ST	**MOE# 6702915** 0.0 CLAY 24.4 MSND 36.6 LMSN 47.5
6702916	3 13	Apr-64	549770 4844615	431.6	53.0	Fr			11.6	36	240	18.3	1659 CT	WS DO	**MOE# 6702916** 0.0 CLAY MSND 6.1 CLAY STNS 39.6 GREY LMSN 53.3
6705071	2 11	Oct-74	550362 4843651	434.3	65.5	Fr			9.1	91	60	18.3	2336 RC	WS DO	**MOE# 6705071** 0.0 TPSL 0.3 BRWN CLAY STNS 3.0 GREY CLAY STNS 36.3 GREY ROCK 45.1 BRWN ROCK 65.5
6705605	4 10	Jul-75	551772 4844391	428.2	79.2	Fr			11.9	45	60	19.8	2336 RC	WS DO	**MOE# 6705605** 0.0 TPSL 0.3 BRWN CLAY SAND 4.6 GREY CLAY STNS 44.2 GREY SAND 46.3 GREY CLAY 63.4 BRWN SAND 73.5 BRWN ROCK 79.2
6706075	4 10	Jun-76	551812 4844321	428.2	57.9	Fr			10.7	45	60	22.9	2336 RC	WS DO	**MOE# 6706075** 0.0 BRWN SAND 3.7 GREY CLAY GRVL 29.6 GREY ROCK 38.7 BRWN ROCK 61.3
6706408	3 10	May-77	551512 4843821	429.8	108.5	Fr			19.8	68	300	25.9	1906 RC	WS DO	**MOE# 6706408** 0.0 BRWN CLAY STNS 78.9 GREY STNS 108.5
6706427	3 13	May-77	549762 4844571	432.5	40.2	Fr			7.0	36	60	21.3	5469 RC	WS DO	**MOE# 6706427** 0.0 BRWN CLAY 5.5 GREY CLAY 37.5 GREY LMSN 40.2
6706528	3 11	Jan-77	551312 4844421	429.8	54.9	Fr			8.2	41	60	22.9	3740 RA	WS DO	**MOE# 6706528** 0.0 BRWN CLAY SAND 10.4 GREY HPAN STNS 15.2 BRWN SAND 23.2 GREY CLAY 30.5 GREY LMSN 54.9
6708187	4 10	Jun-84	551703 4844433	426.1	38.1	Fr			7.0	36	120	19.8	5317 RC	WS DO	**MOE# 6708187** 0.0 CLAY STNS 28.7 LMSN 42.7
6708208	4 9	Aug-85	552010 4844147	427.0	64.9 59.4	Sa Sa			7.9	41	90	25.9	3740 RC	WS DO	**MOE# 6708208** 0.0 BLCK TPSL 0.3 BRWN CLAY 2.4 GREY CLAY STNS 27.4 GREY LMSN 46.3 BRWN LMSN 64.9
6708405	4 12	Mar-86	551020 4845119	427.9	50.3 47.9	Fr Fr			12.8	45	60	17.7	3740 RC	WS DO	**MOE# 6708405** 0.0 BLCK TPSL 0.3 BRWN CLAY SAND 3.7 GREY CLAY STNS 29.0 GREY LMSN SHLE 51.5
6708706	3 12	May-86	550971 4844959	427.0	50.3 45.7	Fr Fr			2.1	91		6.1	2564 CT	WS DO	**MOE# 6708706** 0.0 GRVL 3.0 CLAY 30.5 SAND 33.5 LMSN 50.3
6708770	4 11	May-87	551204 4844968	428.9	38.1	Fr			15.2	23	60	30.5	4643 RC	WS DO	**MOE# 6708770** 0.0 BLCK TPSL 0.3 BRWN SAND 3.4 BLUE CLAY 34.4 GREY LMSN 38.7
6708893	4 10	Jun-87	551854 4844378	428.9	79.2	Fr			12.8	41	60	20.7	3740 RC	WS DO	**MOE# 6708893** 0.0 BRWN FILL 0.9 BRWN CLAY 3.7 GREY CLAY STNS 50.3 GREY SAND 59.4 GREY CLAY STNS 61.3 BRWN SNDS SHLE 63.1 BRWN LMSN 79.2
6708933	4 12	Jan-87	551001 4845118	427.0	41.1	Fr			4.6	91	60	24.4	2336 RC	WS DO	**MOE# 6708933** 0.0 BRWN CLAY GRVL STNS 5.5 GREY CLAY 36.9 GREY ROCK 41.1
6709396	3 12	Jul-88	550350 4844608	431.9	56.1	Fr			5.2	45	180	29.0	1906 RC	WS DO	**MOE# 6709396** 0.0 BRWN CLAY STNS 36.0 BLUE ROCK 37.5 GREY ROCK 42.7 LMSN 56.4
6709484	4 10	Sep-88	551752 4844376	427.9	39.3	Fr			15.8	32	60	21.3	3740 RC	WS DO	**MOE# 6709484** 0.0 BLCK TPSL 0.3 BRWN SAND CLAY 3.7 BRWN CLAY STNS 10.4 GREY CLAY STNS 30.5 GREY LMSN 39.3

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6710384	3 10	Jun-90	551840 4844204	431.0	50.6	Fr			12.2	68	60		2663 RA	WS DO	**MOE# 6710384** 0.0 TPSL 0.3 SAND 4.6 CLAY HPAN 24.4 BLDR GRVL 29.0 GREY LMSN 39.6 BRWN LMSN 50.6
6710576	3 12	Aug-90	549942 4844462	431.6	50.3	Fr			5.8	45	90	16.8	2332 RC	WS DO	MOE# 6710576 0.0 BLCK TPSL 0.6 BRWN CLAY STNS 14.6 GREY CLAY STNS 36.6 BRWN ROCK 59.4
6711080	2 11	Jun-92	550202 4843772	435.3	67.1 53.3	Fr Fr			6.4	45	90	22.9	3317 RC	WS DO	MOE# 6711080 0.0 BRWN CLAY STNS 7.6 GREY CLAY STKY 12.2 GREY CLAY STNS 18.3 GREY CLAY STKY 21.3 GREY CLAY STNS 35.1 GREY LMSN 38.1 BRWN LMSN 39.0 GREY LMSN 40.5 BRWN LMSN 74.7
6711152	4 11	Dec-93	551117 4844955	428.9	50.3 44.2 36.6 36.6	Fr Fr Fr Fr			23.8	41	60	27.4	2663 RA	WS DO	**MOE# 6711152** 0.0 TPSL 0.3 BRWN SAND CLAY 5.5 BRWN CLAY SAND HPAN 7.9 BRWN CLAY SAND GRVL 33.2 GREY LMSN 50.3
6711958	4 10	Sep-96	551722 4844385	427.9	65.5	Fr			12.5	91	60	15.2	6865 RC	WS DO	**MOE# 6711958** 0.0 TPSL 0.3 BRWN SAND 3.4 BRWN GRVL SAND 4.9 GREY CLAY STNS 25.3 GREY CLAY GRVL 35.7 GREY CLAY SILT STNS 51.2 GREY LMSN 70.1
6712452	2 12	Aug-97	550308 4843780	434.9	65.5	Fr			7.0	91	90	22.9	3317 RC	WS DO	**MOE# 6712452** 0.0 BRWN CLAY STNS 6.1 GREY CLAY STNS 32.0 GREY CLAY STNS BLDR 46.0 GREY LMSN 50.3 GREY LMSN 71.6
6712540	2 13	Jun-98	550241 4843906	431.3	57.9	Fr	64.9	-0.9	8.2	91	90		2576 RA	WS DO	**MOE# 6712540** 0.0 TPSL 0.3 BRWN CLAY GRVL 3.0 GREY CLAY GRVL 23.5 BRWN CLAY SLTY GRVL 57.9 GREY SAND GRVL WBRG 65.8
6712549	3 11	Jun-98	551171 4844480	430.1	86.0 79.2 44.2 44.2 44.2 44.2	Fr Fr Fr Fr Fr Fr			8.5	136	60	26.8	2663 RA	WS DO	**MOE# 6712549** 0.0 BRWN CLAY SAND GRVL 7.6 GREY CLAY SAND GRVL 29.0 GREY CLAY GRVL LMSN 32.0 BRWN LMSN LTCL 38.1 BRWN LMSN 47.2 BRWN LMSN LTCL 71.6 GREY LMSN LTCL 76.2 GREY LMSN 79.2 GREY LMSN LTCL 86.0
6712681	3 11	Sep-98	550577 4844018	430.1	54.9	Fr			9.1	136	60	16.8	2336 RA	WS DO	**MOE# 6712681** 0.0 BRWN CLAY STNS 3.0 GREY CLAY STNS 22.9 GREY CLAY SAND GRVL 24.4 GREY CLAY BLDR 31.4 GREY ROCK 44.2 BRWN ROCK 56.4
6713016	3 11	Jun-99	551566 4844182	430.1	94.5 91.4 79.2 79.2 79.2 79.2	Fr Fr Fr Fr Fr Fr			13.7	136	60	33.5	2663 RA	WS DO	**MOE# 6713016** 0.0 TPSL 0.3 BRWN CLAY SAND STNS 7.6 BRWN CLAY GRVL 27.4 GREY SAND GRVL 38.1 BRWN CLAY SAND 51.8 BRWN CLAY SAND GRVL 57.3 BRWN LMSN FCRD 58.5 BRWN LMSN 80.8 GREY LMSN 86.9 GREY LMSN 94.5
6714026	3 11	Mar-02	551213 4844316	430.1	74.7	Fr			9.4	68	60	36.3	2663 RA	WS DO	**MOE# 6714026** 0.0 BLCK TPSL 0.9 BRWN CLAY STNS 10.7 BRWN CLAY HPAN 25.9 BRWN CLAY GRVL 31.7 GREY LMSN FCRD 32.9 GREY LMSN 35.1 BLUE LMSN 74.7
7166124	4 11	NR	551624 4844811	432.5					NR				6475 -	- -	**MOE# 7166124 TAG#A103263** 0.0
7185591	4 9	Jul-12	551874 4844315	430.1	75.6	Fr			15.2	55	720	15.8	7154 RC	WS DO	**MOE# 7185591 TAG#A125533** 0.0 BRWN SAND 4.9 BRWN CLAY STNS 31.1 GREY CLAY 57.6 GREY CLAY STNS 74.7 GREY LMSN 75.6

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS

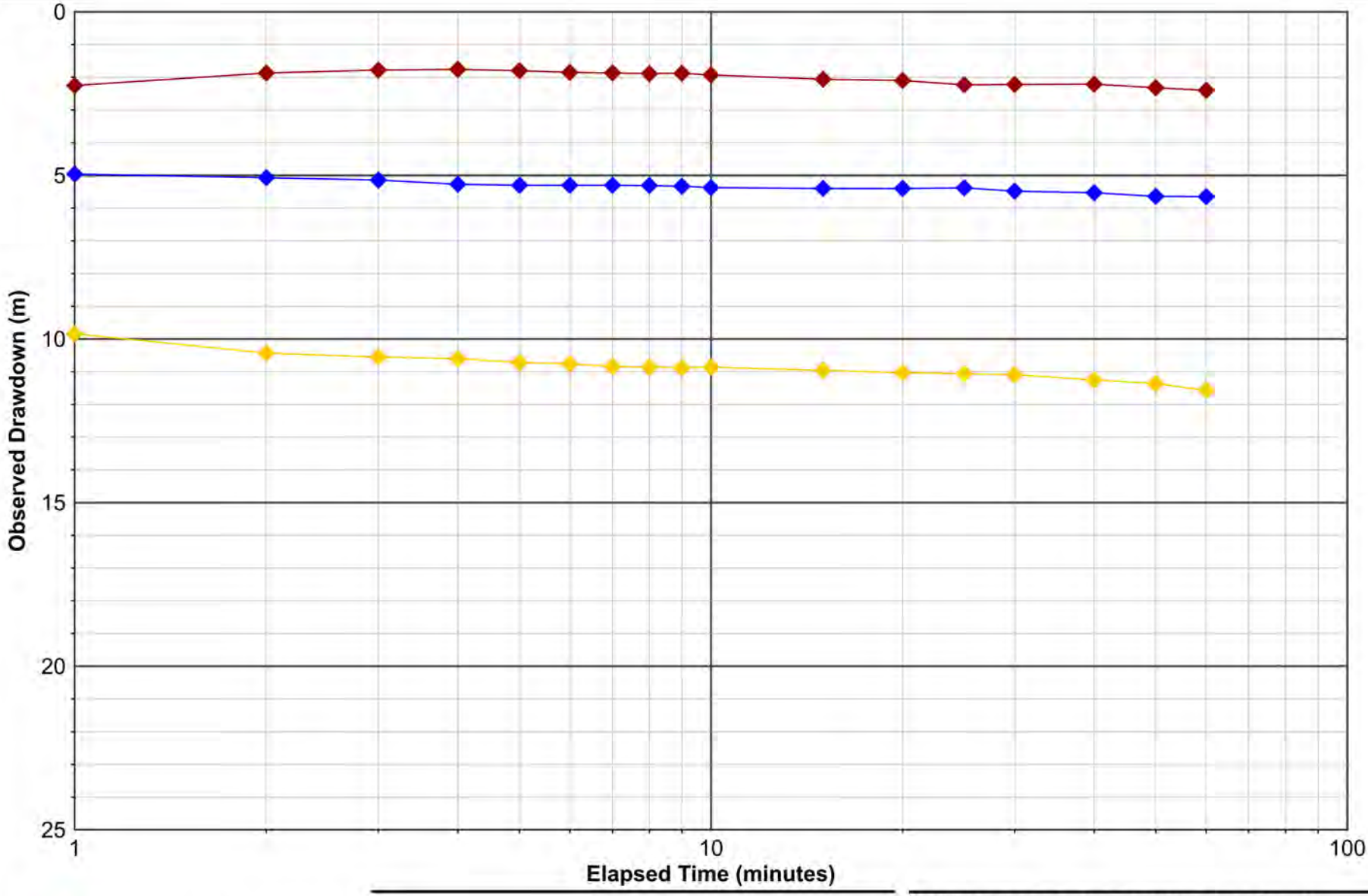
QUALITY:		TYPE:		USE:				METHOD :	
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

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APPENDIX C

Stepped Rate Pumping Test Graphs



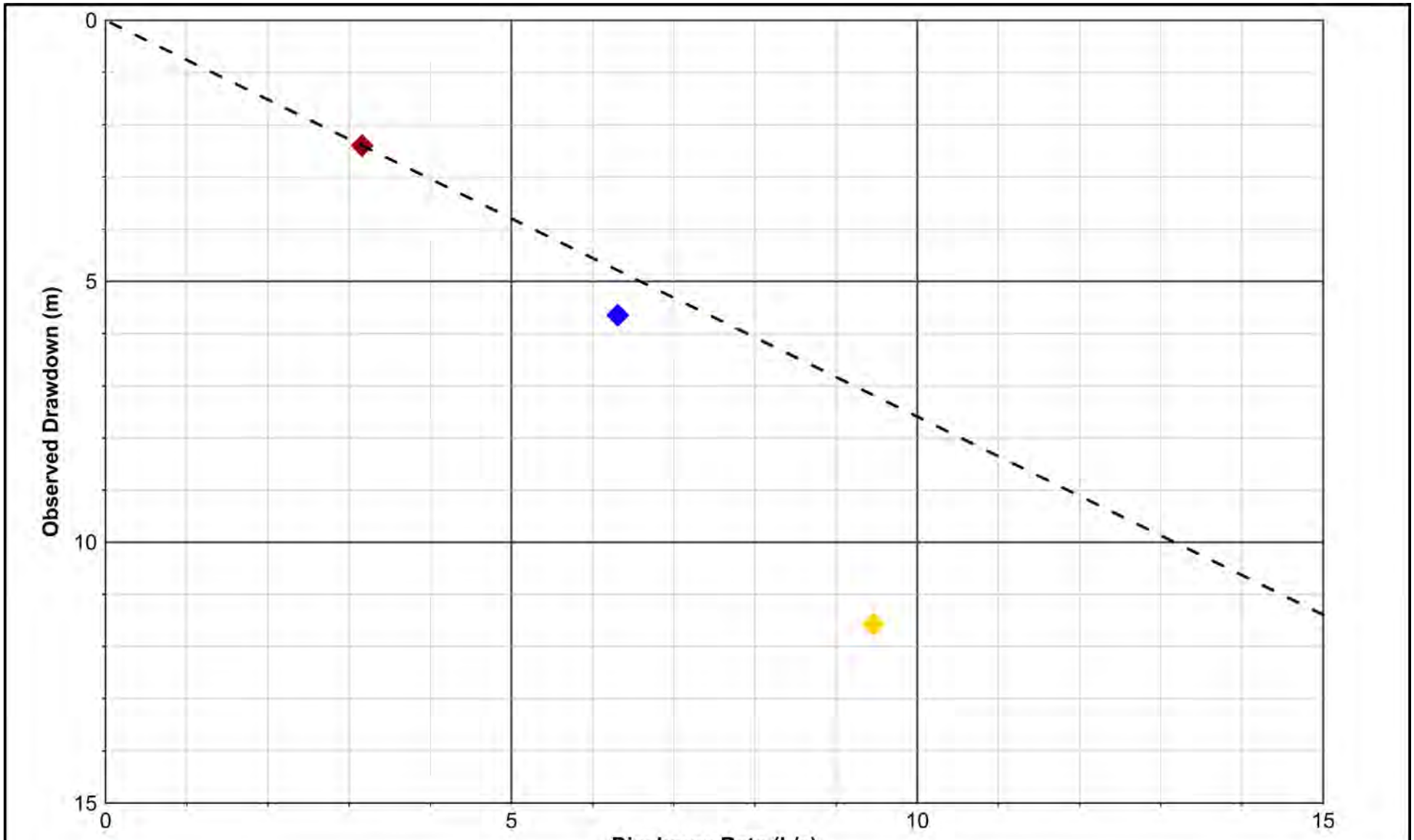
GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT **WATER SUPPLY INVESTIGATION**
FERGUS GOLF CLUB

TITLE **STEP TEST**
DRAWDOWN VERSUS ELAPSED TIME

PROJECT NO.	REV	FIGURE
21456909	A	C1



GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

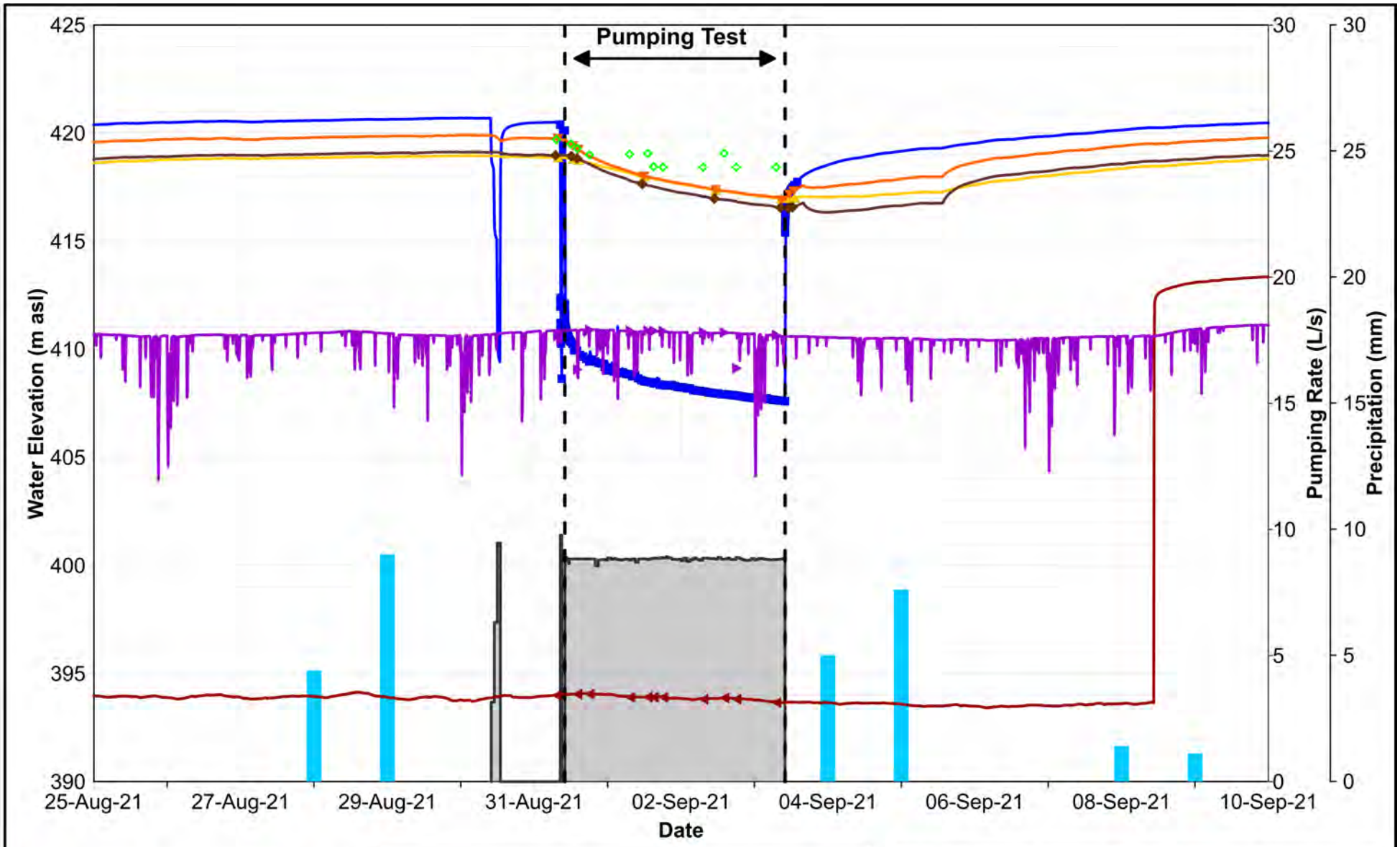
PROJECT **WATER SUPPLY INVESTIGATION**
FERGUS GOLF CLUB

TITLE **STEP TEST**
DRAWDOWN VERSUS DISCHARGE RATE

PROJECT NO.	REV	FIGURE
21456909	A	C2

APPENDIX D

Constant Rate Pumping Test Graphs



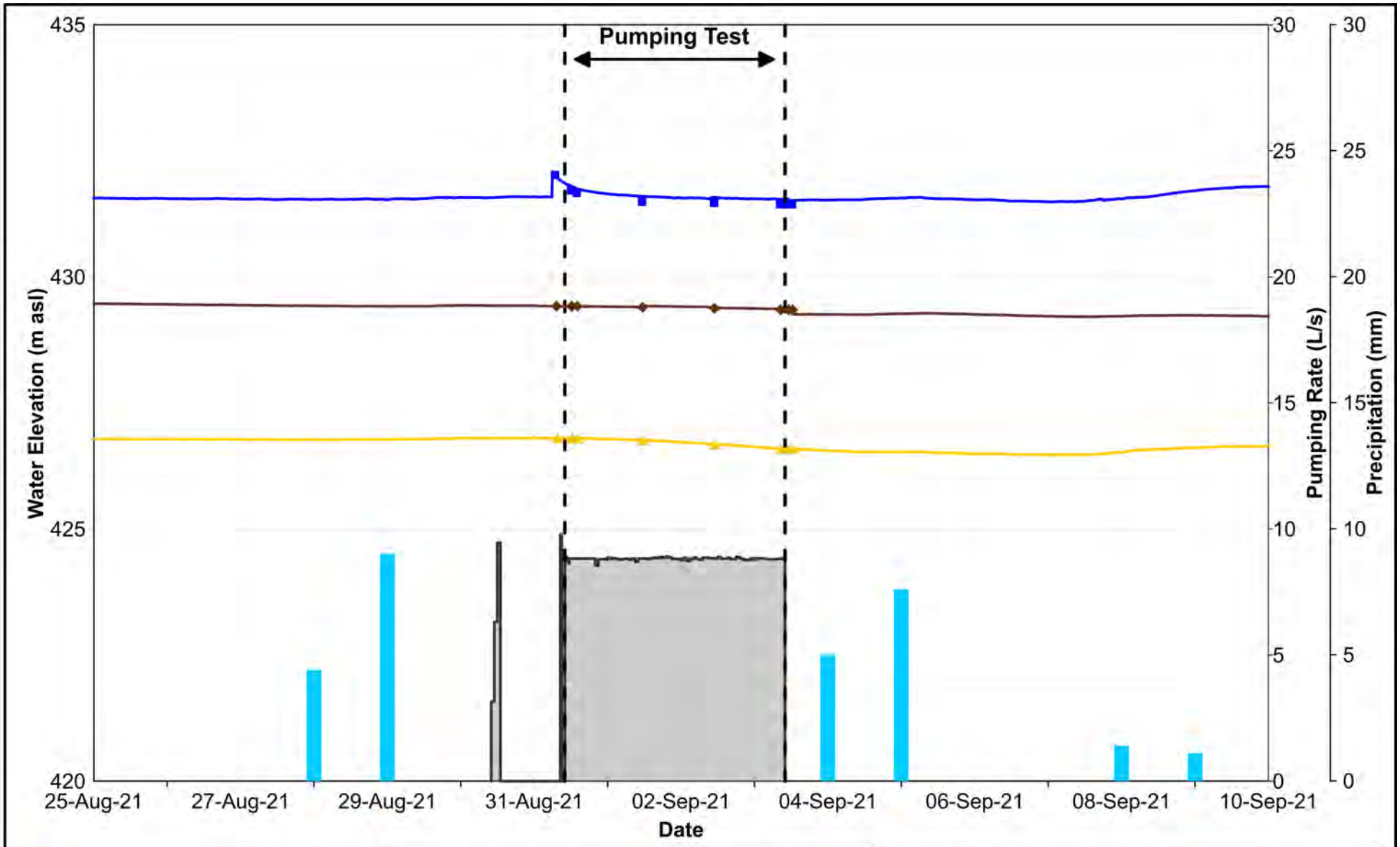
GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT: WATER SUPPLY INVESTIGATION
FERGUS GOLF CLUB

TITLE: GROUNDWATER ELEVATION MONITORING - BEDROCK WELLS

PROJECT NO.	REV	FIGURE
21456909	A	D1



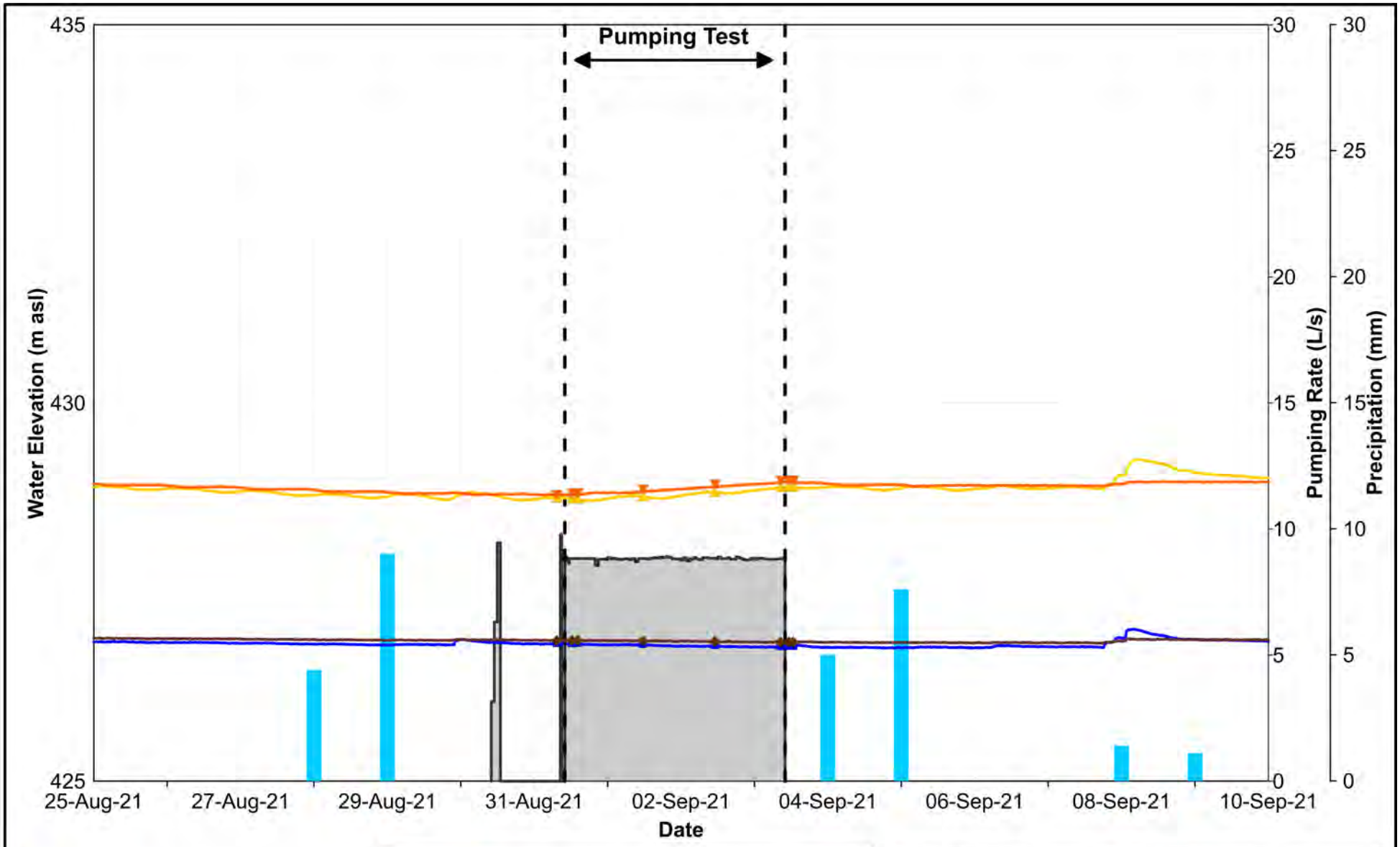
PROJECT: WATER SUPPLY INVESTIGATION
FERGUS GOLF CLUB

TITLE: GROUNDWATER ELEVATION
MONITORING - OVERBURDEN WELLS

GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT NO.	REV	FIGURE
21456909	A	D2



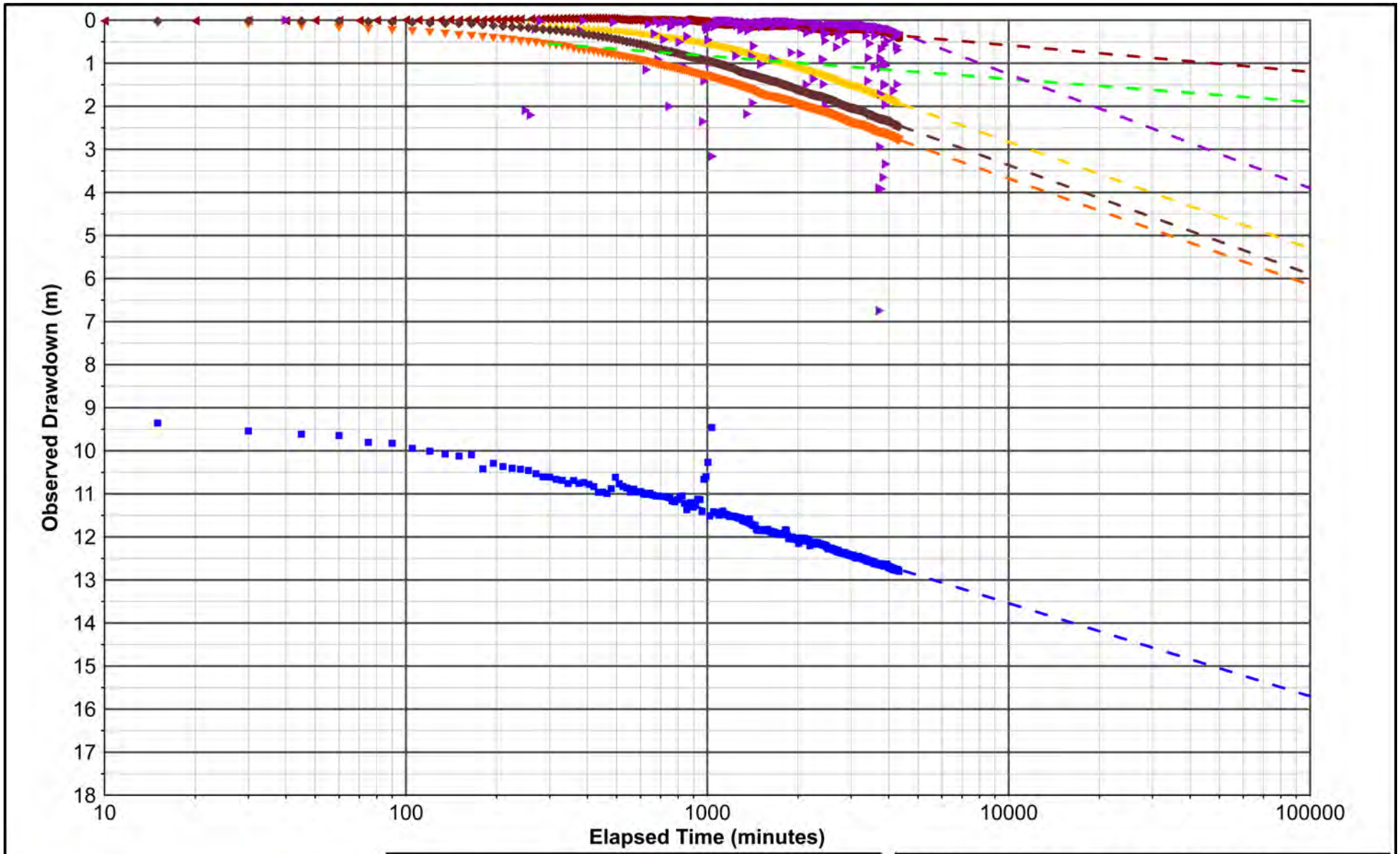
GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT: WATER SUPPLY INVESTIGATION
FERGUS GOLF CLUB

TITLE: GROUNDWATER ELEVATION MONITORING - SURFACE WATER

PROJECT NO.	REV	FIGURE
21456909	A	D3



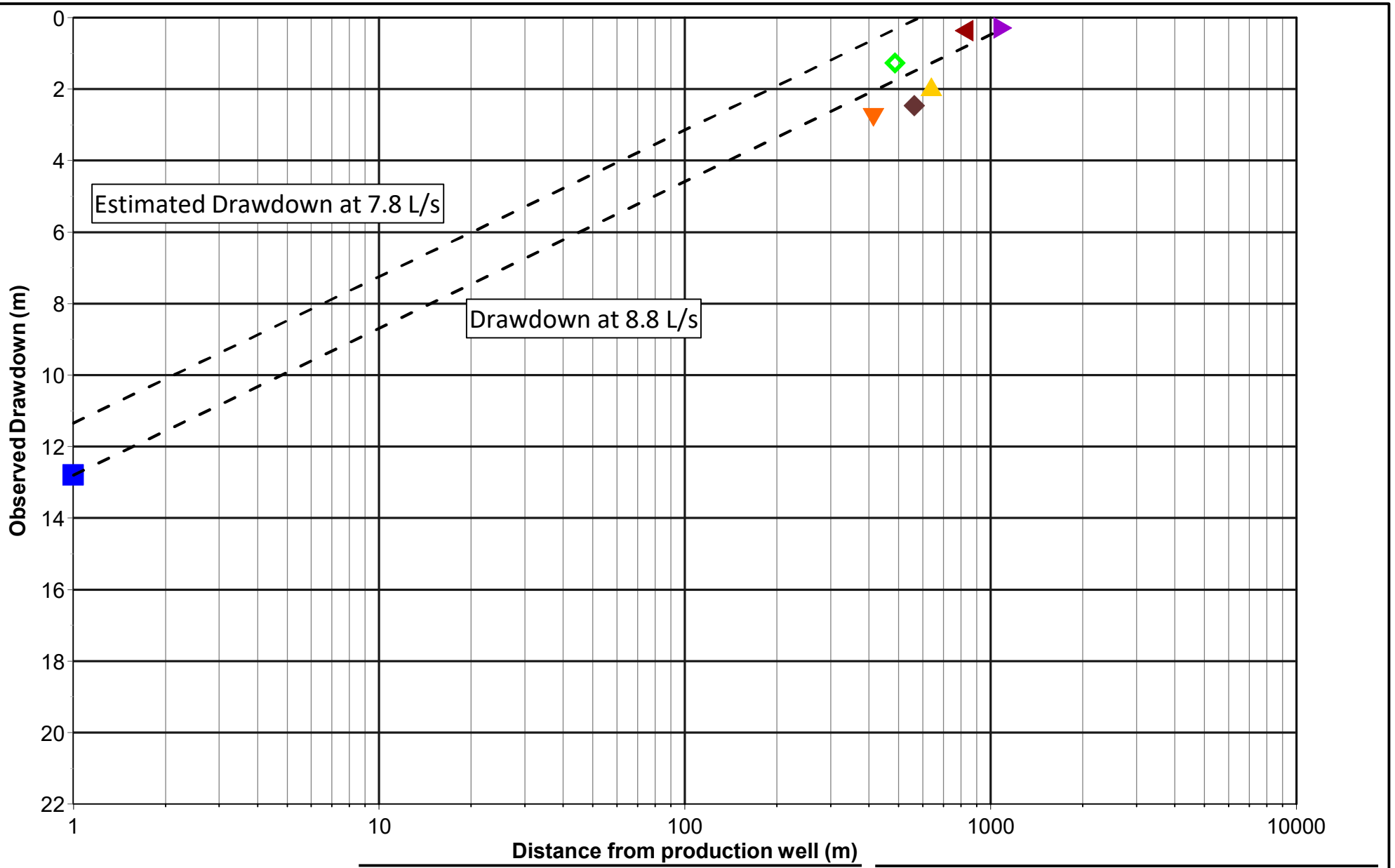
GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT: **WATER SUPPLY INVESTIGATION**
FERGUS GOLF CLUB

TITLE: **CONSTANT RATE TEST**
DRAWDOWN VERSUS LOG TIME
BEDROCK WELLS

PROJECT NO.	REV	FIGURE
21456909	A	D4



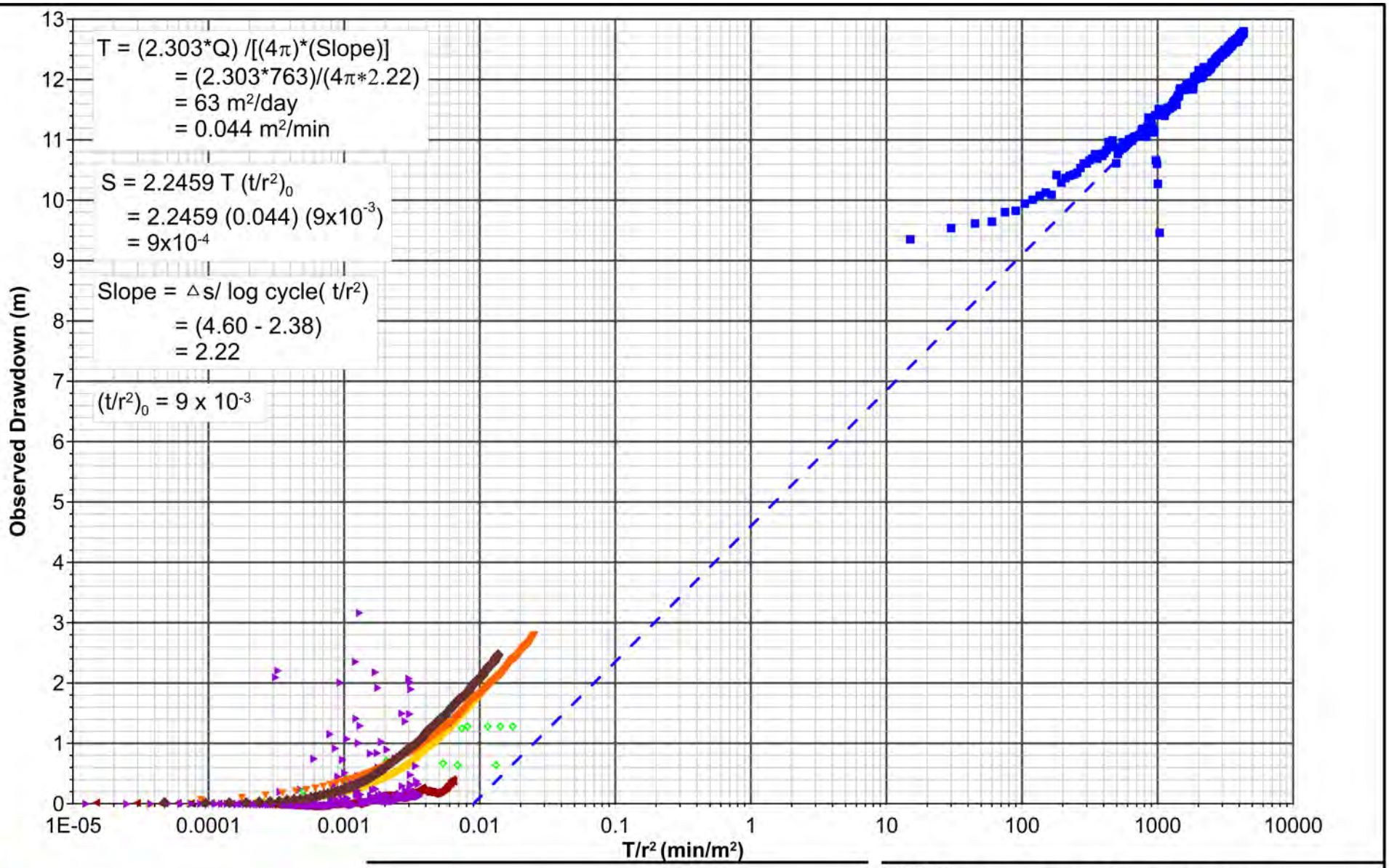
GOLDER

DATE	January 2024
DESIGN	PGM
REVIEW	GRP
APPROVED	GRP

PROJECT **WATER SUPPLY INVESTIGATION**
FERGUS GOLF CLUB

TITLE **CONSTANT RATE TEST**
DRAWDOWN VERSUS DISTANCE

PROJECT NO.	REV	FIGURE
21456909	A	D5



GOLDER

DATE	October 2021
DESIGN	VRP
REVIEW	GRP
APPROVED	GRP

PROJECT **WATER SUPPLY INVESTIGATION**
FERGUS GOLF CLUB

TITLE **CONSTANT RATE TEST**
DRAWDOWN VERSUS T/R²

PROJECT NO.	REV	FIGURE
21456909	A	D6

APPENDIX E

Water Quality Summary

Water Quality Results

		Ontario Drinking Water Standards, Objectives and Guidelines	PW21-1 at 1 hour pumping	PW21-1 at 24 hours pumping	PW21-1 at 72 hours pumping
			2021-08-31 11:00	2021-09-01 10:00	2021-09-03 10:15
Inorganics					
Total Ammonia-N	mg/L		0.18	0.19	0.21
Conductivity	umho/cm		720	770	790
Dissolved Organic Carbon	mg/L	5 (AO)	0.49	<0.40	0.49
Orthophosphate (P)	mg/L		<0.010	<0.010	<0.010
pH	pH units	6.5-8.5 (OG)	8.00	7.93	8.12
Dissolved Sulphate (SO_4)	mg/L	500 (AO)	190	220	250
Alkalinity (Total as $CaCO_3$)	mg/L	30-500 (OG)	180	180	180
Dissolved Chloride (Cl)	mg/L	250 (AO)	8.5	9.1	10
Nitrite (N)	mg/L	1 (STD)	<0.010	<0.010	<0.010
Nitrate (N)	mg/L	10 (STD)	<0.10	<0.10	<0.10
Metals					
Aluminum (Al)	ug/L	100 (OG)	350	77	<4.9
Antimony (Sb)	ug/L	6 (STD)	<0.50	<0.50	<0.50
Arsenic (As)	ug/L	10 (STD)	1.8	1.4	1.5
Barium (Ba)	ug/L	1000 (STD)	24	21	21
Beryllium (Be)	ug/L		<0.40	<0.40	<0.40
Boron (B)	ug/L	5000 (STD)	70	71	70
Cadmium (Cd)	ug/L	5 (STD)	<0.090	<0.090	<0.090
Calcium (Ca)	ug/L		89000	86000	96000
Chromium (Cr)	ug/L	50 (STD)	<5.0	<5.0	<5.0
Cobalt (Co)	ug/L		<0.50	<0.50	<0.50
Copper (Cu)	ug/L	1000 (AO)	6.0	0.92	<0.90
Iron (Fe)	ug/L	300 (AO)	610	240	120
Lead (Pb)	ug/L	10 (STD)	2.7	0.67	<0.50
Lithium (Li)	ug/L		5.8	5.8	5.6
Magnesium (Mg)	ug/L		33000	34000	34000
Manganese (Mn)	ug/L	50 (AO)	58	25	19
Molybdenum (Mo)	ug/L		2.7	3.1	3.2
Nickel (Ni)	ug/L		1.1	<1.0	<1.0
Phosphorus (P)	ug/L		<100	<100	<100
Potassium (K)	ug/L		1200	1100	1100
Selenium (Se)	ug/L	50 (STD)	<2.0	<2.0	<2.0
Silicon (Si)	ug/L		6400	5900	5800
Silver (Ag)	ug/L		<0.090	<0.090	<0.090
Sodium (Na)	ug/L	200000 (AO)	29000	28000	27000
Strontium (Sr)	ug/L		3500	3600	3800
Thallium (Tl)	ug/L		<0.050	<0.050	<0.050
Titanium (Ti)	ug/L		9.6	<5.0	<5.0
Uranium (U)	ug/L	20 (STD)	0.21	0.17	0.21
Vanadium (V)	ug/L		0.79	<0.50	<0.50
Zinc (Zn)	ug/L	5000 (AO)	8.0	<5.0	<5.0

Water Quality Results

		Ontario Drinking Water Standards, Objectives and Guidelines	PW21-1 at 1 hour pumping	PW21-1 at 24 hours pumping	PW21-1 at 72 hours pumping
			2021-08-31 11:00	2021-09-01 10:00	2021-09-03 10:15
Calculated Parameters	Units				
Anion Sum	me/L		7.86	8.58	9.13
Bicarb. Alkalinity (calc. as $CaCO_3$)	mg/L		180	180	180
Calculated TDS	mg/L	500 (AO)	480	510	540
Carb. Alkalinity (calc. as $CaCO_3$)	mg/L		1.7	1.4	2.2
Cation Sum	me/L		8.57	8.39	8.82
Hardness ($CaCO_3$)	mg/L	80-100 (OG)	360	360	380
Ion Balance (% Difference)	%		4.29	1.10	1.75
Langelier Index (@ 20C)	-		0.758	0.654	0.883
Langelier Index (@ 4C)	-		0.510	0.406	0.635
Saturation pH (@ 20C)	pH units		7.25	7.27	7.23
Saturation pH (@ 4C)	pH units		7.50	7.52	7.48
Microbiological					
Background	CFU/100 mL		0	0	0
Total Coliforms	CFU/100 mL	0 (STD)	0	0	0
Escherichia Coli	CFU/100 mL	0 (STD)	0	0	0

Notes

-	No units
ug/L	micrograms per litre
mg/L	milligrams per litre
me/L	milliequilvants per litre
umho/cm	micro mho per litre
NTU	Nephelometric turbidity units
STD	Chemical Standards
OG	Operational Guidelines
AO	Aesthetic Objectives
red highlight	Ontario Drinking Water Standard, Objective or Guideline Exceedance

Ontario Drinking Water Quality Standards Water Quality Results

	UNITS	Ontario Drinking Water Standard	Aesthetic Objective or Operational Guideline	PW21-1
				2021-09-03 10:00
Calculated Parameters				
Calculated TDS	mg/L	-	500	550
Hardness (CaCO3)	mg/L	-	80:100	380
Total Organic Nitrogen	mg/L	-	0.15	<0.10
Inorganics				
Total Ammonia-N	mg/L	-	-	0.21
Colour	TCU	-	5	<2
Fluoride (F-)	mg/L	**1.5**	-	0.62
Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.23
Microcystin	ug/L	-	-	<0.10
Dissolved Organic Carbon	mg/L	-	5	0.48
pH	pH	-	6.5:8.5	8.02
Dissolved Sulphate (SO4)	mg/L	-	500	270
Sulphide	mg/L	-	0.05	<0.020
Turbidity	NTU	-	5	0.7
WAD Cyanide (Free)	mg/L	**0.2**	-	<0.0010
Alkalinity (Total as CaCO3)	mg/L	-	30:500	180
Dissolved Chloride (Cl-)	mg/L	-	250	9.6
Nitrite (N)	mg/L	**1**	-	<0.010
Nitrate (N)	mg/L	**10**	-	<0.10
Nitrate + Nitrite (N)	mg/L	**10**	-	<0.10
Metals				
Mercury (Hg)	mg/L	**0.001**	-	<0.00010
Aluminum (Al)	ug/L	-	100	<4.9
Antimony (Sb)	ug/L	**6**	-	<0.50
Arsenic (As)	ug/L	**10**	-	1.5
Barium (Ba)	ug/L	**1000**	-	21
Boron (B)	ug/L	**5000**	-	74
Cadmium (Cd)	ug/L	**5**	-	<0.090
Calcium (Ca)	ug/L	-	-	93000
Chromium (Cr)	ug/L	**50**	-	<5.0
Copper (Cu)	ug/L	-	1000	<0.90
Iron (Fe)	ug/L	-	300	130
Lead (Pb)	ug/L	**10**	-	<0.50
Magnesium (Mg)	ug/L	-	-	36000
Manganese (Mn)	ug/L	-	50	20
Potassium (K)	ug/L	-	-	1100
Selenium (Se)	ug/L	**50**	-	<2.0
Sodium (Na)	ug/L	-	200000	28000
Uranium (U)	ug/L	**20**	-	0.16
Zinc (Zn)	ug/L	-	5000	<5.0

Ontario Drinking Water Quality Standards Water Quality Results

	UNITS	Ontario Drinking Water Standard	Aesthetic Objective or Operational Guideline	PW21-1
				2021-09-03 10:00
Fixed Gases				
Methane	L/m3		3	0.019
Miscellaneous Parameters				
NTA	mg/L	**0.4**	-	<0.050
Bromate	mg/L	**0.01**	-	<0.005
Semivolatile Organics				
2,3,4,6-Tetrachlorophenol	ug/L	**100**	1	<0.50
2,4,5-T	ug/L	**280**	-	<1.0
2,4,6-Trichlorophenol	ug/L	**5**	2	<0.50
2,4-D	ug/L	**100**	-	<1.0
2,4-Dichlorophenol	ug/L	**900**	0.3	<0.25
Alachlor	ug/L	**5**	-	<0.50
Aldicarb	ug/L	**-**	-	<5.0
Atrazine	ug/L	**-**	-	<0.50
Des-ethyl atrazine	ug/L	**-**	-	<0.50
Atrazine + Desethyl-atrazine	ug/L	**5**	-	<1.0
Bendiocarb	ug/L	**-**	-	<2.0
Bromoxynil	ug/L	**5**	-	<0.50
Carbaryl	ug/L	**90**	-	<5.0
Carbofuran	ug/L	**90**	-	<5.0
Chlorpyrifos (Dursban)	ug/L	**90**	-	<1.0
Cyanazine (Bladex)	ug/L	**-**	-	<1.0
Diazinon	ug/L	**20**	-	<1.0
Dicamba	ug/L	**120**	-	<1.0
Diclofop-methyl	ug/L	**9**	-	<0.90
Dimethoate	ug/L	**20**	-	<2.5
Dinoseb	ug/L	**10**	-	<1.0
Malathion	ug/L	**190**	-	<5.0
Metolachlor	ug/L	**50**	-	<0.50
Metribuzin (Sencor)	ug/L	**80**	-	<5.0
Ethyl Parathion	ug/L	**50**	-	<1.0
Pentachlorophenol	ug/L	**60**	30	<0.50
Phorate	ug/L	**2**	-	<0.50
Picloram	ug/L	**190**	-	<5.0
Prometryne	ug/L	**1**	-	<0.25
Simazine	ug/L	**10**	-	<1.0
Terbufos	ug/L	**1**	-	<0.50
Triallate	ug/L	**230**	-	<1.0
Trifluralin	ug/L	**45**	-	<1.0
Benzo(a)pyrene	ug/L	**0.01**	-	<0.0050
Methyl parathion	ug/L	**-**	-	<1.0
N-Nitrosodimethylamine	ug/L	**0.009**	-	<0.0009

Ontario Drinking Water Quality Standards Water Quality Results

	UNITS	Ontario Drinking Water Standard	Aesthetic Objective or Operational Guideline	PW21-1
				2021-09-03 10:00
Volatile Organics				
1,1-Dichloroethylene	ug/L	**14**	-	<0.10
1,2-Dichlorobenzene	ug/L	**200**	3	<0.20
1,2-Dichloroethane	ug/L	**5**	-	<0.20
1,4-Dichlorobenzene	ug/L	**5**	1	<0.20
Benzene	ug/L	**1**	-	<0.10
Bromodichloromethane	ug/L	**-**	-	<0.10
Bromoform	ug/L	**-**	-	<0.20
Carbon Tetrachloride	ug/L	**2**	-	<0.10
Chlorobenzene	ug/L	**80**	30	<0.10
Chloroform	ug/L	**-**	-	<0.10
Dibromochloromethane	ug/L	**-**	-	<0.20
Methylene Chloride(Dichloromethane)	ug/L	**50**	-	<0.50
Ethylbenzene	ug/L	**140**	1.6	<0.10
Tetrachloroethylene	ug/L	**10**	-	<0.10
Toluene	ug/L	**60**	24	<0.20
Trichloroethylene	ug/L	**5**	-	<0.10
Vinyl Chloride	ug/L	**1**	-	<0.20
o-Xylene	ug/L	**-**	-	<0.10
p+m-Xylene	ug/L	**-**	-	<0.10
Total Xylenes	ug/L	**90**	20	<0.10
Total Trihalomethanes	ug/L	**-**	-	<0.20
Pesticides & Herbicides				
Glyphosate	ug/L	**280**	-	<10
Diquat	ug/L	**70**	-	<7.0
Diuron	ug/L	**150**	-	<10
Guthion (Azinphos-methyl)	ug/L	**20**	-	<2.0
Paraquat	ug/L	**10**	-	<1.0
Temephos	ug/L	**-**	-	<10
Lindane	ug/L	**4**	-	<0.0060
Heptachlor	ug/L	**-**	-	<0.0060
Aldrin	ug/L	**-**	-	<0.0060
Heptachlor epoxide	ug/L	**-**	-	<0.0060
Oxychlordane	ug/L	**-**	-	<0.0060
g-Chlordane	ug/L	**-**	-	<0.0060
a-Chlordane	ug/L	**-**	-	<0.0060
Dieldrin	ug/L	**-**	-	<0.0060
o,p-DDE	ug/L	**-**	-	<0.0060
p,p-DDE	ug/L	**-**	-	<0.0060
o,p-DDD	ug/L	**-**	-	<0.0060
p,p-DDD	ug/L	**-**	-	<0.0060
o,p-DDT	ug/L	**-**	-	<0.0060

Ontario Drinking Water Quality Standards Water Quality Results

	UNITS	Ontario Drinking Water Standard	Aesthetic Objective or Operational Guideline	PW21-1
				2021-09-03 10:00
p,p-DDT	ug/L	-	-	<0.0060
Methoxychlor	ug/L	**900**	-	<0.024
Aroclor 1016	ug/L	-	-	<0.050
Aroclor 1221	ug/L	-	-	<0.050
Aroclor 1232	ug/L	-	-	<0.050
Aroclor 1242	ug/L	-	-	<0.050
Aroclor 1248	ug/L	-	-	<0.050
Aroclor 1254	ug/L	-	-	<0.050
Aroclor 1260	ug/L	-	-	<0.050
Pesticide Calculated Parameters				
Aldrin + Dieldrin	ug/L	**0.7**	-	<0.006
Chlordane (Total)	ug/L	**7**	-	<0.006
DDT+ Metabolites	ug/L	**30**	-	<0.006
Heptachlor + Heptachlor epoxide	ug/L	**3**	-	<0.006
Total PCB	ug/L	**3**	-	<0.05
Dioxin and Furan				
2,3,7,8-Tetra CDD *	pg/L	**15**		<0.973
1,2,3,7,8-Penta CDD *	pg/L	**15**		<0.830
1,2,3,4,7,8-Hexa CDD *	pg/L	**15**		<0.875
1,2,3,6,7,8-Hexa CDD *	pg/L	**15**		<0.778
1,2,3,7,8,9-Hexa CDD *	pg/L	**15**		<0.798
1,2,3,4,6,7,8-Hepta CDD *	pg/L	**15**		<0.760
Octa CDD *	pg/L	**15**		<0.666
Total Tetra CDD *	pg/L	**15**		<0.973
Total Penta CDD *	pg/L	**15**		<0.830
Total Hexa CDD *	pg/L	**15**		<0.814
Total Hepta CDD *	pg/L	**15**		<0.760
2,3,7,8-Tetra CDF **	pg/L	**15**		<0.671
1,2,3,7,8-Penta CDF **	pg/L	**15**		<0.843
2,3,4,7,8-Penta CDF **	pg/L	**15**		<0.715
1,2,3,4,7,8-Hexa CDF **	pg/L	**15**		<0.384
1,2,3,6,7,8-Hexa CDF **	pg/L	**15**		<0.332
2,3,4,6,7,8-Hexa CDF **	pg/L	**15**		<0.349
1,2,3,7,8,9-Hexa CDF **	pg/L	**15**		<0.371
1,2,3,4,6,7,8-Hepta CDF **	pg/L	**15**		<0.313
1,2,3,4,7,8,9-Hepta CDF **	pg/L	**15**		<0.349
Octa CDF **	pg/L	**15**		<0.982
Total Tetra CDF **	pg/L	**15**		<0.671
Total Penta CDF **	pg/L	**15**		<0.775
Total Hexa CDF **	pg/L	**15**		<0.358
Total Hepta CDF **	pg/L	**15**		<0.330

Ontario Drinking Water Quality Standards Water Quality Results

	UNITS	Ontario Drinking Water Standard	Aesthetic Objective or Operational Guideline	PW21-1
				2021-09-03 10:00
Microbiological				
Heterotrophic plate count	CFU/mL	-	-	0
Background	CFU/100mL	-	-	0
Total Coliforms	CFU/100mL	**0**	-	0
Escherichia coli	CFU/100mL	**0**	-	0

Notes

-	No units
pg/L	picograms per litre
ug/L	micrograms per litre
mg/L	milligrams per litre
me/L	milliequilvants per litre
umho/cm	micro mho per litre
NTU	Nephelometric turbidity units
red highlight	Ontario Drinking Water Standard, Objective or Guideline Exceedance

Hyperion Research Ltd.

1008 Allowance Ave. SE, Medicine Hat, AB T1A 3G8
Telephone (888) 529-0847 Fax (403) 5290852 hyperion@telusplanet.net
www.hyperionlab.ca

CALA Testing Accreditation No. A3538

To: **Paul Menkveld**
Golder Associates
210 Sheldon Drive
Cambridge ON
N1T 1A8
519 620-8182
Paul_Menkveld@golder.com

Sample Date:	02-Sep-21
Sample Type:	Raw
LIMS:	
Volume Filtered (L):	389
Rec'd within 96h?:	yes
Temp on arrival <20 °C?:	yes
Conductivity (uS/cm):	779

Project #:	CX21479897
Upload to DB?:	
Field pH:	7.58
Field Temp °C:	9.7
Field Turb (NTU)	
Location:	PW21-1

The methodology used to produce this report conforms to USEPA Method 1623 and/or the USEPA Consensus Method for the Microscopic Particulate Analysis. Based on the validation data, the method is fit for its intended use Hyperion Research Ltd. is accredited for this analysis by CALA under the ISO/IEC 17025 standard.

Raw Data

Primary Particulates	Total Count	#/380L (100 US gal)	Relative Risk Factor
Diatoms	0	0.0	0
Other Algae	0	0.0	0
Insect/larvae	0	0.0	0
Rotifers	0	0.0	0
Plant Debris	0	0.0	0
Giardia/Crypto	0	0.0	0

Sum of Relative Risk Factors = **0**

From the EPA Consensus Method:
Risk of Surface Water Contamination based on sum of Relative Risk Factors

0 to 9	Low Risk
10 to 19	Moderate Risk
20+	High Risk

Secondary Particulates	Total Count	#/380L (100 US gal)	
Nematodes	0	0.0	These particulates are sometimes found in groundwater and are not considered to add risk
Pollen	0	0.0	
Crustacea	0	0.0	
Unknown	0	0.0	

Minerals Observed: silica, clay, iron, other carbonate minerals

Processing Data

Date/Time Rec'd:	03-Sep-21 12:22:00 PM
Sample Temp:	14
Lab ID:	61550
Filter Type	Filta-Max
Date/Time Conc:	03-Sep-21 1:30:00 PM
Eluted By	CW
IMS System	Dynabeads
IMS Lot No:	01039465
Pellet Vol (mL):	0.2
Resusp Vol (uL):	100.0
MAb Conjugate:	EasyStainCY3
MAb Lot No:	C104G203
Control G:	4
Control C:	4
Date/Time Stained:	07-Sep-21 11:30:00 AM
Stained By:	CW
Read By:	PW
Vol Used (uL):	100.0
Sample Equivalent Vol (L)	389

Recovery efficiencies for particles are known to be low by the Consensus method. Minimum recovery was measured to be 6.5 +/-1.2% for Giardia cysts, 0.5 +/-0.2% for Cryptosporidium oocysts and 4.2+/2.3% for Euglena (algae). The average recovery using the MPA-1623 Method is 69.0+/-6.9 for Giardia, 62.7+/-2.9 for Cryptosporidium and 23.1+/-6.5% for Diatoms.

***Giardia cysts/100L* 0** ***Cryptosporidium oocysts/100L* 0**

Spore Count Surface Water CFU/L: 2700
Spore Count Well Water CFU/L: 0

Comments:
Surface water contained a variety of diatoms, blue green algae and other photosynthetic pigment bearing organisms. Rotifers also observed.

Analyst:

Peter M. Wallis, Ph.D.

Conclusion: Based on this sample, the risk of surface water contamination is judged to be: **Low**

Your Project #: 21456909
Your C.O.C. #: 842982-01-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/07
Report #: R6799650
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1O9389
Received: 2021/08/31, 15:39

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/09/02	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/09/03	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2021/09/01	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2021/09/02	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/09/02	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2021/09/03	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2021/09/02	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2021/09/03		
Anion and Cation Sum	1	N/A	2021/09/03		
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/08/31	CAM SOP-00551	MOE E3407
Total Ammonia-N	1	N/A	2021/09/03	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2021/09/04	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/09/01	2021/09/02	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2021/09/01	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/09/03		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/09/03		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2021/09/01	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/09/03		Auto Calc

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 21456909
Your C.O.C. #: 842982-01-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/07
Report #: R6799650
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1O9389
Received: 2021/08/31, 15:39

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1O9389
Report Date: 2021/09/07

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QNK225		
Sampling Date		2021/08/31 11:00		
COC Number		842982-01-01		
	UNITS	PW21-1-1H	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	7.86	N/A	7551574
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	180	1.0	7551572
Calculated TDS	mg/L	480	1.0	7551581
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.7	1.0	7551572
Cation Sum	me/L	8.57	N/A	7551574
Hardness (CaCO3)	mg/L	360	1.0	7551575
Ion Balance (% Difference)	%	4.29	N/A	7551573
Langelier Index (@ 20C)	N/A	0.758		7551576
Langelier Index (@ 4C)	N/A	0.510		7551577
Saturation pH (@ 20C)	N/A	7.25		7551576
Saturation pH (@ 4C)	N/A	7.50		7551577
Inorganics				
Total Ammonia-N	mg/L	0.18	0.050	7556775
Conductivity	umho/cm	720	1.0	7554995
Dissolved Organic Carbon	mg/L	0.49	0.40	7554317
Orthophosphate (P)	mg/L	<0.010	0.010	7553950
pH	pH	8.00		7554984
Dissolved Sulphate (SO4)	mg/L	190	1.0	7553936
Alkalinity (Total as CaCO3)	mg/L	180	1.0	7554993
Dissolved Chloride (Cl-)	mg/L	8.5	1.0	7553932
Nitrite (N)	mg/L	<0.010	0.010	7554359
Nitrate (N)	mg/L	<0.10	0.10	7554359
Metals				
Aluminum (Al)	ug/L	350	4.9	7554226
Antimony (Sb)	ug/L	<0.50	0.50	7554226
Arsenic (As)	ug/L	1.8	1.0	7554226
Barium (Ba)	ug/L	24	2.0	7554226
Beryllium (Be)	ug/L	<0.40	0.40	7554226
Boron (B)	ug/L	70	10	7554226
Cadmium (Cd)	ug/L	<0.090	0.090	7554226
Calcium (Ca)	ug/L	89000	200	7554226

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QNK225		
Sampling Date		2021/08/31 11:00		
COC Number		842982-01-01		
	UNITS	PW21-1-1H	RDL	QC Batch
Chromium (Cr)	ug/L	<5.0	5.0	7554226
Cobalt (Co)	ug/L	<0.50	0.50	7554226
Copper (Cu)	ug/L	6.0	0.90	7554226
Iron (Fe)	ug/L	610	100	7554226
Lead (Pb)	ug/L	2.7	0.50	7554226
Lithium (Li)	ug/L	5.8	5.0	7554226
Magnesium (Mg)	ug/L	33000	50	7554226
Manganese (Mn)	ug/L	58	2.0	7554226
Molybdenum (Mo)	ug/L	2.7	0.50	7554226
Nickel (Ni)	ug/L	1.1	1.0	7554226
Phosphorus (P)	ug/L	<100	100	7554226
Potassium (K)	ug/L	1200	200	7554226
Selenium (Se)	ug/L	<2.0	2.0	7554226
Silicon (Si)	ug/L	6400	50	7554226
Silver (Ag)	ug/L	<0.090	0.090	7554226
Sodium (Na)	ug/L	29000	100	7554226
Strontium (Sr)	ug/L	3500	1.0	7554226
Thallium (Tl)	ug/L	<0.050	0.050	7554226
Titanium (Ti)	ug/L	9.6	5.0	7554226
Uranium (U)	ug/L	0.21	0.10	7554226
Vanadium (V)	ug/L	0.79	0.50	7554226
Zinc (Zn)	ug/L	8.0	5.0	7554226

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

MICROBIOLOGY (WATER)

BV Labs ID		QNK225	
Sampling Date		2021/08/31 11:00	
COC Number		842982-01-01	
	UNITS	PW21-1-1H	QC Batch
Microbiological			
Background	CFU/100mL	0	7552730
Total Coliforms	CFU/100mL	0	7552730
Escherichia coli	CFU/100mL	0	7552730
QC Batch = Quality Control Batch			

BV Labs Job #: C1O9389
Report Date: 2021/09/07

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

TEST SUMMARY

BV Labs ID: QNK225
Sample ID: PW21-1-1H
Matrix: Water

Collected: 2021/08/31
Shipped:
Received: 2021/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7554993	N/A	2021/09/02	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7551572	N/A	2021/09/03	Automated Statchk
Chloride by Automated Colourimetry	KONE	7553932	N/A	2021/09/01	Alina Dobreanu
Conductivity	AT	7554995	N/A	2021/09/02	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7554317	N/A	2021/09/02	Julianna Castiglione
Hardness (calculated as CaCO3)		7551575	N/A	2021/09/03	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7554226	N/A	2021/09/02	Arefa Dabhad
Ion Balance (% Difference)	CALC	7551573	N/A	2021/09/03	Automated Statchk
Anion and Cation Sum	CALC	7551574	N/A	2021/09/03	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7552730	N/A	2021/08/31	Soham Patel
Total Ammonia-N	LACH/NH4	7556775	N/A	2021/09/03	Amanpreet Sappal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7554359	N/A	2021/09/04	Nimarta Singh
pH	AT	7554984	2021/09/01	2021/09/02	Surinder Rai
Orthophosphate	KONE	7553950	N/A	2021/09/01	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7551576	N/A	2021/09/03	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7551577	N/A	2021/09/03	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7553936	N/A	2021/09/01	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	7551581	N/A	2021/09/03	Automated Statchk

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

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

Package 1	8.3°C

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1O9389
Report Date: 2021/09/07

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7553932	Dissolved Chloride (Cl-)	2021/09/01	125 (1)	80 - 120	106	80 - 120	<1.0	mg/L	17	20
7553936	Dissolved Sulphate (SO4)	2021/09/01	103	75 - 125	107	80 - 120	<1.0	mg/L	NC	20
7553950	Orthophosphate (P)	2021/09/01	116	75 - 125	98	80 - 120	<0.010	mg/L	NC	25
7554226	Aluminum (Al)	2021/09/02	99	80 - 120	105	80 - 120	<4.9	ug/L	0.91	20
7554226	Antimony (Sb)	2021/09/02	100	80 - 120	101	80 - 120	<0.50	ug/L	NC	20
7554226	Arsenic (As)	2021/09/02	95	80 - 120	98	80 - 120	<1.0	ug/L	NC	20
7554226	Barium (Ba)	2021/09/02	98	80 - 120	98	80 - 120	<2.0	ug/L	0.63	20
7554226	Beryllium (Be)	2021/09/02	92	80 - 120	98	80 - 120	<0.40	ug/L	NC	20
7554226	Boron (B)	2021/09/02	92	80 - 120	93	80 - 120	<10	ug/L	1.4	20
7554226	Cadmium (Cd)	2021/09/02	100	80 - 120	101	80 - 120	<0.090	ug/L	NC	20
7554226	Calcium (Ca)	2021/09/02	NC	80 - 120	101	80 - 120	<200	ug/L	1.6	20
7554226	Chromium (Cr)	2021/09/02	91	80 - 120	96	80 - 120	<5.0	ug/L	NC	20
7554226	Cobalt (Co)	2021/09/02	96	80 - 120	96	80 - 120	<0.50	ug/L	NC	20
7554226	Copper (Cu)	2021/09/02	95	80 - 120	100	80 - 120	<0.90	ug/L	1.1	20
7554226	Iron (Fe)	2021/09/02	98	80 - 120	100	80 - 120	<100	ug/L	NC	20
7554226	Lead (Pb)	2021/09/02	93	80 - 120	99	80 - 120	<0.50	ug/L	NC	20
7554226	Lithium (Li)	2021/09/02	101	80 - 120	105	80 - 120	<5.0	ug/L	NC	20
7554226	Magnesium (Mg)	2021/09/02	93	80 - 120	101	80 - 120	<50	ug/L	1.3	20
7554226	Manganese (Mn)	2021/09/02	95	80 - 120	98	80 - 120	<2.0	ug/L	NC	20
7554226	Molybdenum (Mo)	2021/09/02	96	80 - 120	96	80 - 120	<0.50	ug/L	4.2	20
7554226	Nickel (Ni)	2021/09/02	91	80 - 120	96	80 - 120	<1.0	ug/L	NC	20
7554226	Phosphorus (P)	2021/09/02	NC	80 - 120	105	80 - 120	<100	ug/L	0.12	20
7554226	Potassium (K)	2021/09/02	98	80 - 120	102	80 - 120	<200	ug/L	0.59	20
7554226	Selenium (Se)	2021/09/02	99	80 - 120	101	80 - 120	<2.0	ug/L	NC	20
7554226	Silicon (Si)	2021/09/02	100	80 - 120	104	80 - 120	<50	ug/L	0.68	20
7554226	Silver (Ag)	2021/09/02	97	80 - 120	97	80 - 120	<0.090	ug/L	NC	20
7554226	Sodium (Na)	2021/09/02	96	80 - 120	104	80 - 120	<100	ug/L	2.5	20
7554226	Strontium (Sr)	2021/09/02	92	80 - 120	98	80 - 120	<1.0	ug/L	0.56	20
7554226	Thallium (Tl)	2021/09/02	97	80 - 120	99	80 - 120	<0.050	ug/L	NC	20
7554226	Titanium (Ti)	2021/09/02	96	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
7554226	Uranium (U)	2021/09/02	99	80 - 120	101	80 - 120	<0.10	ug/L	8.9	20

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7554226	Vanadium (V)	2021/09/02	91	80 - 120	93	80 - 120	<0.50	ug/L	NC	20
7554226	Zinc (Zn)	2021/09/02	93	80 - 120	98	80 - 120	<5.0	ug/L	0.33	20
7554317	Dissolved Organic Carbon	2021/09/01	96	80 - 120	97	80 - 120	<0.40	mg/L	3.2	20
7554359	Nitrate (N)	2021/09/04	103	80 - 120	99	80 - 120	<0.10	mg/L	NC	20
7554359	Nitrite (N)	2021/09/04	108	80 - 120	101	80 - 120	<0.010	mg/L	0	20
7554984	pH	2021/09/02			102	98 - 103			0.71	N/A
7554993	Alkalinity (Total as CaCO3)	2021/09/02			95	85 - 115	<1.0	mg/L	2.2	20
7554995	Conductivity	2021/09/02			99	85 - 115	<1.0	umho/cm	0.99	25
7556775	Total Ammonia-N	2021/09/03	98	75 - 125	100	80 - 120	<0.050	mg/L	NC	20

N/A = Not Applicable

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

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

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

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

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

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

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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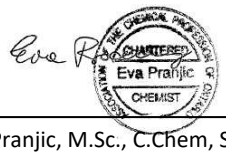
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1O9389
Report Date: 2021/09/07

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Soham N Patel

Soham Patel, Analyst 2

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

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CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#21375 Golder Associates Ltd	Company Name:		Quotation #:	B80683	BV Labs Job #:	Bottle Order #: 842982
Attention:	Accounts Payable	Attention:	Gregory Padusenko	P.O. #:			
Address:	210 Sheldon Drive Cambridge ON N1T 1A8	Address:		Project:	21456909	COC #: C#842982-01-01	Project Manager: Ema Gitej
Tel:	(519) 620-8182 Fax:	Tel:	(519) 620-8182 Ext: 6509 Fax: (519) 620-9878	Project Name:			
Email:	CanadaAccountsPayableInvoices@golder.com	Email:	Gregory_Padusenko@golder.com	Site #:			
				Sampled By:	PGM		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☐ Table 3 ☐ Agri/Other ☐ For RSC; ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw; ☐ Reg 558 ☐ Storm Sewer Bylaw; ☐ MISA Municipality ___; ☐ PWQO ☐ Reg 406 Table ___; ☐ Other ___

Special instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	RCAp - Comprehensive	Total Coliforms/ E. coli, CFU/100mL	# of Bottles	Comments
1		PW21-1-1h	21/08/31	11:00	GW		X	X	5	metals "as received"
2										
3										
4										
5										
6										
7										
8										
9										
10										

31-Aug-21 15:39
Ema Gitej
C109389
DSG ENV 028

MICRO

REC'D IN WATERLOO

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Paul McKerrell / Paul McKerrell	21/08/31	15:38	Jasprit Kaur / Jasprit Kaur	2021/08/31	15:39	
			Jasprit Kaur / Jasprit Kaur	2021/08/31	17:32	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes	No
	12 | 8 | 5	Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

5 5 5

Bureau Veritas Canada (2019) Inc.

BV# 421153

Your Project #: 21456909
Your C.O.C. #: 842982-02-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/08
Report #: R6801679
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P0721
Received: 2021/09/01, 12:47

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/09/02	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/09/03	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2021/09/03	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2021/09/02	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/09/04	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2021/09/08	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2021/09/07	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2021/09/08		
Anion and Cation Sum	1	N/A	2021/09/08		
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/09/01	CAM SOP-00551	MOE E3407
Total Ammonia-N	1	N/A	2021/09/07	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2021/09/07	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/09/02	2021/09/02	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2021/09/07	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/09/08		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/09/08		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2021/09/03	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/09/08		Auto Calc

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 21456909
Your C.O.C. #: 842982-02-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/08
Report #: R6801679
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P0721
Received: 2021/09/01, 12:47

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QNR201		
Sampling Date		2021/09/01 10:00		
COC Number		842982-02-01		
	UNITS	PW21-1-24H	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	8.58	N/A	7554531
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	180	1.0	7554527
Calculated TDS	mg/L	510	1.0	7554151
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.4	1.0	7554527
Cation Sum	me/L	8.39	N/A	7554531
Hardness (CaCO3)	mg/L	360	1.0	7553628
Ion Balance (% Difference)	%	1.10	N/A	7554530
Langelier Index (@ 20C)	N/A	0.654		7554532
Langelier Index (@ 4C)	N/A	0.406		7554533
Saturation pH (@ 20C)	N/A	7.27		7554532
Saturation pH (@ 4C)	N/A	7.52		7554533
Inorganics				
Total Ammonia-N	mg/L	0.19	0.050	7559941
Conductivity	umho/cm	770	1.0	7556506
Dissolved Organic Carbon	mg/L	<0.40	0.40	7557669
Orthophosphate (P)	mg/L	<0.010	0.010	7557512
pH	pH	7.93		7556498
Dissolved Sulphate (SO4)	mg/L	220	1.0	7557509
Alkalinity (Total as CaCO3)	mg/L	180	1.0	7556503
Dissolved Chloride (Cl-)	mg/L	9.1	1.0	7557483
Nitrite (N)	mg/L	<0.010	0.010	7556524
Nitrate (N)	mg/L	<0.10	0.10	7556524
Metals				
Aluminum (Al)	ug/L	77	4.9	7556622
Antimony (Sb)	ug/L	<0.50	0.50	7556622
Arsenic (As)	ug/L	1.4	1.0	7556622
Barium (Ba)	ug/L	21	2.0	7556622
Beryllium (Be)	ug/L	<0.40	0.40	7556622
Boron (B)	ug/L	71	10	7556622
Cadmium (Cd)	ug/L	<0.090	0.090	7556622
Calcium (Ca)	ug/L	86000	200	7556622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QNR201		
Sampling Date		2021/09/01 10:00		
COC Number		842982-02-01		
	UNITS	PW21-1-24H	RDL	QC Batch
Chromium (Cr)	ug/L	<5.0	5.0	7556622
Cobalt (Co)	ug/L	<0.50	0.50	7556622
Copper (Cu)	ug/L	0.92	0.90	7556622
Iron (Fe)	ug/L	240	100	7556622
Lead (Pb)	ug/L	0.67	0.50	7556622
Lithium (Li)	ug/L	5.8	5.0	7556622
Magnesium (Mg)	ug/L	34000	50	7556622
Manganese (Mn)	ug/L	25	2.0	7556622
Molybdenum (Mo)	ug/L	3.1	0.50	7556622
Nickel (Ni)	ug/L	<1.0	1.0	7556622
Phosphorus (P)	ug/L	<100	100	7556622
Potassium (K)	ug/L	1100	200	7556622
Selenium (Se)	ug/L	<2.0	2.0	7556622
Silicon (Si)	ug/L	5900	50	7556622
Silver (Ag)	ug/L	<0.090	0.090	7556622
Sodium (Na)	ug/L	28000	100	7556622
Strontium (Sr)	ug/L	3600	1.0	7556622
Thallium (Tl)	ug/L	<0.050	0.050	7556622
Titanium (Ti)	ug/L	<5.0	5.0	7556622
Uranium (U)	ug/L	0.17	0.10	7556622
Vanadium (V)	ug/L	<0.50	0.50	7556622
Zinc (Zn)	ug/L	<5.0	5.0	7556622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1P0721
Report Date: 2021/09/08

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

MICROBIOLOGY (WATER)

BV Labs ID		QNR201	
Sampling Date		2021/09/01 10:00	
COC Number		842982-02-01	
	UNITS	PW21-1-24H	QC Batch
Microbiological			
Background	CFU/100mL	0	7555081
Total Coliforms	CFU/100mL	0	7555081
Escherichia coli	CFU/100mL	0	7555081
QC Batch = Quality Control Batch			

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BV Labs Job #: C1P0721
Report Date: 2021/09/08

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

TEST SUMMARY

BV Labs ID: QNR201
Sample ID: PW21-1-24H
Matrix: Water

Collected: 2021/09/01
Shipped:
Received: 2021/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7556503	N/A	2021/09/02	Surinder Rai
Carbonate, Bicarbonate and Hydroxide	CALC	7554527	N/A	2021/09/03	Automated Statchk
Chloride by Automated Colourimetry	KONE	7557483	N/A	2021/09/03	Alina Dobreanu
Conductivity	AT	7556506	N/A	2021/09/02	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7557669	N/A	2021/09/04	Nimarta Singh
Hardness (calculated as CaCO3)		7553628	N/A	2021/09/08	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7556622	N/A	2021/09/07	Nan Raykha
Ion Balance (% Difference)	CALC	7554530	N/A	2021/09/08	Automated Statchk
Anion and Cation Sum	CALC	7554531	N/A	2021/09/08	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7555081	N/A	2021/09/01	Soham Patel
Total Ammonia-N	LACH/NH4	7559941	N/A	2021/09/07	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7556524	N/A	2021/09/07	Chandra Nandlal
pH	AT	7556498	2021/09/02	2021/09/02	Surinder Rai
Orthophosphate	KONE	7557512	N/A	2021/09/07	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7554532	N/A	2021/09/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7554533	N/A	2021/09/08	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7557509	N/A	2021/09/03	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	7554151	N/A	2021/09/08	Automated Statchk

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

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

Package 1	15.0°C

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1P0721
Report Date: 2021/09/08

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7556498	pH	2021/09/02			102	98 - 103			0.16	N/A
7556503	Alkalinity (Total as CaCO3)	2021/09/02			97	85 - 115	<1.0	mg/L	1.3	20
7556506	Conductivity	2021/09/02			99	85 - 115	<1.0	umho/cm	0.27	25
7556524	Nitrate (N)	2021/09/07	97	80 - 120	100	80 - 120	<0.10	mg/L	NC	20
7556524	Nitrite (N)	2021/09/07	102	80 - 120	102	80 - 120	<0.010	mg/L	NC	20
7556622	Aluminum (Al)	2021/09/07	105	80 - 120	104	80 - 120	<4.9	ug/L	1.9	20
7556622	Antimony (Sb)	2021/09/07	103	80 - 120	103	80 - 120	<0.50	ug/L	NC	20
7556622	Arsenic (As)	2021/09/07	100	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
7556622	Barium (Ba)	2021/09/07	102	80 - 120	100	80 - 120	<2.0	ug/L	1.7	20
7556622	Beryllium (Be)	2021/09/07	101	80 - 120	99	80 - 120	<0.40	ug/L	NC	20
7556622	Boron (B)	2021/09/07	NC	80 - 120	99	80 - 120	<10	ug/L	5.5	20
7556622	Cadmium (Cd)	2021/09/07	99	80 - 120	99	80 - 120	<0.090	ug/L	NC	20
7556622	Calcium (Ca)	2021/09/07	100	80 - 120	98	80 - 120	<200	ug/L	0.79	20
7556622	Chromium (Cr)	2021/09/07	99	80 - 120	101	80 - 120	<5.0	ug/L	NC	20
7556622	Cobalt (Co)	2021/09/07	99	80 - 120	99	80 - 120	<0.50	ug/L	NC	20
7556622	Copper (Cu)	2021/09/07	100	80 - 120	100	80 - 120	<0.90	ug/L	1.4	20
7556622	Iron (Fe)	2021/09/07	99	80 - 120	100	80 - 120	<100	ug/L	NC	20
7556622	Lead (Pb)	2021/09/07	99	80 - 120	98	80 - 120	<0.50	ug/L	1.6	20
7556622	Lithium (Li)	2021/09/07	102	80 - 120	102	80 - 120	<5.0	ug/L	1.2	20
7556622	Magnesium (Mg)	2021/09/07	96	80 - 120	102	80 - 120	<50	ug/L	0.17	20
7556622	Manganese (Mn)	2021/09/07	97	80 - 120	98	80 - 120	<2.0	ug/L	NC	20
7556622	Molybdenum (Mo)	2021/09/07	101	80 - 120	102	80 - 120	<0.50	ug/L	5.2	20
7556622	Nickel (Ni)	2021/09/07	97	80 - 120	97	80 - 120	<1.0	ug/L	2.3	20
7556622	Phosphorus (P)	2021/09/07	110	80 - 120	113	80 - 120	<100	ug/L	1.3	20
7556622	Potassium (K)	2021/09/07	100	80 - 120	101	80 - 120	<200	ug/L	0.42	20
7556622	Selenium (Se)	2021/09/07	99	80 - 120	99	80 - 120	<2.0	ug/L	NC	20
7556622	Silicon (Si)	2021/09/07	107	80 - 120	104	80 - 120	<50	ug/L	1.7	20
7556622	Silver (Ag)	2021/09/07	97	80 - 120	98	80 - 120	<0.090	ug/L	NC	20
7556622	Sodium (Na)	2021/09/07	98	80 - 120	100	80 - 120	<100	ug/L	0.71	20
7556622	Strontium (Sr)	2021/09/07	100	80 - 120	99	80 - 120	<1.0	ug/L	0.80	20
7556622	Thallium (Tl)	2021/09/07	98	80 - 120	97	80 - 120	<0.050	ug/L	NC	20

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7556622	Titanium (Ti)	2021/09/07	103	80 - 120	100	80 - 120	<5.0	ug/L	NC	20
7556622	Uranium (U)	2021/09/07	100	80 - 120	100	80 - 120	<0.10	ug/L	5.8	20
7556622	Vanadium (V)	2021/09/07	97	80 - 120	97	80 - 120	<0.50	ug/L	NC	20
7556622	Zinc (Zn)	2021/09/07	98	80 - 120	97	80 - 120	<5.0	ug/L	4.6	20
7557483	Dissolved Chloride (Cl-)	2021/09/03	123 (1)	80 - 120	107	80 - 120	<1.0	mg/L	9.2	20
7557509	Dissolved Sulphate (SO4)	2021/09/03	128 (1)	75 - 125	99	80 - 120	<1.0	mg/L	NC	20
7557512	Orthophosphate (P)	2021/09/07	126 (1)	75 - 125	100	80 - 120	<0.010	mg/L	NC	25
7557669	Dissolved Organic Carbon	2021/09/04	92	80 - 120	96	80 - 120	<0.40	mg/L	0.35	20
7559941	Total Ammonia-N	2021/09/07	99	75 - 125	100	80 - 120	<0.050	mg/L	NC	20

N/A = Not Applicable

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

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

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

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

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

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

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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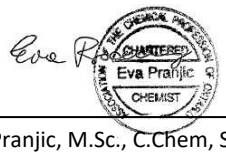
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1P0721
Report Date: 2021/09/08

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Soham N Patel

Soham Patel, Analyst 2

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

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

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CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#21375 Golder Associates Ltd	Company Name:		Quotation #:	B80683	BV Labs Job #:	Bottle Order #: 842982
Attention:	Accounts Payable	Attention:	Gregory Padusenko	P.O. #:			
Address:	210 Sheldon Drive Cambridge ON N1T 1A8	Address:		Project:	21456909	COC #: C#842982-02-01	Project Manager: Ema Gitej
Tel:	(519) 620-8182 Fax:	Tel:	(519) 620-8182 Ext: 6509 Fax: (519) 620-9878	Project Name:			
Email:	CanadaAccountsPayableInvoices@golder.com	Email:	Gregory_Padusenko@golder.com	Site #:			
				Sampled By:	PGM		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___	☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ___ ☐ PWQO ☐ Reg 406 Table ___ ☐ Other ___	

Include Criteria on Certificate of Analysis (Y/N)? ___

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle) Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): RCAp - Comprehensive	Total Coliforms/ E. coli, CFU/100mL	# of Bottles	Comments
1		PW21-1-24h	21/09/01	10:00	GW		X	X	5	metals as received
2										
3										
4										
5										
6										
7										
8										
9										
10										

REC'D IN WATERLOO

01-Sep-21 12:47
Ema Gitej
C1P0721

on Ice packs

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Paul Mackenzie	21/09/01	12:45	Jaspreet Saini / DIPIKA SINGH	21/09/01 21/09/01	12:47 15:58	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes	No
	4 | 5 | 6	Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

LR# 420404 1/1 2

Your Project #: 21456909
Your C.O.C. #: 842982-03-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/09
Report #: R6803629
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P4142
Received: 2021/09/03, 13:54

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/09/07	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/09/08	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2021/09/07	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2021/09/07	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2021/09/08	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2021/09/08	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2021/09/08	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2021/09/08		
Anion and Cation Sum	1	N/A	2021/09/08		
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/09/03	CAM SOP-00551	MOE E3407
Total Ammonia-N	1	N/A	2021/09/09	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (3)	1	N/A	2021/09/07	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2021/09/04	2021/09/07	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2021/09/07	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/09/08		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/09/08		Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2021/09/07	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/09/08		Auto Calc

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report.

Your Project #: 21456909
Your C.O.C. #: 842982-03-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/09/09
Report #: R6803629
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P4142
Received: 2021/09/03, 13:54

Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QOI301		
Sampling Date		2021/09/03 10:15		
COC Number		842982-03-01		
	UNITS	PW21-1-72H	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	9.13	N/A	7559095
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	180	1.0	7559092
Calculated TDS	mg/L	540	1.0	7559099
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.2	1.0	7559092
Cation Sum	me/L	8.82	N/A	7559095
Hardness (CaCO3)	mg/L	380	1.0	7558603
Ion Balance (% Difference)	%	1.75	N/A	7559094
Langelier Index (@ 20C)	N/A	0.883		7559096
Langelier Index (@ 4C)	N/A	0.635		7559098
Saturation pH (@ 20C)	N/A	7.23		7559096
Saturation pH (@ 4C)	N/A	7.48		7559098
Inorganics				
Total Ammonia-N	mg/L	0.21	0.050	7564734
Conductivity	umho/cm	790	1.0	7560958
Dissolved Organic Carbon	mg/L	0.49	0.40	7562606
Orthophosphate (P)	mg/L	<0.010	0.010	7561002
pH	pH	8.12		7560957
Dissolved Sulphate (SO4)	mg/L	250	1.0	7561000
Alkalinity (Total as CaCO3)	mg/L	180	1.0	7560955
Dissolved Chloride (Cl-)	mg/L	10	1.0	7560992
Nitrite (N)	mg/L	<0.010	0.010	7560968
Nitrate (N)	mg/L	<0.10	0.10	7560968
Metals				
Aluminum (Al)	ug/L	<4.9	4.9	7563979
Antimony (Sb)	ug/L	<0.50	0.50	7563979
Arsenic (As)	ug/L	1.5	1.0	7563979
Barium (Ba)	ug/L	21	2.0	7563979
Beryllium (Be)	ug/L	<0.40	0.40	7563979
Boron (B)	ug/L	70	10	7563979
Cadmium (Cd)	ug/L	<0.090	0.090	7563979
Calcium (Ca)	ug/L	96000	200	7563979

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RCAP - COMPREHENSIVE (DRINKING WATER)

BV Labs ID		QOI301		
Sampling Date		2021/09/03 10:15		
COC Number		842982-03-01		
	UNITS	PW21-1-72H	RDL	QC Batch
Chromium (Cr)	ug/L	<5.0	5.0	7563979
Cobalt (Co)	ug/L	<0.50	0.50	7563979
Copper (Cu)	ug/L	<0.90	0.90	7563979
Iron (Fe)	ug/L	120	100	7563979
Lead (Pb)	ug/L	<0.50	0.50	7563979
Lithium (Li)	ug/L	5.6	5.0	7563979
Magnesium (Mg)	ug/L	34000	50	7563979
Manganese (Mn)	ug/L	19	2.0	7563979
Molybdenum (Mo)	ug/L	3.2	0.50	7563979
Nickel (Ni)	ug/L	<1.0	1.0	7563979
Phosphorus (P)	ug/L	<100	100	7563979
Potassium (K)	ug/L	1100	200	7563979
Selenium (Se)	ug/L	<2.0	2.0	7563979
Silicon (Si)	ug/L	5800	50	7563979
Silver (Ag)	ug/L	<0.090	0.090	7563979
Sodium (Na)	ug/L	27000	100	7563979
Strontium (Sr)	ug/L	3800	1.0	7563979
Thallium (Tl)	ug/L	<0.050	0.050	7563979
Titanium (Ti)	ug/L	<5.0	5.0	7563979
Uranium (U)	ug/L	0.21	0.10	7563979
Vanadium (V)	ug/L	<0.50	0.50	7563979
Zinc (Zn)	ug/L	<5.0	5.0	7563979

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1P4142
Report Date: 2021/09/09

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

MICROBIOLOGY (WATER)

BV Labs ID		QOI301	
Sampling Date		2021/09/03 10:15	
COC Number		842982-03-01	
	UNITS	PW21-1-72H	QC Batch
Microbiological			
Background	CFU/100mL	0	7560239
Total Coliforms	CFU/100mL	0	7560239
Escherichia coli	CFU/100mL	0	7560239
QC Batch = Quality Control Batch			

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BV Labs Job #: C1P4142
Report Date: 2021/09/09

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

TEST SUMMARY

BV Labs ID: QOI301
Sample ID: PW21-1-72H
Matrix: Water

Collected: 2021/09/03
Shipped:
Received: 2021/09/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7560955	N/A	2021/09/07	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	7559092	N/A	2021/09/08	Automated Statchk
Chloride by Automated Colourimetry	KONE	7560992	N/A	2021/09/07	Alina Dobreanu
Conductivity	AT	7560958	N/A	2021/09/07	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7562606	N/A	2021/09/08	Julianna Castiglione
Hardness (calculated as CaCO3)		7558603	N/A	2021/09/08	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	7563979	N/A	2021/09/08	Arefa Dabhad
Ion Balance (% Difference)	CALC	7559094	N/A	2021/09/08	Automated Statchk
Anion and Cation Sum	CALC	7559095	N/A	2021/09/08	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	7560239	N/A	2021/09/03	Soham Patel
Total Ammonia-N	LACH/NH4	7564734	N/A	2021/09/09	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7560968	N/A	2021/09/07	Chandra Nandlal
pH	AT	7560957	2021/09/04	2021/09/07	Yogesh Patel
Orthophosphate	KONE	7561002	N/A	2021/09/07	Avneet Kour Sudan
Sat. pH and Langelier Index (@ 20C)	CALC	7559096	N/A	2021/09/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	7559098	N/A	2021/09/08	Automated Statchk
Sulphate by Automated Colourimetry	KONE	7561000	N/A	2021/09/07	Avneet Kour Sudan
Total Dissolved Solids (TDS calc)	CALC	7559099	N/A	2021/09/08	Automated Statchk

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

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

Package 1	10.7°C
Package 2	15.0°C

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1P4142
Report Date: 2021/09/09

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PGM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7560955	Alkalinity (Total as CaCO3)	2021/09/07			95	85 - 115	<1.0	mg/L	0.40	20
7560957	pH	2021/09/07			101	98 - 103			2.0	N/A
7560958	Conductivity	2021/09/07			100	85 - 115	<1.0	umho/cm	0.35	25
7560968	Nitrate (N)	2021/09/07	99	80 - 120	101	80 - 120	<0.10	mg/L	NC	20
7560968	Nitrite (N)	2021/09/07	104	80 - 120	103	80 - 120	<0.010	mg/L	NC	20
7560992	Dissolved Chloride (Cl-)	2021/09/07	104	80 - 120	103	80 - 120	<1.0	mg/L	4.7	20
7561000	Dissolved Sulphate (SO4)	2021/09/07	115	75 - 125	100	80 - 120	<1.0	mg/L	0.31	20
7561002	Orthophosphate (P)	2021/09/07	NC	75 - 125	100	80 - 120	<0.010	mg/L	13	25
7562606	Dissolved Organic Carbon	2021/09/08	80	80 - 120	96	80 - 120	<0.40	mg/L	0.84	20
7563979	Aluminum (Al)	2021/09/08	101	80 - 120	102	80 - 120	<4.9	ug/L		
7563979	Antimony (Sb)	2021/09/08	112	80 - 120	104	80 - 120	<0.50	ug/L		
7563979	Arsenic (As)	2021/09/08	98	80 - 120	101	80 - 120	<1.0	ug/L		
7563979	Barium (Ba)	2021/09/08	99	80 - 120	101	80 - 120	<2.0	ug/L		
7563979	Beryllium (Be)	2021/09/08	97	80 - 120	100	80 - 120	<0.40	ug/L		
7563979	Boron (B)	2021/09/08	88	80 - 120	94	80 - 120	<10	ug/L		
7563979	Cadmium (Cd)	2021/09/08	101	80 - 120	100	80 - 120	<0.090	ug/L		
7563979	Calcium (Ca)	2021/09/08	NC	80 - 120	103	80 - 120	<200	ug/L		
7563979	Chromium (Cr)	2021/09/08	93	80 - 120	97	80 - 120	<5.0	ug/L		
7563979	Cobalt (Co)	2021/09/08	96	80 - 120	100	80 - 120	<0.50	ug/L		
7563979	Copper (Cu)	2021/09/08	101	80 - 120	102	80 - 120	<0.90	ug/L		
7563979	Iron (Fe)	2021/09/08	94	80 - 120	99	80 - 120	<100	ug/L		
7563979	Lead (Pb)	2021/09/08	97	80 - 120	99	80 - 120	<0.50	ug/L	0.96	20
7563979	Lithium (Li)	2021/09/08	103	80 - 120	109	80 - 120	<5.0	ug/L		
7563979	Magnesium (Mg)	2021/09/08	92	80 - 120	100	80 - 120	<50	ug/L		
7563979	Manganese (Mn)	2021/09/08	95	80 - 120	100	80 - 120	<2.0	ug/L		
7563979	Molybdenum (Mo)	2021/09/08	101	80 - 120	99	80 - 120	<0.50	ug/L		
7563979	Nickel (Ni)	2021/09/08	94	80 - 120	98	80 - 120	<1.0	ug/L		
7563979	Phosphorus (P)	2021/09/08	99	80 - 120	104	80 - 120	<100	ug/L		
7563979	Potassium (K)	2021/09/08	100	80 - 120	101	80 - 120	<200	ug/L		
7563979	Selenium (Se)	2021/09/08	101	80 - 120	101	80 - 120	<2.0	ug/L		
7563979	Silicon (Si)	2021/09/08	103	80 - 120	104	80 - 120	<50	ug/L		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7563979	Silver (Ag)	2021/09/08	98	80 - 120	97	80 - 120	<0.090	ug/L		
7563979	Sodium (Na)	2021/09/08	94	80 - 120	98	80 - 120	<100	ug/L		
7563979	Strontium (Sr)	2021/09/08	94	80 - 120	101	80 - 120	<1.0	ug/L		
7563979	Thallium (Tl)	2021/09/08	100	80 - 120	99	80 - 120	<0.050	ug/L		
7563979	Titanium (Ti)	2021/09/08	98	80 - 120	100	80 - 120	<5.0	ug/L		
7563979	Uranium (U)	2021/09/08	100	80 - 120	96	80 - 120	<0.10	ug/L		
7563979	Vanadium (V)	2021/09/08	93	80 - 120	97	80 - 120	<0.50	ug/L		
7563979	Zinc (Zn)	2021/09/08	95	80 - 120	101	80 - 120	<5.0	ug/L		
7564734	Total Ammonia-N	2021/09/09	101	75 - 125	99	80 - 120	<0.050	mg/L	15	20

N/A = Not Applicable

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

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

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

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

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

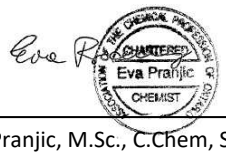
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Soham N Patel

Soham Patel, Analyst 2

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

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Page 1 of 1

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#21375 Golder Associates Ltd	Company Name:		Quotation #:	B80683	BV Labs Job #:	Bottle Order #: 842982
Attention:	Accounts Payable	Attention:	Gregory Padusenko	P.O. #:			
Address:	210 Sheldon Drive Cambridge ON N1T 1A8	Address:		Project:	21456909	COC #: C#842982-03-01	Project Manager: Ema Gitej
Tel:	(519) 620-8182 Fax:	Tel:	(519) 620-8182 Ext: 6509 Fax: (519) 620-9878	Project Name:			
Email:	CanadaAccountsPayableInvoices@golder.com	Email:	Gregory_Padusenko@golder.com	Site #:			
				Sampled By:	PGM		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☐ Table 3 ☐ Agri/Other ☐ For RSC; ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw; ☐ Reg 558 ☐ Storm Sewer Bylaw; ☐ MISA Municipality ___; ☐ PWQO ☐ Reg 406 Table ___; ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	RCAp - Comprehensive	Total Coliforms/ E. coli, CFU/100mL	# of Bottles	Comments
1		PW21-1-72A	21/09/03	10:15	GW		X	X	5	-metals as received -disregard labelled date
2										
3										
4										
5										
6										
7										
8										
9										
10										

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

MICRO

REC'D IN WATERLOO
03-Sep-21 13:54
Ema Gitej
C1P4142
YTH ENV-1270
On Ice Packs

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
PP MW / Paul Markvd	21/09/03	13:55	Jasprit Dave	2021/09/03	13:54	
			By Mossey	21/09/03	18:05	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei				Custody Seal Present	Yes	No
	9.1	12	15	15	Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

WTF 421156 7/7/4 9/4/6 & 9/9/9

Your Project #: 21456909
Your C.O.C. #: 842984-01-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/10/06
Report #: R6842011
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P4129
Received: 2021/09/03, 13:54

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	1	N/A	2021/09/07	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	1	N/A	2021/09/07	CAM SOP-00463	SM 23 4500-Cl E m
Colour	1	N/A	2021/09/09	CAM SOP-00412	SM 23 2120C m
Free (WAD) Cyanide	1	N/A	2021/09/10	CAM SOP-00457	OMOE E3015 m
Dioxins/Furans in Water (1613B) (1)	1	2021/10/01	2021/10/04	BRL SOP-00410	EPA 1613B m
Diuron, Guthion, Temephos	1	2021/09/10	2021/09/10	CAM SOP-00306	EPA 532 m
Dissolved Organic Carbon (DOC) (2)	1	N/A	2021/09/08	CAM SOP-00446	SM 23 5310 B m
Diquat / Paraquat	1	2021/09/07	2021/09/09	CAM SOP-00327	EPA 549.2 m
Fluoride	1	2021/09/04	2021/09/07	CAM SOP-00449	SM 23 4500-F C m
Glyphosate	1	2021/09/09	2021/09/09	CAM SOP-00305	HPLC in-house method
Hardness (calculated as CaCO3)	1	N/A	2021/09/08	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA	1	2021/09/07	2021/09/07	CAM SOP-00453	EPA 7470A m
Metals Analysis by ICPMS (as received) (3)	1	N/A	2021/09/07	CAM SOP-00447	EPA 6020B m
Total Coliforms/ E. coli, CFU/100mL	1	N/A	2021/09/03	CAM SOP-00551	MOE E3407
Dissolved Methane in Water	1	N/A	2021/09/08	CAM SOP-00219 Modified Combustible Gas Indicator Method	RSKSOP-175 m
Heterotrophic plate count, (CFU/mL)	1	N/A	2021/09/03	CAM SOP-00512	SM 9215B
Microcystin	1	N/A	2021/09/08	CAM SOP-00476	OMECC-LSB E3469
NDMA in Drinking Water (MSABN-3291Amod)	1	2021/09/09	2021/09/14	BRL SOP-00012	MOE Method E3388
Total Ammonia-N	1	N/A	2021/09/09	CAM SOP-00441	USGS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (4)	1	N/A	2021/09/07	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrilotriacetic Acid (NTA) (5)	1	2021/09/07	2021/09/07	CAM SOP-00411	EPA 430.1 m
OC Pesticides (Selected) & PCB (6)	1	2021/09/08	2021/09/10	CAM SOP-00307	EPA 8081A/ 8082B m
OC Pesticides Summed Parameters	1	N/A	2021/09/04	CAM SOP-00307	EPA 8081A/8082B m
ODWS - Semi-Volatiles	1	2021/09/09	2021/09/10	CAM SOP-00301	EPA 8270 m
Organic Nitrogen	1	N/A	2021/09/10	Auto Calc.	
pH	1	2021/09/04	2021/09/07	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry	1	N/A	2021/09/07	CAM SOP-00464	EPA 375.4 m
Sulphide	1	N/A	2021/09/07	CAM SOP-00455	SM 23 4500-S G m

Your Project #: 21456909
Your C.O.C. #: 842984-01-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/10/06
Report #: R6842011
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P4129
Received: 2021/09/03, 13:54

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Dissolved Solids (TDS calc)	1	N/A	2021/09/08		Auto Calc
Total Kjeldahl Nitrogen in Water	1	2021/09/07	2021/09/09	CAM SOP-00938	OMOE E3516 m
Turbidity	1	N/A	2021/09/07	CAM SOP-00417	SM 23 2130 B m
VOCs (Drinking Water)	1	N/A	2021/09/07	CAM SOP-00226	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Metals analysis was performed on the sample 'as received'.
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(5) Bureau Veritas Laboratories attempt to commence NTA analysis as soon as possible in accordance with the reference method. However, rapid analysis may not be practically achievable, particularly for samples from remote locations. Extended delay in analysis times may increase the uncertainty of the test results, but does not necessarily imply that the results are compromised.
(6) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 21456909
Your C.O.C. #: 842984-01-01

Attention: Gregory Padusenko

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/10/06
Report #: R6842011
Version: 4 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P4129
Received: 2021/09/03, 13:54

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Calculated Parameters								
Calculated TDS	mg/L	550	N/A	1.0				7559099
Hardness (CaCO3)	mg/L	380	N/A	1.0				7558603
Total Organic Nitrogen	mg/L	<0.10	N/A	0.10				7560118
Inorganics								
Total Ammonia-N	mg/L	0.21	N/A	0.050				7564744
Colour	TCU	<2	N/A	2				7563603
Fluoride (F-)	mg/L	0.62	N/A	0.10				7560960
Total Kjeldahl Nitrogen (TKN)	mg/L	0.23	N/A	0.10				7563005
Microcystin	ug/L	<0.10	N/A	0.10				7564587
Dissolved Organic Carbon	mg/L	0.48	N/A	0.40				7562606
pH	pH	8.02						7560966
Dissolved Sulphate (SO4)	mg/L	270	N/A	1.0				7560983
Sulphide	mg/L	<0.020	N/A	0.020				7562455
Turbidity	NTU	0.7	N/A	0.1				7560716
WAD Cyanide (Free)	mg/L	<0.0010	N/A	0.0010				7567661
Alkalinity (Total as CaCO3)	mg/L	180	N/A	1.0				7560961
Dissolved Chloride (Cl-)	mg/L	9.6	N/A	1.0				7560985
Nitrite (N)	mg/L	<0.010	N/A	0.010				7560968
Nitrate (N)	mg/L	<0.10	N/A	0.10				7560968
Nitrate + Nitrite (N)	mg/L	<0.10	N/A	0.10				7560968
Miscellaneous Parameters								
NTA	mg/L	<0.050	N/A	0.050				7561547
Fixed Gases								
Methane	L/m3	0.019	N/A	0.005				7565203
Metals								
Mercury (Hg)	mg/L	<0.00010	N/A	0.00010				7562014

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch
N/A = Not Applicable

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Aluminum (Al)	ug/L	<4.9	N/A	4.9				7561948
Antimony (Sb)	ug/L	<0.50	N/A	0.50				7561948
Arsenic (As)	ug/L	1.5	N/A	1.0				7561948
Barium (Ba)	ug/L	21	N/A	2.0				7561948
Boron (B)	ug/L	74	N/A	10				7561948
Cadmium (Cd)	ug/L	<0.090	N/A	0.090				7561948
Calcium (Ca)	ug/L	93000	N/A	200				7561948
Chromium (Cr)	ug/L	<5.0	N/A	5.0				7561948
Copper (Cu)	ug/L	<0.90	N/A	0.90				7561948
Iron (Fe)	ug/L	130	N/A	100				7561948
Lead (Pb)	ug/L	<0.50	N/A	0.50				7561948
Magnesium (Mg)	ug/L	36000	N/A	50				7561948
Manganese (Mn)	ug/L	20	N/A	2.0				7561948
Potassium (K)	ug/L	1100	N/A	200				7561948
Selenium (Se)	ug/L	<2.0	N/A	2.0				7561948
Sodium (Na)	ug/L	28000	N/A	100				7561948
Uranium (U)	ug/L	0.16	N/A	0.10				7561948
Zinc (Zn)	ug/L	<5.0	N/A	5.0				7561948
Semivolatile Organics								
2,3,4,6-Tetrachlorophenol	ug/L	<0.50	N/A	0.50				7566501
2,4,5-T	ug/L	<1.0	N/A	1.0				7566501
2,4,6-Trichlorophenol	ug/L	<0.50	N/A	0.50				7566501
2,4-D	ug/L	<1.0	N/A	1.0				7566501
2,4-Dichlorophenol	ug/L	<0.25	N/A	0.25				7566501
Alachlor	ug/L	<0.50	N/A	0.50				7566501
Aldicarb	ug/L	<5.0	N/A	5.0				7566501
Atrazine	ug/L	<0.50	N/A	0.50				7566501

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch
N/A = Not Applicable

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Des-ethyl atrazine	ug/L	<0.50	N/A	0.50				7566501
Atrazine + Desethyl-atrazine	ug/L	<1.0	N/A	1.0				7566501
Bendiocarb	ug/L	<2.0	N/A	2.0				7566501
Bromoxynil	ug/L	<0.50	N/A	0.50				7566501
Carbaryl	ug/L	<5.0	N/A	5.0				7566501
Carbofuran	ug/L	<5.0	N/A	5.0				7566501
Chlorpyrifos (Dursban)	ug/L	<1.0	N/A	1.0				7566501
Cyanazine (Bladex)	ug/L	<1.0	N/A	1.0				7566501
Diazinon	ug/L	<1.0	N/A	1.0				7566501
Dicamba	ug/L	<1.0	N/A	1.0				7566501
Diclofop-methyl	ug/L	<0.90	N/A	0.90				7566501
Dimethoate	ug/L	<2.5	N/A	2.5				7566501
Dinoseb	ug/L	<1.0	N/A	1.0				7566501
Malathion	ug/L	<5.0	N/A	5.0				7566501
Metolachlor	ug/L	<0.50	N/A	0.50				7566501
Metribuzin (Sencor)	ug/L	<5.0	N/A	5.0				7566501
Ethyl Parathion	ug/L	<1.0	N/A	1.0				7566501
Pentachlorophenol	ug/L	<0.50	N/A	0.50				7566501
Phorate	ug/L	<0.50	N/A	0.50				7566501
Picloram	ug/L	<5.0	N/A	5.0				7566501
Prometryne	ug/L	<0.25	N/A	0.25				7566501
Simazine	ug/L	<1.0	N/A	1.0				7566501
Terbufos	ug/L	<0.50	N/A	0.50				7566501
Triallate	ug/L	<1.0	N/A	1.0				7566501
Trifluralin	ug/L	<1.0	N/A	1.0				7566501
Benzo(a)pyrene	ug/L	<0.0050	N/A	0.0050				7566501
Methyl parathion	ug/L	<1.0	N/A	1.0				7566501

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
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N/A = Not Applicable

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Volatile Organics								
1,1-Dichloroethylene	ug/L	<0.10	N/A	0.10				7559332
1,2-Dichlorobenzene	ug/L	<0.20	N/A	0.20				7559332
1,2-Dichloroethane	ug/L	<0.20	N/A	0.20				7559332
1,4-Dichlorobenzene	ug/L	<0.20	N/A	0.20				7559332
Benzene	ug/L	<0.10	N/A	0.10				7559332
Bromodichloromethane	ug/L	<0.10	N/A	0.10				7559332
Bromoform	ug/L	<0.20	N/A	0.20				7559332
Carbon Tetrachloride	ug/L	<0.10	N/A	0.10				7559332
Chlorobenzene	ug/L	<0.10	N/A	0.10				7559332
Chloroform	ug/L	<0.10	N/A	0.10				7559332
Dibromochloromethane	ug/L	<0.20	N/A	0.20				7559332
Methylene Chloride(Dichloromethane)	ug/L	<0.50	N/A	0.50				7559332
Ethylbenzene	ug/L	<0.10	N/A	0.10				7559332
Tetrachloroethylene	ug/L	<0.10	N/A	0.10				7559332
Toluene	ug/L	<0.20	N/A	0.20				7559332
Trichloroethylene	ug/L	<0.10	N/A	0.10				7559332
Vinyl Chloride	ug/L	<0.20	N/A	0.20				7559332
o-Xylene	ug/L	<0.10	N/A	0.10				7559332
p+m-Xylene	ug/L	<0.10	N/A	0.10				7559332
Total Xylenes	ug/L	<0.10	N/A	0.10				7559332
Total Trihalomethanes	ug/L	<0.20	N/A	0.20				7559332
Pesticides & Herbicides								
Glyphosate	ug/L	<10	N/A	10				7567026
Diquat	ug/L	<7.0	N/A	7.0				7561822
Diuron	ug/L	<10	N/A	10				7569961
Guthion (Azinphos-methyl)	ug/L	<2.0	N/A	2.0				7569961

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Paraquat	ug/L	<1.0	N/A	1.0				7561822
Temephos	ug/L	<10	N/A	10				7569961
Calculated Parameters								
Aldrin + Dieldrin	ug/L	<0.006	N/A	0.006				7558226
Chlordane (Total)	ug/L	<0.006	N/A	0.006				7558226
DDT+ Metabolites	ug/L	<0.006	N/A	0.006				7558226
Heptachlor + Heptachlor epoxide	ug/L	<0.006	N/A	0.006				7558226
Total PCB	ug/L	<0.05	N/A	0.05				7558226
Pesticides & Herbicides								
Lindane	ug/L	<0.0060	N/A	0.0060				7565829
Heptachlor	ug/L	<0.0060	N/A	0.0060				7565829
Aldrin	ug/L	<0.0060	N/A	0.0060				7565829
Heptachlor epoxide	ug/L	<0.0060	N/A	0.0060				7565829
Oxychlordane	ug/L	<0.0060	N/A	0.0060				7565829
g-Chlordane	ug/L	<0.0060	N/A	0.0060				7565829
a-Chlordane	ug/L	<0.0060	N/A	0.0060				7565829
Dieldrin	ug/L	<0.0060	N/A	0.0060				7565829
o,p-DDE	ug/L	<0.0060	N/A	0.0060				7565829
p,p-DDE	ug/L	<0.0060	N/A	0.0060				7565829
o,p-DDD	ug/L	<0.0060	N/A	0.0060				7565829
p,p-DDD	ug/L	<0.0060	N/A	0.0060				7565829
o,p-DDT	ug/L	<0.0060	N/A	0.0060				7565829
p,p-DDT	ug/L	<0.0060	N/A	0.0060				7565829
Methoxychlor	ug/L	<0.024	N/A	0.024				7565829
Aroclor 1016	ug/L	<0.050	N/A	0.050				7565829
Aroclor 1221	ug/L	<0.050	N/A	0.050				7565829
Aroclor 1232	ug/L	<0.050	N/A	0.050				7565829

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Aroclor 1242	ug/L	<0.050	N/A	0.050				7565829
Aroclor 1248	ug/L	<0.050	N/A	0.050				7565829
Aroclor 1254	ug/L	<0.050	N/A	0.050				7565829
Aroclor 1260	ug/L	<0.050	N/A	0.050				7565829
Dioxins & Furans								
2,3,7,8-Tetra CDD *	pg/L	<0.973	0.973	10.0	1.00	0.973	0	7615543
1,2,3,7,8-Penta CDD *	pg/L	<0.830	0.830	50.0	1.00	0.830	0	7615543
1,2,3,4,7,8-Hexa CDD *	pg/L	<0.875	0.875	50.0	0.100	0.0875	0	7615543
1,2,3,6,7,8-Hexa CDD *	pg/L	<0.778	0.778	50.0	0.100	0.0778	0	7615543
1,2,3,7,8,9-Hexa CDD *	pg/L	<0.798	0.798	50.0	0.100	0.0798	0	7615543
1,2,3,4,6,7,8-Hepta CDD *	pg/L	<0.760	0.760	50.0	0.0100	0.00760	0	7615543
Octa CDD *	pg/L	<0.666	0.666	100	0.000300	0.000200	0	7615543
Total Tetra CDD *	pg/L	<0.973	0.973	10.0			0	7615543
Total Penta CDD *	pg/L	<0.830	0.830	50.0			0	7615543
Total Hexa CDD *	pg/L	<0.814	0.814	50.0			0	7615543
Total Hepta CDD *	pg/L	<0.760	0.760	50.0			0	7615543
2,3,7,8-Tetra CDF **	pg/L	<0.671	0.671	10.0	0.100	0.0671	0	7615543
1,2,3,7,8-Penta CDF **	pg/L	<0.843	0.843	50.0	0.0300	0.0253	0	7615543
2,3,4,7,8-Penta CDF **	pg/L	<0.715	0.715	50.0	0.300	0.215	0	7615543
1,2,3,4,7,8-Hexa CDF **	pg/L	<0.384	0.384	50.0	0.100	0.0384	0	7615543
1,2,3,6,7,8-Hexa CDF **	pg/L	<0.332	0.332	50.0	0.100	0.0332	0	7615543
2,3,4,6,7,8-Hexa CDF **	pg/L	<0.349	0.349	50.0	0.100	0.0349	0	7615543
1,2,3,7,8,9-Hexa CDF **	pg/L	<0.371	0.371	50.0	0.100	0.0371	0	7615543
1,2,3,4,6,7,8-Hepta CDF **	pg/L	<0.313	0.313	50.0	0.0100	0.00313	0	7615543
1,2,3,4,7,8,9-Hepta CDF **	pg/L	<0.349	0.349	50.0	0.0100	0.00349	0	7615543

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
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QC Batch = Quality Control Batch
N/A = Not Applicable
* CDD = Chloro Dibenzo-p-Dioxin
** CDF = Chloro Dibenzo-p-Furan

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Octa CDF **	pg/L	<0.982	0.982	100	0.000300	0.000295	0	7615543
Total Tetra CDF **	pg/L	<0.671	0.671	10.0			0	7615543
Total Penta CDF **	pg/L	<0.775	0.775	50.0			0	7615543
Total Hexa CDF **	pg/L	<0.358	0.358	50.0			0	7615543
Total Hepta CDF **	pg/L	<0.330	0.330	50.0			0	7615543
Semivolatile Organics								
N-Nitrosodimethylamine	ug/L	<0.0009	N/A	0.0009				7566404
Microbiological								
Heterotrophic plate count	CFU/mL	0	N/A	N/A				7560282
Background	CFU/100mL	0	N/A	N/A				7560239
Total Coliforms	CFU/100mL	0	N/A	N/A				7560239
Escherichia coli	CFU/100mL	0	N/A	N/A				7560239
TOTAL TOXIC EQUIVALENCY	pg/L					2.5		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	70						7615543
C13-1234678 HeptaCDD *	%	120						7615543
C13-1234678 HeptaCDF **	%	111						7615543
C13-123478 HexaCDD *	%	96						7615543
C13-123478 HexaCDF **	%	92						7615543
C13-1234789 HeptaCDF **	%	121						7615543
C13-123678 HexaCDD *	%	97						7615543
C13-123678 HexaCDF **	%	97						7615543
C13-12378 PentaCDD *	%	78						7615543
C13-12378 PentaCDF **	%	74						7615543
C13-123789 HexaCDF **	%	105						7615543

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
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** CDF = Chloro Dibenzo-p-Furan
N/A = Not Applicable
* CDD = Chloro Dibenzo-p-Dioxin

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268						
Sampling Date		2021/09/03 10:00						
COC Number		842984-01-01			TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-234678 HexaCDF **	%	99						7615543
C13-23478 PentaCDF **	%	82						7615543
C13-2378 TetraCDD *	%	63						7615543
C13-2378 TetraCDF **	%	61						7615543
C13-OCDD *	%	115						7615543
D6-N-Nitrosodimethylamine	%	39						7566404
2,4,5,6-Tetrachloro-m-xylene	%	50						7565829
Decachlorobiphenyl	%	104						7565829
2,4,6-Tribromophenol	%	78						7566501
2,4-Dichlorophenyl Acetic Acid	%	79						7566501
2-Fluorobiphenyl	%	69						7566501
D14-Terphenyl (FS)	%	83						7566501
D5-Nitrobenzene	%	83						7566501
4-Bromofluorobenzene	%	96						7559332
D4-1,2-Dichloroethane	%	96						7559332
D8-Toluene	%	106						7559332

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RDL = Reportable Detection Limit
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QC Batch = Quality Control Batch
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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268					
Sampling Date		2021/09/03 10:00					
COC Number		842984-01-01		TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1 Lab-Dup	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Inorganics							
Fluoride (F-)	mg/L	0.62	0.10				7560960
pH	pH	8.05					7560966
Alkalinity (Total as CaCO3)	mg/L	180	1.0				7560961
Nitrite (N)	mg/L	<0.010	0.010				7560968
Nitrate (N)	mg/L	<0.10	0.10				7560968
Nitrate + Nitrite (N)	mg/L	<0.10	0.10				7560968
Metals							
Mercury (Hg)	mg/L	<0.00010	0.00010				7562014
Volatile Organics							
1,1-Dichloroethylene	ug/L	<0.10	0.10				7559332
1,2-Dichlorobenzene	ug/L	<0.20	0.20				7559332
1,2-Dichloroethane	ug/L	<0.20	0.20				7559332
1,4-Dichlorobenzene	ug/L	<0.20	0.20				7559332
Benzene	ug/L	<0.10	0.10				7559332
Bromodichloromethane	ug/L	<0.10	0.10				7559332
Bromoform	ug/L	<0.20	0.20				7559332
Carbon Tetrachloride	ug/L	<0.10	0.10				7559332
Chlorobenzene	ug/L	<0.10	0.10				7559332
Chloroform	ug/L	<0.10	0.10				7559332
Dibromochloromethane	ug/L	<0.20	0.20				7559332
Methylene Chloride(Dichloromethane)	ug/L	<0.50	0.50				7559332
Ethylbenzene	ug/L	<0.10	0.10				7559332

RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
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Lab-Dup = Laboratory Initiated Duplicate

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ODWQSOG TABLES 1, 2 AND 4 (WATER)

BV Labs ID		QOI268					
Sampling Date		2021/09/03 10:00					
COC Number		842984-01-01		TOXIC EQUIVALENCY		# of	
	UNITS	PW21-1 Lab-Dup	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Tetrachloroethylene	ug/L	<0.10	0.10				7559332
Toluene	ug/L	<0.20	0.20				7559332
Trichloroethylene	ug/L	<0.10	0.10				7559332
Vinyl Chloride	ug/L	<0.20	0.20				7559332
o-Xylene	ug/L	<0.10	0.10				7559332
p+m-Xylene	ug/L	<0.10	0.10				7559332
Total Xylenes	ug/L	<0.10	0.10				7559332
Total Trihalomethanes	ug/L	<0.20	0.20				7559332
Pesticides & Herbicides							
Diuron	ug/L	<10	10				7569961
Guthion (Azinphos-methyl)	ug/L	<2.0	2.0				7569961
Temephos	ug/L	<10	10				7569961
TOTAL TOXIC EQUIVALENCY	pg/L				0		
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	96					7559332
D4-1,2-Dichloroethane	%	98					7559332
D8-Toluene	%	104					7559332

RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
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BV Labs Job #: C1P4129
Report Date: 2021/10/06

Golder Associates Ltd
Client Project #: 21456909
Sampler Initials: PM

TEST SUMMARY

BV Labs ID: QOI268
Sample ID: PW21-1
Matrix: Water

Collected: 2021/09/03
Shipped:
Received: 2021/09/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7560961	N/A	2021/09/07	Yogesh Patel
Chloride by Automated Colourimetry	KONE	7560985	N/A	2021/09/07	Alina Dobreanu
Colour	SPEC	7563603	N/A	2021/09/09	Viorica Rotaru
Free (WAD) Cyanide	SKAL/CN	7567661	N/A	2021/09/10	Aditiben Patel
Dioxins/Furans in Water (1613B)	HRMS/MS	7615543	2021/10/01	2021/10/04	Cathy Xu
Diuron, Guthion, Temephos	LC/UV	7569961	2021/09/10	2021/09/10	Kimberley Linde
Dissolved Organic Carbon (DOC)	TOCV/NDIR	7562606	N/A	2021/09/08	Julianna Castiglione
Diquat / Paraquat	LC/UV	7561822	2021/09/07	2021/09/09	James Lee
Fluoride	ISE	7560960	2021/09/04	2021/09/07	Yogesh Patel
Glyphosate	LC/FLU	7567026	2021/09/09	2021/09/09	Furneesh Kumar
Hardness (calculated as CaCO3)		7558603	N/A	2021/09/08	Automated Statchk
Mercury in Water by CVAA	CV/AA	7562014	2021/09/07	2021/09/07	Gagandeep Rai
Metals Analysis by ICPMS (as received)	ICP/MS	7561948	N/A	2021/09/07	Azita Fazaeli
Total Coliforms/ E. coli, CFU/100mL	PL	7560239	N/A	2021/09/03	Soham Patel
Dissolved Methane in Water	GC/FID	7565203	N/A	2021/09/08	Shilpa Kataria
Heterotrophic plate count, (CFU/mL)	PL	7560282	N/A	2021/09/03	Farhana Rahman
Microcystin	ELIS	7564587	N/A	2021/09/08	Chris Li
NDMA in Drinking Water (MSABN-3291Amod)	GCTQ/MS	7566404	2021/09/09	2021/09/14	Wenhui (Susie) Shi
Total Ammonia-N	LACH/NH4	7564744	N/A	2021/09/09	Viorica Rotaru
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7560968	N/A	2021/09/07	Chandra Nandlal
Nitrilotriacetic Acid (NTA)	SPEC	7561547	2021/09/07	2021/09/07	Viorica Rotaru
OC Pesticides (Selected) & PCB	GC/ECD	7565829	2021/09/08	2021/09/10	Joy Zhang
OC Pesticides Summed Parameters	CALC	7558226	N/A	2021/09/04	Automated Statchk
ODWS - Semi-Volatiles	GC/MS	7566501	2021/09/09	2021/09/10	Wendy Zhao
Organic Nitrogen	CALC	7560118	N/A	2021/09/10	Automated Statchk
pH	AT	7560966	2021/09/04	2021/09/07	Yogesh Patel
Sulphate by Automated Colourimetry	KONE	7560983	N/A	2021/09/07	Alina Dobreanu
Sulphide	ISE/S	7562455	N/A	2021/09/07	Neil Dassanayake
Total Dissolved Solids (TDS calc)	CALC	7559099	N/A	2021/09/08	Automated Statchk
Total Kjeldahl Nitrogen in Water	SKAL	7563005	2021/09/07	2021/09/09	Rajni Tyagi
Turbidity	AT	7560716	N/A	2021/09/07	Neil Dassanayake
VOCs (Drinking Water)	P&T/MS	7559332	N/A	2021/09/07	Dina Wang

BV Labs ID: QOI268 Dup
Sample ID: PW21-1
Matrix: Water

Collected: 2021/09/03
Shipped:
Received: 2021/09/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	7560961	N/A	2021/09/07	Yogesh Patel
Diuron, Guthion, Temephos	LC/UV	7569961	2021/09/10	2021/09/10	Kimberley Linde
Fluoride	ISE	7560960	2021/09/04	2021/09/07	Yogesh Patel
Mercury in Water by CVAA	CV/AA	7562014	2021/09/07	2021/09/07	Gagandeep Rai
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	7560968	N/A	2021/09/07	Chandra Nandlal
pH	AT	7560966	2021/09/04	2021/09/07	Yogesh Patel
VOCs (Drinking Water)	P&T/MS	7559332	N/A	2021/09/07	Dina Wang

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

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

Package 1	10.7°C
Package 2	15.0°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7559332	4-Bromofluorobenzene	2021/09/07	98	70 - 130	97	70 - 130	94	%				
7559332	D4-1,2-Dichloroethane	2021/09/07	91	70 - 130	95	70 - 130	98	%				
7559332	D8-Toluene	2021/09/07	105	70 - 130	103	70 - 130	105	%				
7565829	2,4,5,6-Tetrachloro-m-xylene	2021/09/09	58	30 - 130	57	30 - 130	58	%				
7565829	Decachlorobiphenyl	2021/09/09	108	30 - 130	95	30 - 130	98	%				
7566404	D6-N-Nitrosodimethylamine	2021/09/14			39	10 - 85	40	%				
7566501	2,4,6-Tribromophenol	2021/09/09	77	30 - 130	76	30 - 130	82	%				
7566501	2,4-Dichlorophenyl Acetic Acid	2021/09/09	75	30 - 130	71	30 - 130	77	%				
7566501	2-Fluorobiphenyl	2021/09/09	63	30 - 130	65	30 - 130	67	%				
7566501	D14-Terphenyl (FS)	2021/09/09	81	30 - 130	81	30 - 130	87	%				
7566501	D5-Nitrobenzene	2021/09/09	75	30 - 130	77	30 - 130	85	%				
7615543	37CL4 2378 Tetra CDD	2021/10/03			77	35 - 197	84	%				
7615543	C13-1234678 HeptaCDD	2021/10/03			119	23 - 140	111	%				
7615543	C13-1234678 HeptaCDF	2021/10/03			110	28 - 143	105	%				
7615543	C13-123478 HexaCDD	2021/10/03			97	32 - 141	88	%				
7615543	C13-123478 HexaCDF	2021/10/03			93	26 - 152	96	%				
7615543	C13-1234789 HeptaCDF	2021/10/03			121	28 - 138	111	%				
7615543	C13-123678 HexaCDD	2021/10/03			95	28 - 130	103	%				
7615543	C13-123678 HexaCDF	2021/10/03			98	26 - 123	96	%				
7615543	C13-12378 PentaCDD	2021/10/03			77	25 - 181	72	%				
7615543	C13-12378 PentaCDF	2021/10/03			75	24 - 185	73	%				
7615543	C13-123789 HexaCDF	2021/10/03			104	29 - 147	102	%				
7615543	C13-234678 HexaCDF	2021/10/03			98	28 - 136	96	%				
7615543	C13-23478 PentaCDF	2021/10/03			81	21 - 178	78	%				
7615543	C13-2378 TetraCDD	2021/10/03			66	25 - 164	75	%				
7615543	C13-2378 TetraCDF	2021/10/03			63	24 - 169	75	%				
7615543	C13-OCDD	2021/10/03			114	17 - 157	100	%				
7559332	1,1-Dichloroethylene	2021/09/07	93	70 - 130	92	70 - 130	<0.10	ug/L	NC	30		
7559332	1,2-Dichlorobenzene	2021/09/07	88	70 - 130	90	70 - 130	<0.20	ug/L	NC	30		
7559332	1,2-Dichloroethane	2021/09/07	78	70 - 130	83	70 - 130	<0.20	ug/L	NC	30		
7559332	1,4-Dichlorobenzene	2021/09/07	105	70 - 130	105	70 - 130	<0.20	ug/L	NC	30		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7559332	Benzene	2021/09/07	81	70 - 130	84	70 - 130	<0.10	ug/L	NC	30		
7559332	Bromodichloromethane	2021/09/07	NC	70 - 130	88	70 - 130	<0.10	ug/L	NC	30		
7559332	Bromoform	2021/09/07	82	70 - 130	87	70 - 130	<0.20	ug/L	NC	30		
7559332	Carbon Tetrachloride	2021/09/07	88	70 - 130	88	70 - 130	<0.10	ug/L	NC	30		
7559332	Chlorobenzene	2021/09/07	90	70 - 130	90	70 - 130	<0.10	ug/L	NC	30		
7559332	Chloroform	2021/09/07	NC	70 - 130	89	70 - 130	<0.10	ug/L	NC	30		
7559332	Dibromochloromethane	2021/09/07	82	70 - 130	87	70 - 130	<0.20	ug/L	NC	30		
7559332	Ethylbenzene	2021/09/07	88	70 - 130	86	70 - 130	<0.10	ug/L	NC	30		
7559332	Methylene Chloride(Dichloromethane)	2021/09/07	85	70 - 130	86	70 - 130	<0.50	ug/L	NC	30		
7559332	o-Xylene	2021/09/07	87	70 - 130	86	70 - 130	<0.10	ug/L	NC	30		
7559332	p+m-Xylene	2021/09/07	95	70 - 130	90	70 - 130	<0.10	ug/L	NC	30		
7559332	Tetrachloroethylene	2021/09/07	85	70 - 130	83	70 - 130	<0.10	ug/L	NC	30		
7559332	Toluene	2021/09/07	88	70 - 130	88	70 - 130	<0.20	ug/L	NC	30		
7559332	Total Trihalomethanes	2021/09/07					<0.20	ug/L	NC	30		
7559332	Total Xylenes	2021/09/07					<0.10	ug/L	NC	30		
7559332	Trichloroethylene	2021/09/07	92	70 - 130	91	70 - 130	<0.10	ug/L	NC	30		
7559332	Vinyl Chloride	2021/09/07	92	70 - 130	88	70 - 130	<0.20	ug/L	NC	30		
7560716	Turbidity	2021/09/07			99	85 - 115	<0.1	NTU	5.2	20		
7560960	Fluoride (F-)	2021/09/07	101	80 - 120	96	80 - 120	<0.10	mg/L	1.4	20		
7560961	Alkalinity (Total as CaCO3)	2021/09/07			96	85 - 115	<1.0	mg/L	0.48	20		
7560966	pH	2021/09/07			101	98 - 103			0.36	N/A		
7560968	Nitrate (N)	2021/09/07	99	80 - 120	101	80 - 120	<0.10	mg/L	NC	20		
7560968	Nitrite (N)	2021/09/07	104	80 - 120	103	80 - 120	<0.010	mg/L	NC	20		
7560983	Dissolved Sulphate (SO4)	2021/09/07	NC	75 - 125	103	80 - 120	<1.0	mg/L	0.25	20		
7560985	Dissolved Chloride (Cl-)	2021/09/07	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.3	20		
7561547	NTA	2021/09/07	83	80 - 120	93	80 - 120	<0.050	mg/L	NC	20		
7561822	Diquat	2021/09/09	83	50 - 130	95	50 - 130	<7.0	ug/L	4.2	40		
7561822	Paraquat	2021/09/09	62	50 - 130	101	50 - 130	<1.0	ug/L	7.7	40		
7561948	Aluminum (Al)	2021/09/07	101	80 - 120	101	80 - 120	<4.9	ug/L	NC	20		
7561948	Antimony (Sb)	2021/09/07	103	80 - 120	99	80 - 120	<0.50	ug/L	NC	20		
7561948	Arsenic (As)	2021/09/07	100	80 - 120	97	80 - 120	<1.0	ug/L	0.41	20		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7561948	Barium (Ba)	2021/09/07	97	80 - 120	98	80 - 120	<2.0	ug/L	1.4	20		
7561948	Boron (B)	2021/09/07	97	80 - 120	97	80 - 120	<10	ug/L	2.0	20		
7561948	Cadmium (Cd)	2021/09/07	100	80 - 120	100	80 - 120	<0.090	ug/L	NC	20		
7561948	Calcium (Ca)	2021/09/07	NC	80 - 120	99	80 - 120	<200	ug/L	2.1	20		
7561948	Chromium (Cr)	2021/09/07	100	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
7561948	Copper (Cu)	2021/09/07	98	80 - 120	98	80 - 120	<0.90	ug/L	11	20		
7561948	Iron (Fe)	2021/09/07	98	80 - 120	97	80 - 120	<100	ug/L	1.1	20		
7561948	Lead (Pb)	2021/09/07	96	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
7561948	Magnesium (Mg)	2021/09/07	NC	80 - 120	97	80 - 120	<50	ug/L	1.4	20		
7561948	Manganese (Mn)	2021/09/07	98	80 - 120	99	80 - 120	<2.0	ug/L	1.0	20		
7561948	Potassium (K)	2021/09/07	98	80 - 120	96	80 - 120	<200	ug/L	1.9	20		
7561948	Selenium (Se)	2021/09/07	103	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
7561948	Sodium (Na)	2021/09/07	97	80 - 120	98	80 - 120	<100	ug/L	1.2	20		
7561948	Uranium (U)	2021/09/07	100	80 - 120	104	80 - 120	<0.10	ug/L	3.0	20		
7561948	Zinc (Zn)	2021/09/07	98	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
7562014	Mercury (Hg)	2021/09/07	95	75 - 125	97	80 - 120	<0.00010	mg/L	NC	20		
7562455	Sulphide	2021/09/07	103	80 - 120	103	80 - 120	<0.020	mg/L	NC	20		
7562606	Dissolved Organic Carbon	2021/09/08	80	80 - 120	96	80 - 120	<0.40	mg/L	0.84	20		
7563005	Total Kjeldahl Nitrogen (TKN)	2021/09/09	NC	80 - 120	95	80 - 120	<0.10	mg/L			96	80 - 120
7563603	Colour	2021/09/09			99	80 - 120	<2	TCU	NC	25		
7564587	Microcystin	2021/09/08	96	60 - 140	94	60 - 140	<0.10	ug/L	NC	20		
7564744	Total Ammonia-N	2021/09/09	100	75 - 125	97	80 - 120	<0.050	mg/L	2.8	20		
7565203	Methane	2021/09/09					<0.005	L/m3	6.1	20		
7565829	a-Chlordane	2021/09/09	89	30 - 130	85	30 - 130	<0.0060	ug/L	6.5	40		
7565829	Aldrin	2021/09/09	78	30 - 130	71	30 - 130	<0.0060	ug/L	5.0	40		
7565829	Aroclor 1016	2021/09/09					<0.050	ug/L				
7565829	Aroclor 1221	2021/09/09					<0.050	ug/L				
7565829	Aroclor 1232	2021/09/09					<0.050	ug/L				
7565829	Aroclor 1242	2021/09/09					<0.050	ug/L				
7565829	Aroclor 1248	2021/09/09					<0.050	ug/L				
7565829	Aroclor 1254	2021/09/09					<0.050	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7565829	Aroclor 1260	2021/09/09					<0.050	ug/L				
7565829	Dieldrin	2021/09/09	105	30 - 130	99	30 - 130	<0.0060	ug/L	5.2	40		
7565829	g-Chlordane	2021/09/09	94	30 - 130	85	30 - 130	<0.0060	ug/L	5.6	40		
7565829	Heptachlor epoxide	2021/09/09	100	30 - 130	89	30 - 130	<0.0060	ug/L	3.4	40		
7565829	Heptachlor	2021/09/09	83	30 - 130	75	30 - 130	<0.0060	ug/L	6.1	40		
7565829	Lindane	2021/09/09	97	30 - 130	88	30 - 130	<0.0060	ug/L	3.7	40		
7565829	Methoxychlor	2021/09/09	110	30 - 130	100	30 - 130	<0.024	ug/L	6.6	40		
7565829	o,p-DDD	2021/09/09	105	30 - 130	102	30 - 130	<0.0060	ug/L	6.0	40		
7565829	o,p-DDE	2021/09/09	114	30 - 130	94	30 - 130	<0.0060	ug/L	4.5	40		
7565829	o,p-DDT	2021/09/09	104	30 - 130	90	30 - 130	<0.0060	ug/L	7.6	40		
7565829	Oxychlordane	2021/09/09	91	30 - 130	84	30 - 130	<0.0060	ug/L	5.0	40		
7565829	p,p-DDD	2021/09/09	101	30 - 130	93	30 - 130	<0.0060	ug/L	6.0	40		
7565829	p,p-DDE	2021/09/09	82	30 - 130	74	30 - 130	<0.0060	ug/L	6.8	40		
7565829	p,p-DDT	2021/09/09	107	30 - 130	91	30 - 130	<0.0060	ug/L	9.9	40		
7566404	N-Nitrosodimethylamine	2021/09/14			102	65 - 135	<0.0009	ug/L	1.5	25		
7566501	2,3,4,6-Tetrachlorophenol	2021/09/09	83	30 - 130	82	30 - 130	<0.50	ug/L	1.7	40		
7566501	2,4,5-T	2021/09/09	82	30 - 130	80	30 - 130	<1.0	ug/L	4.9	40		
7566501	2,4,6-Trichlorophenol	2021/09/09	77	30 - 130	78	30 - 130	<0.50	ug/L	2.4	40		
7566501	2,4-D	2021/09/09	74	30 - 130	70	30 - 130	<1.0	ug/L	3.3	40		
7566501	2,4-Dichlorophenol	2021/09/09	68	30 - 130	69	30 - 130	<0.25	ug/L	0.99	40		
7566501	Alachlor	2021/09/09	108	40 - 130	108	40 - 130	<0.50	ug/L	2.0	40		
7566501	Aldicarb	2021/09/09	89	70 - 130	90	70 - 130	<5.0	ug/L	3.4	40		
7566501	Atrazine + Desethyl-atrazine	2021/09/09	64	30 - 130	62	30 - 130	<1.0	ug/L	0.36	40		
7566501	Atrazine	2021/09/09	86	30 - 130	84	30 - 130	<0.50	ug/L	0.95	40		
7566501	Bendiocarb	2021/09/09	89	40 - 130	90	40 - 130	<2.0	ug/L	2.4	40		
7566501	Benzo(a)pyrene	2021/09/09	101	30 - 130	96	30 - 130	<0.0050	ug/L	3.3	40		
7566501	Bromoxynil	2021/09/09	87	40 - 130	85	40 - 130	<0.50	ug/L	1.3	40		
7566501	Carbaryl	2021/09/09	91	40 - 130	91	40 - 130	<5.0	ug/L	0.80	40		
7566501	Carbofuran	2021/09/09	92	40 - 130	90	40 - 130	<5.0	ug/L	0.47	40		
7566501	Chlorpyrifos (Dursban)	2021/09/09	86	40 - 130	86	40 - 130	<1.0	ug/L	3.0	40		
7566501	Cyanazine (Bladex)	2021/09/09	80	40 - 130	76	40 - 130	<1.0	ug/L	1.9	40		

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7566501	Des-ethyl atrazine	2021/09/09	42	30 - 130	40	30 - 130	<0.50	ug/L	3.1	40		
7566501	Diazinon	2021/09/09	77	40 - 130	78	40 - 130	<1.0	ug/L	2.4	40		
7566501	Dicamba	2021/09/09	75	30 - 130	73	30 - 130	<1.0	ug/L	2.8	40		
7566501	Diclofop-methyl	2021/09/09	89	40 - 130	87	40 - 130	<0.90	ug/L	1.2	40		
7566501	Dimethoate	2021/09/09	76	40 - 130	74	40 - 130	<2.5	ug/L	1.9	40		
7566501	Dinoseb	2021/09/09	84	40 - 130	82	40 - 130	<1.0	ug/L	1.3	40		
7566501	Ethyl Parathion	2021/09/09	80	40 - 130	78	40 - 130	<1.0	ug/L	0.67	40		
7566501	Malathion	2021/09/09	86	40 - 130	85	40 - 130	<5.0	ug/L	0.19	40		
7566501	Methyl parathion	2021/09/09	81	30 - 130	79	30 - 130	<1.0	ug/L	0.14	40		
7566501	Metolachlor	2021/09/09	77	40 - 130	77	40 - 130	<0.50	ug/L	0.72	40		
7566501	Metribuzin (Sencor)	2021/09/09	107	40 - 130	105	40 - 130	<5.0	ug/L	0.63	40		
7566501	Pentachlorophenol	2021/09/09	80	25 - 130	79	25 - 130	<0.50	ug/L	0.13	40		
7566501	Phorate	2021/09/09	74	40 - 130	74	40 - 130	<0.50	ug/L	2.5	40		
7566501	Picloram	2021/09/09	41	10 - 130	38	10 - 130	<5.0	ug/L	13	40		
7566501	Prometryne	2021/09/09	85	30 - 130	81	30 - 130	<0.25	ug/L	4.9	40		
7566501	Simazine	2021/09/09	80	40 - 130	78	40 - 130	<1.0	ug/L	0.038	40		
7566501	Terbufos	2021/09/09	79	40 - 130	79	40 - 130	<0.50	ug/L	1.3	40		
7566501	Triallate	2021/09/09	84	40 - 130	83	40 - 130	<1.0	ug/L	1.2	40		
7566501	Trifluralin	2021/09/09	94	40 - 130	91	40 - 130	<1.0	ug/L	3.6	40		
7567026	Glyphosate	2021/09/09	106	50 - 130	108	50 - 130	<10	ug/L	NC	40		
7567661	WAD Cyanide (Free)	2021/09/10	97	80 - 120	98	80 - 120	<0.0010	mg/L	NC	20		
7569961	Diuron	2021/09/10	88	40 - 130	85	40 - 130	<10	ug/L	NC	40		
7569961	Guthion (Azinphos-methyl)	2021/09/10	102	40 - 130	98	40 - 130	<2.0	ug/L	NC	40		
7569961	Temephos	2021/09/10	70	40 - 130	65	40 - 130	<10	ug/L	NC	40		
7615543	1,2,3,4,6,7,8-Hepta CDD	2021/10/03			105	70 - 140	<1.02, EDL=1.02	pg/L	2.8	25		
7615543	1,2,3,4,6,7,8-Hepta CDF	2021/10/03			99	82 - 122	<1.20, EDL=1.20	pg/L	3.0	25		
7615543	1,2,3,4,7,8,9-Hepta CDF	2021/10/03			99	78 - 138	<1.38, EDL=1.38	pg/L	2.0	25		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7615543	1,2,3,4,7,8-Hexa CDD	2021/10/03			104	70 - 164	<1.19, EDL=1.19	pg/L	8.3	25		
7615543	1,2,3,4,7,8-Hexa CDF	2021/10/03			103	72 - 134	<1.32, EDL=1.32	pg/L	1.9	25		
7615543	1,2,3,6,7,8-Hexa CDD	2021/10/03			114	76 - 134	<0.906, EDL=0.906	pg/L	0.88	25		
7615543	1,2,3,6,7,8-Hexa CDF	2021/10/03			103	84 - 130	<1.21, EDL=1.21	pg/L	2.9	25		
7615543	1,2,3,7,8,9-Hexa CDD	2021/10/03			111	64 - 162	<0.995, EDL=0.995	pg/L	4.4	25		
7615543	1,2,3,7,8,9-Hexa CDF	2021/10/03			103	78 - 130	<1.37, EDL=1.37	pg/L	0.97	25		
7615543	1,2,3,7,8-Penta CDD	2021/10/03			110	25 - 181	<1.03, EDL=1.03	pg/L	1.8	25		
7615543	1,2,3,7,8-Penta CDF	2021/10/03			107	80 - 134	<1.47, EDL=1.47	pg/L	3.7	25		
7615543	2,3,4,6,7,8-Hexa CDF	2021/10/03			108	70 - 156	<1.29, EDL=1.29	pg/L	1.8	25		
7615543	2,3,4,7,8-Penta CDF	2021/10/03			111	68 - 160	<1.27, EDL=1.27	pg/L	3.5	25		
7615543	2,3,7,8-Tetra CDD	2021/10/03			99	67 - 158	<1.33, EDL=1.33	pg/L	2.0	25		
7615543	2,3,7,8-Tetra CDF	2021/10/03			102	75 - 158	<1.06, EDL=1.06	pg/L	1.9	25		
7615543	Octa CDD	2021/10/03			112	78 - 144	<1.14, EDL=1.14	pg/L	2.6	25		
7615543	Octa CDF	2021/10/03			116	63 - 170	1.31, EDL=1.24	pg/L	3.4	25		
7615543	Total Hepta CDD	2021/10/03					<1.02, EDL=1.02	pg/L				
7615543	Total Hepta CDF	2021/10/03					<1.28, EDL=1.28	pg/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7615543	Total Hexa CDD	2021/10/03					<1.02, EDL=1.02	pg/L				
7615543	Total Hexa CDF	2021/10/03					<1.30, EDL=1.30	pg/L				
7615543	Total Penta CDD	2021/10/03					<1.03, EDL=1.03	pg/L				
7615543	Total Penta CDF	2021/10/03					<1.36, EDL=1.36	pg/L				
7615543	Total Tetra CDD	2021/10/03					<1.33, EDL=1.33	pg/L				
7615543	Total Tetra CDF	2021/10/03					<1.06, EDL=1.06	pg/L				

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

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VALIDATION SIGNATURE PAGE

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VALIDATION SIGNATURE PAGE(CONT'D)

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

For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#21375 Golder Associates Ltd	Company Name:		Quotation #:	B80683	BV Labs Job #:	Bottle Order #: 842984
Attention:	Accounts Payable	Attention:	Gregory Padusenko	P.O. #:			
Address:	210 Sheldon Drive Cambridge ON N1T 1A8	Address:		Project:	21456909	COC #: C#842984-01-01	Project Manager: Ema Gitej
Tel:	(519) 620-8182 Fax:	Tel:	(519) 620-8182 Ext: 6509 Fax: (519) 620-9878	Project Name:			
Email:	CanadaAccountsPayableInvoices@golder.com	Email:	Gregory_Padusenko@golder.com	Site #:			
				Sampled By:	PEM		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality ☐ PWQO ☐ Reg 406 Table ☐ Other

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle) Metals / Hg / Cr VI	ODWSOG Tables 1, 2 and 4	# of Bottles	Comments
1		PW21-1	21/09/03	10:00	GW		X	27	disregard date on label
2									
3									
4									
5									
6									
7									
8									
9									
10									

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ____ Time Required: ____ ☐
Rush Confirmation Number: ____ *(call lab for #)*

REC'D IN WATERLOO
03-Sep-21 13:54
Ema Gitej
C1P4129
YTH ENV-1270
On Ice Packs

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Rec'd	Custody Seal Present	Yes	No
Paul McKell	21/09/03	13:59	Inspect Courier Rep + Return	2021/09/03	13:54			9/1/12 15/15/15	Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

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** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

BV#421154 ONSCE 7174 9/4/6 9/9/9 Submitted as 2 coolers

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 210000568-NR

22-September-2021

Bureau Veritas Canada - Mississauga
Attn : Subcontract Coordinator

6740 Campobello Road
Mississauga, ON
L5N 2L8, Canada

Phone: 905-817-5798
Fax:

Date Rec. : 07 September 2021
LR Report: **CA15208-SEP21**
Reference: Job#: C1P4129

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Bromate mg/L
1: Analysis Start Date		---	16-Sep-21
2: Analysis Start Time		---	13:01
3: Analysis Completed Date		---	22-Sep-21
4: Analysis Completed Time		---	11:40
5: MAC		---	0.01
6: MDL		---	0.005
7: QC - Blank		---	< 0.005
8: QC - STD % Recovery		---	98%
9: QC - DUP % RPD		---	ND
10: NR PW21-1	03-Sep-21 10:00	14.0	< 0.005

MAC - Maximum Acceptable Concentration
MDL - SGS Method Detection Limit
NR - Not regulated / reportable under applicable Provincial drinking water regulations as per client.
ND - Not Detected

Method Descriptions

Parameter	Description	SGS Method Code
Bromate	Bromate by Ion Chromatograph	ME-CA-[ENV]IC-LAK-AN-006

Kimberley Didsbury
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002649470

Data reported represents the sample submitted to SGS. Reproduction of this analytical report in full or in part is prohibited without prior written approval. Please refer to SGS General Conditions of Services located at https://www.sgs.ca/en/terms-and-conditions (Printed copies are available upon request.)
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Updated Hydrogeological Investigation Report
Fergus Golf Course Redevelopment
Residential Development
Fergus, Ontario

GEMTEC Project: 101987.017

GEMTEC
www.gemtec.ca

Submitted to:

Fergus Development Inc.
3190 Steeles Avenue East, Suite 300
Markham, Ontario
L3R 1G9

Updated Hydrogeological Investigation Report
Fergus Golf Course Redevelopment
Residential Development
Fergus, Ontario

November 11, 2024
GEMTEC Project: 101987.017

experience • knowledge • integrity

GEMTEC Consulting Engineers and Scientists Limited
850 Champlain Avenue, Unit 101
Oshawa, ON, Canada
L1J 8C3

November 11, 2024 File: 101987.017 – Rev2

Fergus Development Inc.
3190 Steeles Avenue East, Suite 300
Markham, Ontario
L3R 1G9

Attention: Theyonas Manoharan, P.Eng., Project Manager, Land Development
Bobby Wang, H.B.Sc., M.Eng., LEED AP BD + C

Re: Updated Hydrogeological Investigation Report - Residential Development
8243 and 8282 Wellington Road 19, Fergus, Ontario

Please find enclosed the draft Updated Hydrogeological Investigation Report for the proposed residential development project at 8243 and 8282 Wellington Road 19 in the Town of Fergus, Ontario. Please provide any comments on the draft report. This report was prepared by Andy Weatherson P.Geo and Jacqueline Brook P.Geo, and reviewed by Andrius Paznekas, M.Sc., P.Geo. If there are any questions in the meantime, please contact the undersigned.

Yours truly,

GEMTEC Consulting Engineers and Scientists Limited

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

Chris Kellestine, A.Sc.T., PMP
Associate VP Operations - Ontario

CC/AW/JB/AP/CLK/sv

N:\Projects\101900\101987.017\Deliverables\Reports\7. Updated HIR\101987.017_RPT_Hydrog Investigation Update_Fergus_2024-11-11_Rev2.docx

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) has been retained by Fergus Development Inc. to conduct a hydrogeological investigation as part of the detailed plan submission process and provide an update to the hydrogeological conceptual model for the proposed residential redevelopment of the Fergus Golf Club property located at 8243 and 8282 Wellington Road 19 in the Town of Fergus, Ontario.

This report updates information provided in a previous Hydrogeological Investigation Report:

- WSP Canada Inc (WSP). April 2023. *Hydrogeological Investigation – Updated*. *Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Fergus, Ontario.* Submitted to 883890 Ontario Limited c/o Fergus Development Inc. (WSP, 2023a)

The current report includes additional information from a supplemental drilling program carried out in 2023, additional water level monitoring data from 2023 and 2024, water quality sampling, and a revised water balance assessment based on the current site design. The purposes of this hydrogeological investigation are to:

- Update the conceptual model of the site with new information;
- Prepare an assessment of the pre-development, post-development, and mitigated post-development water balance based on the current site design; and
- To provide a preliminary assessment of the need for construction dewatering permitting as well as identify groundwater users that could be potentially impacted by construction.

This Report is subject to the Conditions and Limitations of This Report, which follows the text of the report, and are considered an integral part of the report (Appendix A). The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, GEMTEC should be given an opportunity to confirm that the recommendations in this report are still valid.

1.1 Site and Project Description

Fergus Golf Club property (the Site) is located along Wellington Road 19 starting approximately 0.2 km northeast of 2nd Line extending to 3rd Line. The Site consists of two parcels; the northwest parcel (the NW Site) which is 42.35 ha, situated on the north side of Wellington Road 19, and the southeast parcel (the SE Site) which is 39.85 ha, situated on the south side of Wellington Road 19 as shown on Figure B.1, Site Location Map, in Appendix B.

The “Overall Development Concept” drawing (Burnside, 2024; Appendix C) indicate that the NW Site will be redeveloped as a golf course, and the SE Site will be redeveloped to include 118

approximately half acre residential lots, 6.34 ha of open space, a stormwater management facility and associated roads and utilities. The SE Site is currently occupied by a residential house, a golf course, and grass fields.

1.2 Existing Subsurface Investigation Reports

This report draws on previous hydrogeological and geotechnical reports for subsurface investigation information, referenced as follows:

- WSP Canada Inc (WSP). January 2022. *Water Supply Investigation. Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Fergus, Ontario*. Submitted to 883890 Ontario Limited c/o Fergus Development Inc. (WSP, 2022)
- WSP Canada Inc (WSP). April 2023*. Hydrogeological Investigation – Updated. Proposed Residential Redevelopment, 8243 and 8282 Wellington Road 19, Fergus, Ontario.* Submitted to 883890 Ontario Limited c/o Fergus Development Inc. (WSP, 2023a)
- GEMTEC Consulting Engineers and Scientists (GEMTEC). November 2023. *DRAFT Detailed Report Fergus Golf Course Redevelopment Site Course Lands, Fergus, Ontario.* Submitted to Fergus Development Inc. (GEMTEC, 2023)

2.0 PROJECT SETTING

2.1 Topography and Drainage

The Site is located in the Grand River watershed. Surface water features near the Site include Lake Belwood to the east of the SE Site, which is the reservoir along the Grand River created by the construction of the Shand Dam, and Irvine Creek located to the west of the NW Site, which flows southwest.

A survey prepared by R-PE Surveying Ltd. O.L.S. in 2021, included in Appendix C, shows that elevations at the SE Site vary between approximately 427.5 metres above sea level (m asl) and 437 m asl. The SE Site is shaped like a trough, from Wellington Road 19 along the northern perimeter, the topography slopes downward to the south and east, there is a topographic low in the centre of the SE Site associated with a wetland, and the topography increases again along the eastern perimeter of the SE Site.

Within the SE Site, surface water features include three small irrigation ponds, local wetlands and the Black Creek Drain. The upstream limit of the Black Creek Drain receives runoff from the roadside ditch along Wellington Road 19, and flows southward through the middle of the wetland in the centre of the SE Site and discharges to Irvine Creek 2.5 km to the west. The irrigation ponds will not be retained post-development.

There are four unevaluated wetlands on the SE Site, most of which are mapped around the forested and undeveloped area in the central portion of the SE Site shown in Figure B.2, Physiography and Drainage (MNRF, 2024). The largest wetland situated in the central portion of

the SE site will be retained post development and the three smaller mapped wetlands will not be retained.

2.2 Physiography and Geology

The Site physiography is shown on Figure B.2, Physiography and Drainage, Appendix B. Physiographic mapping (Chapman and Putnam, 2007) indicates that the Site is located across two physiographic regions: Drumlinized Till Plains and Spillway. The northern third of the NW Site and the majority of SE Site are mapped as spillway and the southern two thirds of the NW Site is mapped as drumlinized till plains.

Surficial geology mapping of the Site is shown on Figure B.3, Surficial Geology, Appendix B. Published surficial geology mapping (Ontario Geological Survey, 2010) of the Site, indicates that the surficial geology across most of the SE Site consists of distal sands and gravel deposits overlying glacial till deposits. The glacial till is exposed at the surface on the NW Site. On the eastern portion of the NW Site the surficial geology is comprised of a fine-grained till, and on the western portion of the NW Site the surficial geology consists of a stone-poor, sandy silt to silty sand ablation till.

Paleozoic bedrock geology mapping (Armstrong and Dodge, 2007) indicates that the overburden is underlain by shale and dolostone of the Guelph Formation.

2.3 Designated Areas

The MECP Source Protection Information Atlas (MECP, 2023) was reviewed for the presence of source water protection areas within 500 m of the site including: Wellhead Protection Areas (WHPA) associated with municipal groundwater supplies, Intake Protection Zones (IPZ) associated with municipal surface water supplies, Significant Groundwater Recharge Areas (SGRA), and Highly Vulnerable Aquifers (HVA).

The nearest HVA is located approximately 2 km southeast of the SE Site. Much of the NW and SE Site are within a WHPA-D and SGRA. Portions of the SE Site and NW Site are located within IPZ-3s associated with the Black Creek Drain and a tributary of Irvine Creek, and a portion NW and SE Site are located within a WHPA-Q (for quantity). The extent of the WHPA-Q is shown on Figure B.1, Site Location Map, Appendix B.

2.4 Water Well Records

A review of the Ministry of the Environment, Conservation, and Parks (MECP) water well records (WWR) (MECP, 2021) indicated that there are 72 WWR reported within approximately 500 m of the Site (Figure B.4, *MECP Well Records within 500 metres*, Appendix B), including 62 domestic supply wells, one public supply well, seven abandoned, and two wells of unknown use.

According to the WWR, overburden ranges from 21.3 m to 74.7 m with an average thickness of 33.96 m, and generally consists of clay, loam, sand, and gravel/stones. The underlying bedrock consists of shale and limestone bedrock.

Static groundwater level ranged from approximately 1.2 m to 23.8 m below ground surface (bgs). A summary of information from the WWR is presented in Table D.1 in Appendix D. A summary of the data from the water well records that were reviewed is presented in Table 2.1 below.

Table 2.1 – Summary of MECP Water Well Records

Category	Overburden	Bedrock	Well Depth (m)		
			Min.	Max.	Avg.
Domestic/Livestock/ Cooling and A/C	15	47	6.4	92.0	44.1
Public	1	0	25.6	25.6	25.6
Abandoned	7 records		-	-	-
Records with Poor or No Information	2 records		-	-	-

3.0 PREVIOUS INVESTIGATIONS BY OTHERS

3.1 Site Instrumentation

The Site is instrumented with numerous previously installed monitoring wells, test holes, piezometers and staff gauges for the purposes of groundwater and surface water level monitoring (WSP, 2022; WSP 2023a, 2023b, and 2023c). The locations of the boreholes, monitoring wells, piezometers, and staff gauges are shown on Figure B.1, Site Plan, of Appendix B, and construction details are included in Table E.1, Well Construction Information, of Appendix E. WSP (2023a) previously installed eighteen boreholes (Boreholes BH21-01 to BH21-18) between March 22 and March 30, 2021. The boreholes were advanced at both the NW Site and SE Site to depths ranging from about 3 m to 10 m below ground surface (bgs). Monitoring wells were installed in 16 of the boreholes, including a bi-level installation at Borehole BH21-07.

Five piezometer and staff gauge pairs (PZ1/SG1 to PZ5/SG5) were installed at the SE Site as part of the hydrogeological investigation by WSP (2023a). The piezometer and staff gauge pair, PZ1/SG1, is located within the Black Creek Drain and PZ2/SG2 to PZ5/SG5, inclusive, are located within the local wetlands.

As part of the drinking water supply study carried by out in 2021 by WSP (2022), a test hole was drilled in the northwest corner of the NW Site, PW21-1. PW21-1 is cased to a depth of 32.9 m bgs and has an open bedrock interval between the depths of 32.9 to 84.1 m bgs. Three additional

bedrock monitoring wells (MW101, MW102, and MW103) were installed to a depth 61 m bgs. Two additional piezometer and staff gauge pairs were installed ponds on the NW Site (MP-1/SG-1 and MP-2/SG-2) as part of the water supply study investigation by WSP (2022).

Additional shallow monitoring wells were installed as part of Phase Two Environmental Site Assessments for the NW Site [MW22-01 (NW Site)] and SE Site [MW22-27 (SE Site) and MW22-28 (SE Site)] (WSP, 2023b and WSP, 2023c).

In addition to supply well PW21-1, there are four historical bedrock supply wells on-site: North Irrigation Well, South Irrigation Well, Clubhouse Well, and Old Clubhouse well.

3.2 Water Level Monitoring

WSP (2023a) monitored groundwater levels in seventeen monitoring wells in April 2021 and October 2022. The shallow groundwater levels (i.e., excluding BH21-07D) ranged from -0.09 m bgs (artesian conditions; BH21-17 on April 5, 2021) to 3.37 m bgs (BH21-09 on October 7, 2022), and from elevation (El.) 423.97 m above mean sea level (amsl) (BH21-01 on April 9, 2021) to El. 434.56 m amsl (BH21-03 on April 14, 2021). Shallow groundwater flow at the SE Site was inferred to generally flow towards Black Creek Drain, with the exception of the eastern edge of the SE Site where the inferred flow was in a northeasterly direction towards Lake Belwood (WSP, 2023a). An upward vertical gradient was observed at BH21-07S/D in April 2021 and October 2022.

Water levels were measured at monitoring wells MW22-01, MW22-27 and MW22-28 as part of the Phase Two Environmental Site Assessments (WSP, 2023b and WSP, 2023c) on December 13, 2022 and January 11, 2023. Water level measurements at the other monitoring locations were not completed.

Black Creek Drain was flowing when the piezometers and staff gauges were installed on March 29, 2021, but stagnant water or dry conditions were observed in April 2021 and October 2022 (WSP, 2023a).

Levels in within the piezometer staff gauge pairs instrumented throughout the Site were observed on three events in April 2021. Upward vertical gradients were observed at PZ1/SG1 and PZ3/SG3 during all three events. Downward vertical gradient were observed at PZ5/SG5 during all three events, and both upward and downward vertical gradients were observed at PZ2/SG2 and PZ4/SG4 (WSP, 2023a).

A summary of the water level monitoring data is provided in Table E.2, Groundwater Depths and Elevations, of Appendix E.

3.3 Hydraulic Response Testing

WSP (2023a) conducted single well response testing (i.e., rising head tests) at the monitoring wells constructed in Boreholes BH21-01, BH21-03, BH21-05, BH21-06, BH21-07S, BH21-08, BH21-10, BH21-16, BH21-17 and BH21-18 between April 8 and 14, 2021. The tested material included non-cohesive silty sand, sandy silt, silt and sand, silty sand and gravel and glacial till, as well as cohesive silty clay, clayey silt and glacial till. The estimated hydraulic conductivity values for the non-cohesive material ranged from 2 x 10^{-7} m/s (BH21-06 and BH21-18) to 4 x 10^{-6} m/s (BH21-08)(WSP, 2023a). The estimated hydraulic conductivity values for the cohesive material ranged from 8 x 10^{-9} m/s (BH21-01) to 6 x 10^{-6} m/s (BH21-03) (WSP, 2023a).

4.0 FIELD INVESTIGATION PROCEDURES

4.1 Geotechnical Investigation

The field work for the current geotechnical investigation (GEMTEC, 2023) at the Site was carried out between October 31 and November 20, 2023, during which time 46 boreholes (designated as Boreholes BH23-01 to BH23-46) were advanced at the Site, including 25 boreholes at the SE Site and 21 boreholes at the NW Site. Boreholes were advanced to depths between about 3.2 m and 9.6 m bgs at the locations shown on the Site Plan, Figure B.1, in Appendix B.

The boreholes were advanced using a track-mounted drill rig supplied and operated by a specialist drilling contractor, subcontracted by GEMTEC, who is a Ministry of the Environment, Conservation and Parks (MECP)-licensed Water Well Contractor. Standard Penetration Testing (SPT) and sampling was carried out at regular intervals of depth in the boreholes using conventional 35 mm internal diameter split spoon sampling equipment advanced using an automatic hammer, in accordance with ASTM D1586 (99) “Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils”. The split-spoon samplers used in the investigations limit the maximum particle size that can be sampled and tested to about 35 mm. Therefore, particles or objects that may exist within the soils that are larger than this dimension were not sampled or represented in the grain size distributions. The results of the in-situ field tests (i.e., SPT “N”-values), as presented on the Record of Borehole sheets and in subsequent sections of this report, are the values measured directly in the field and are unfactored / uncorrected. The groundwater conditions were recorded in the open boreholes immediately following drilling.

The field work for this investigation was directed by a member of our technical staff who located the boreholes in the field, directed the sampling and in-situ testing operation, logged the boreholes and cared for the samples obtained. The samples were identified in the field, placed in appropriate containers, labelled and transported to GEMTEC’s Mississauga office for further examination and laboratory testing. Index and classification tests, consisting of water content determinations, Atterberg limits and grain size distribution, were carried out on selected soil samples.

The borehole locations were selected by GEMTEC in consultation with the project team and staked out on-site by GEMTEC technical staff. The as-drilled ground surface elevations, locations and elevations of the monitoring wells were surveyed by Rady-Pentek & Edward (R-PE) Surveyor Ltd. of Woodbridge, Ontario for the NW Site, and by GEMTEC staff in the SE Site. The coordinates and geodetic elevation data (CGVD2013) were provided to GEMTEC. The ground surface elevations for each borehole location where monitoring wells were not installed were estimated from the existing site grading drawings and should be considered as approximate.

Descriptions of the subsurface conditions observed in the boreholes are provided on the Record of Borehole sheets in Appendix F. The results of the laboratory tests on soil samples are also provided on the Record of Borehole sheets (Appendix F).

4.2 Monitoring Wells Installed for Other Investigations

Two shallow monitoring wells were installed on the NW Site as part of the Phase Two Site Assessment Update (GEMTEC, 2024b): BH23-N1 and BH23-N2. In addition, three deep overburden wells were installed in 2024 by GEMTEC as requested by R.J. Burnside and Associates (Burnside): BH24-1, BH24-2 and BH24-3. The Record of Borehole sheets for these wells are also included in Appendix F.

4.3 Hydrogeological Investigation

4.3.1 Site Instrumentation

As part of the combined geotechnical (GEMTEC, 2023) and hydrogeological field program, monitoring wells were installed at fourteen borehole locations (Boreholes BH23-02, BH23-09, BH23-20, BH23-24, BH23-27, BH23-29, BH23-33, BH23-36, BH23-38, BH23-41, BH23-43, BH23-44, BH23-45 and BH23-46). Bi-level monitoring well installations (i.e., shallow (S) and deep (D) monitoring well pairs installed in separate and adjacent boreholes) were installed at Boreholes BH23-20 and BH23-24 for a total of sixteen monitoring wells.

The monitoring wells were constructed using nominal 50 mm diameter polyvinyl chloride (PVC) standpipe and machine-slotted screen. The annular space between the monitoring well screen and surrounding soils was backfilled with silica filter sand to a maximum of 0.6 m above the top of the screen, and the remainder of the annular space was sealed with bentonite. Monitoring wells were completed with either aboveground protective steel casings or flush mount casings depending on their location throughout the golf course.

Following installation, all of the monitoring wells (other than those constructed for Burnside) were developed to remove drilling fluids, solids or other particles that may have been introduced during drilling/installation. All monitoring wells were purged using dedicated 16 mm inside diameter low density polyethylene (LDPE) tubing and a D-25 Waterra™ foot valve. The monitoring wells were developed by removing three well volumes or until dry.

4.3.2 Hydraulic Response Testing

In addition to in-situ single well response testing (SWRT) conducted by WSP (2023a), in-situ SWRT was carried out in ten selected monitoring wells (i.e., Boreholes BH23-02, BH23-09, BH23-20S, BH23-20D, BH23-27, BH23-29, BH23-33, BH23-36, BH23-41 and BH23-46) to estimate the bulk hydraulic conductivity (K_b) of the overburden materials adjacent to the screened intervals. The testing consisted of creating an instantaneous change through rapid well purging in the well by removing a known volume of water, followed by recording the time taken for the water level to return to static conditions (i.e., rising head test). The data was analyzed using the Aqtesolv® for Windows® version 4.50 software and the Bouwer and Rice (1976) solution for unconfined conditions.

A summary of the test results is provided in Table E.3, Appendix E. The hydraulic response testing data, analysis, input parameters and estimated bulk hydraulic conductivity for each test is provided in Appendix G.

4.3.3 Groundwater and Surface Water Sampling

To evaluate disposal options for pumped groundwater from potential future construction dewatering activities, groundwater samples were collected from the monitoring wells installed in Boreholes BH23-20S, BH23-33, and BH23-41. Samples were collected on December 19 and 21, 2023.

Prior to collecting the groundwater samples, the monitoring wells were purged in accordance with industry standards to obtain representative samples. Following purging, the groundwater was sampled with the use of a dedicated bailer and poured directly into laboratory-supplied sample bottles. The groundwater was not field filtered to allow for comparison of the analytical results to the sewer use by-law discharge limits and the surface water quality objectives.

In addition, a surface water sample was collected on December 19, 2023 from Black Creek Drain on the SE Site, at the location shown on the Site Plan, Figure B.1, in Appendix B. The sample was collected from the bank by hand dipping a clean sampling container into the flow and pouring directly into laboratory-supplied sample bottles. The surface water was not field filtered to allow for comparison of the analytical results to the surface water quality objectives. According to historic data available from the Fergus MOE weather station (climate.weather.gc.ca; Climate ID: 6142402), trace amounts of precipitation prior to the sampling event.

The samples obtained during this investigation were packed into coolers with ice for transit to the analytical laboratory. The samples were hand delivered on the days of collection to Bureau Veritas Laboratories (BV Labs) of Mississauga, Ontario. The samples were analyzed for the list of parameters included in The Centre Wellington Sewer Use By-Law # 2022-66, Schedule A Restricted Wastes – Sanitary Sewer (Schedule A Limits) and Schedule B Restricted Wastes - Storm Sewer (Schedule B Limits). The analytical results were compared to the Schedule A Limits and Schedule B Limits and to the Provincial Water Quality Objectives (PWQO) of the Ministry of

the Environment and Energy (MOEE, now the MECP), Policies, Guidelines and Provincial Water Quality Objectives, July 1994, Table 2 – Table of PWQOs and Interim PWQOs. A summary of the water quality data (i.e., Table H.1) with comparison to the Limits and PWQO, and the laboratory Certificate of Analysis, is provided in Appendix H.

5.0 SITE CHARACTERISATION

5.1 Subsurface Conditions

As previously indicated, the soil and groundwater conditions identified in the boreholes as part of the current study are presented on the Record of Borehole sheets in Appendix F. The Record of Borehole sheets indicate the subsurface conditions at the specific borehole locations only. Boundaries between zones on the Record of Borehole sheets are often not distinct, but rather are transitional and have been interpreted from discontinuous drilling observations. The precision with which subsurface conditions are indicated depends on the method of drilling, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at locations other than the boreholes may vary from the conditions encountered in the boreholes, both laterally and with depth. In addition to soil variability, fill of variable physical and chemical composition is present in portions of the Site associated with previous construction activities (i.e., parking areas, buildings, etc.).

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and GEMTEC does not guarantee descriptions as exact but infers accuracy to the extent that is common in current geotechnical and hydrogeological practice.

Boreholes BH23-01 to BH23-25 were advanced at the SE Site. The subsurface soil conditions at the SE Site are generally comprised of:

- surficial topsoil and organics ranging in thickness from about 0.2 m to 0.4 m, underlain by;
- native silt to silty clay in Boreholes BH23-01 to BH23-06 and below the silty sand deposit in Boreholes BH23-07 and BH23-13. The silt to silty clay extended to depths between 0.8 m and 2.3 m bgs. The silt to silty clay was underlain by;
- native sand to silty sand to sand and silt to clayey sand in Boreholes BH23-01, BH23-02 and BH23-05. This material was encountered directly beneath the topsoil in Boreholes BH23-07, BH23-08, BH23-10 to BH23-13, and BH23-15 to BH23-25. The sand deposits extended to depths between 0.8 m and 4.8 m bgs and was underlain by;
- silt till to silty clay till to clayey silt till. All boreholes except Boreholes BH23-06 and BH23-21 were terminated in the glacial till at depths between 3.2 m and 9.6 m bgs. The glacial till was underlain by;
- silt to gravelly silty sand was encountered in Boreholes BH23-06 and BH23-21 at depths of 9.1 m and 3.1 m, respectively.

Boreholes BH23-26 to BH23-46 were advanced at the NW Site. The subsurface soil conditions at the NW Site are generally comprised of:

- surficial topsoil ranging in thickness from about 0.1 m to 0.3 m, underlain by;
- a relatively thin layer of native silt to silty sand extending to depths between about 0.8 m and 1.5 m bgs. A silty clay deposit was encountered in Borehole BH23-29 underlying the silt deposit and was observed to be about 1.5 m thick. The silt to silty sand was underlain by;
- silty clay till to clayey silt till to silt till. An approximately 0.8 m thick silty sand deposit was encountered within the glacial till at a depth of about 2.3 m bgs. All boreholes were terminated in the glacial till at depths between 3.5 m and 9.6 m bgs.

5.2 Water Level Monitoring

Details of the monitoring well installations are summarized in Table E.1, Appendix E. Groundwater level readings were taken in on-site monitoring wells on five events (November 30 and December 1, December 18, 2023, January 3-5 and 8, February 5, and March 11-12, 2024). The groundwater levels were measured relative to the top of the PVC standpipe at each monitoring well location. In addition, groundwater and surface water level readings were taken from all piezometer and staff gauges previously installed by WSP over four events (November 30 and December 1, 2023, January 3-5 and 8, February 5, and March 11-12, 2024). The groundwater depth and elevation data are provided in Table E.2, Appendix E.

The groundwater levels in the monitoring across the Site ranged from -0.05 m bgs (artesian conditions; Borehole BH21-08 on March 11, 2024) to 3.90 m bgs (Borehole BH24-03 on March 11-12, 2024) and from El. 424.13 m amsl (Borehole BH24-02) to El. 434.51 m amsl (Borehole BH21-03). Groundwater elevations on March 11-12, 2024 are contoured on Figure B.5 in Appendix B. Shallow groundwater generally follows topography, and in the SE Site, shallow groundwater is interpreted to discharge to the Black Creek Drain and to Belwood Lake on eastern portion of the SE Site.

There are three bi-level monitoring well locations on the SE Site (i.e., Boreholes BH21-07S/D, BH23-20S/D, and BH23-24S/D), the vertical hydraulic gradient was assessed from the groundwater levels measured between November 2023 and March 2024 when measurements were taken at the bi-level monitoring wells locations. The estimated vertical hydraulic gradient for the bi-level monitoring wells are summarized in Table 5.1.

Table 5.1 – Summary Hydraulic Gradients at Bi-Level Monitoring

Bi-Level Well Installation	Nov. 30 and Dec. 1, 2023 (m/m)	Dec. 18-19, 2023 (m/m)	Jan. 3-5, 2024 (m/m)	Feb. 5, 2024 (m/m)	March 11-12, 2024 (m/m)
BH21-07S/D	ND[1]	ND	ND	0.06 (downward)	0.05 (downward)
BH23-20S/D	0.02 (downward)	0.01 (downward)	0.02 (downward)	0.02 (downward)	0.02 (downward)
BH23-24S/D	0.003 (downward)	0.04 (downward)	0.02 (downward)	- 0.005 (upward)	0.02 (downward)

Notes: 1. ND – No Data

The vertical hydraulic gradients at all three locations were downward during most monitoring events, indicating recharging conditions. A small upward gradient was observed at BH23-24S/D on February 5, 2024 indicating discharging conditions.

Water levels at the piezometer and staff gauge pairs were monitored from November 30, 2023 to March 12, 2024. Variable recharge and discharge conditions were observed at these locations during the monitoring period and staff gauges were observed to be dry at some different locations during the monitoring period.

Table 5.2 – Summary Hydraulic Gradients at Piezometer Staff Gauge pairs

Bi-Level Well Installation	Nov. 30 and Dec. 1, 2023	Jan. 3-5, 8, 2024	Feb. 5, 2024	March 11-12, 2024
PZ1/SG1	Dry[1]	Dry	Upward	Downward
PZ2/SG2	Upward	Dry	Downward	Downward
PZ3/SG3	Dry	Dry	Upward	Downward
PZ4/SG4	ND [2]	ND	Downward	Downward
PZ5/SG5	ND	ND	ND	Dry

Notes:
1. Dry staff gauge
2. ND – No Data

The groundwater conditions described in this report refer only to those measured at the place and time of observation. Seasonal and annual fluctuations should be anticipated.

The range of water levels as monitored by GEMTEC, and the assessment of shallow groundwater flow directions are generally consistent with previous investigations (WSP, 2023a).

5.3 Hydraulic Response Test Results

The results of the hydraulic response testing carried out in the monitoring wells installed by GEMTEC are presented in Appendix G. The hydraulic conductivity values estimated from the rising head tests are presented in Table E.3, Appendix E. Table 5.3 provides a summary of the test results.

Table 5.3 – Summary Hydraulic Conductivity Estimates

Unit	No. of Tests	Minimum K_b [m/s]	Maximum K_b [m/s]	Geomean K_b [m/s]
(ML) Gravelly, Sandy Silt Till, (ML) Sandy Silt Till	2	7×10^{-9}	7×10^{-8}	2×10^{-8}
(CL-ML) Silty Clay Till to Clayey Silt Till, (CL-ML) Sandy Silty Clay Till	6	6×10^{-9}	6×10^{-7}	3×10^{-8}
(CL) Silty Clay Till, (CL) Sandy Silty Clay Till	2	2×10^{-8}	4×10^{-7}	9×10^{-8}

The hydraulic conductivities of the glacial till at the tested intervals in the monitoring wells ranged from 6×10^{-9} m/s to 6×10^{-7} m/s, with a geomean of 3×10^{-8} m/s (n=10) across the site. The geometric averages of tests carried out on the NW Site and SE Site were 4×10^{-8} and 2×10^{-7} m/s respectively. These hydraulic conductivity values generally fall within the literature range for till of 10^{-8} m/s to 10^{-6} m/s (Fetter, 1994).

The results of the hydraulic conductivity analyses completed by GEMTEC are also generally consistent with the testing carried out by WSP as discussed in Section 3.3. A summary of current and previous hydraulic testing of Site monitoring wells is provided in Table E.3, Appendix E.

5.4 Water Quality Results

A summary of the analytical results for the groundwater and surface water samples collected December 19 and December 21, 2023 from Boreholes BH23-20S, BH23-33 and BH23-41, and the Black Creek Drain is presented in Table H.1 in Appendix H. The Laboratory Certificates of Analysis are also provided in Appendix H.

The surface water (SW) sample and groundwater sample from Borehole BH23-33 met the PWQO. The groundwater sample from BH23-33 also met the Schedule A and Schedule B Limits (Centre Wellington Sewer Use By-Law # 2022-66, Schedule A Restricted Wastes – Sanitary Sewer and Schedule B Restricted Wastes - Storm Sewer).

The following exceedances of the Schedule A Limits, Schedule B Limits, and the PWQO in the groundwater samples from Boreholes BH23-20S and BH23-41 were identified:

Borehole BH23-20S

- Total Suspended Solids (TSS) (32 mg/L vs. Schedule B of 15 mg/L).
- Total Cobalt (0.0034 mg/L vs. the PWQO of 0.0009 mg/L);
- Total Iron (0.5 mg/L vs. the PWQO of 0.3 mg/L); and,

Borehole BH23-41

- TSS (20 mg/L vs. Schedule B of 15 mg/L).
- Total Iron (0.36 mg/L vs. the PWQO of 0.3 mg/L); and,

The elevated TSS at Boreholes BH23-20S and BH23-41 is considered to be due to the difficulty of developing a monitoring well in cohesive glacial till soils to a sediment-free condition prior to sampling. It is noted that only total aluminum was analysed, the PWQO only applies to dissolved aluminum; in samples where TSS was elevated (Boreholes BH23-20S and BH23-41), total aluminum exceeded the PWQO for dissolved aluminum. The elevated aluminum may be the result of dissolution of suspended sediment (e.g., clay minerals) during sample acidification rather than representing elevated concentrations of dissolved aluminum.

Treatment of pumped water from the excavations for sediment removal to meet the Schedule B Limit for TSS of 15 mg/L at the point(s) of discharge should be anticipated. Treatment measures may include sediment or weir tanks, filter bags or cannisters, and the like. Further treatment for the removal of cobalt and iron may also be required.

6.0 TEMPORARY CONSTRUCTION DEWATERING

This section provides an estimate of temporary construction dewatering needs and potential permitting requirements based on the design details available at the time of report preparation for the following features:

- the utility corridors for water main, storm and sanitary sewers;
- the SWM pond construction; and
- the sewage pump station equipment.

It is also noted that a foundation drain collector will be proposed for a number of lots in the southern portion of the SE Site. The foundation drain collector will collect groundwater from the

residential foundation drains and will discharge it to Black Creek Drain downstream of the central wetland. Groundwater in the foundation drain collector will be segregated from the storm water to maintain it's thermal properties. As designs and placements of the foundation drain collector has not been provided, estimates of groundwater discharge from this feature has not been calculated.

6.1 Temporary Construction Dewatering Assumptions

GEMTEC has estimated construction dewatering needs based on the design drawings prepared by Burnside and TYLin (see Appendix C for copies of selected drawings), and information on construction methods as provided to GEMTEC. The analytical model assumptions and daily water taking volumes presented are for identifying dewatering permitting requirements only and do not constitute dewatering design recommendations.

6.1.1 Utility Corridor Excavations

Construction dewatering rate estimates for the utility corridor excavations were based on the conditions at Station 0+575, which is estimated to be the deepest segment of the corridor relative to the current ground surface, and the following assumptions:

- The bottom of the excavation is assumed to be the bottom of the manhole, MH10A, at El. 423.2 m amsl. The dewatering elevation is assumed to be 1.0 m below the bottom of the excavation, or El. 422.2 m amsl.
- Trenches for the utility corridors would proceed in sequential segments using a daily cut and cover method. Trench segments are assumed to be 30 m in length with a width of 5 m.
- The nearest shallow monitoring well is the monitoring at Borehole BH23-24S. The maximum groundwater elevation at Borehole BH23-24S was EL. 426.49 m amsl during the water level snapshot carried out in March, 2024.
- It is assumed that the fill used to increase the grade will have similar hydraulic properties to the native soil. A hydraulic conductivity of 2×10^{-7} m/s was assumed for the predominant silty clay till and other cohesive soils, which the geometric mean of monitoring wells tested in the SE Site as described in Section 5.3.

6.1.2 SWM Pond

Construction dewatering rate estimates for the SWM Pond were based on the following assumptions:

- The future SWP pond will have a base elevation of El 424.35 m amsl and the depth of the clay liner is proposed to be 1.5 m, therefore the bottom of the excavation is estimated to be approximately El. 422.80 m amsl. The dewatering elevation is assumed to be 1.0 m below the bottom of the clay liner, or El. 421.8 m amsl.
- The pond is approximated by a rectangle with width of 32 m and length of 160 m.

- A groundwater elevation that is 0.5 m higher than the maximum groundwater elevation observed at the shallow monitoring well located within the footprint of the future SWM pond, BH23-20S, which was El. 426.41 m amsl during the water level snapshot carried out in March, 2024.
- There are surficial sandy deposits near the pond overlying the till. A saturated thickness of 2 m of silty sand with a hydraulic conductivity of 6 x 10^{-6} m/s (the maximum hydraulic conductivity observed at the Site.
- The soil below the sand was assumed to have a hydraulic conductivity of 3 x 10^{-7} m/s, which is the average hydraulic conductivity for the shallow and deep monitoring wells at BH23-20, a bi-level monitoring well installation within the footprint of the future SWM pond.

6.1.3 Sewage Pump Station

The sewage pump station consists of several features including:

- Precast wet well;
- Precast valve chamber;
- Control building;
- Transformer; and
- Generator.

The utility corridor excavation described above at Station 0+575 is located at the connection for the sanitary pumping station. As such, this area will also have a grade increase of approximately 2.6 m.

The nearest shallow monitoring well is the monitoring at Borehole BH23-24S. The maximum groundwater elevation at borehole BH23-24S was EL. 426.49 m amsl during the water level snapshot carried out in March, 2024A hydraulic conductivity of 2 x 10^{-7} m/s was assumed for the predominant silty clay till and other cohesive soils, which the geometric mean of monitoring wells tested in the SE Site as described in Section 5.3.

Precast Wet Well

- The precast wet well floor is proposed at an elevation of 418.5 m asl. It is assumed that the base of the excavation for this feature will be 0.5 below the bottom of the floor.
- The precast wet well is proposed to have a radius of 2.1 m.

Precast Valve Chamber

- The precast valve chamber floor is proposed at an elevation of 426.0 m asl. It is assumed that the base of the excavation for this feature will be 0.5 below the bottom of the floor.
- The proposed dimension of the precast valve chamber floor are 4.4 m by 3.0 m.

Control Building, Transformer, and Generator

- It is assumed that the control building, transformer and generator will all be constructed using a slab on grade foundation. The excavation for each slab is assumed to extend 0.5 m bgs.
- The proposed dimension of the control building, transformer, and generator are estimated to be 5 m by 5 m, 3 m by 3 m, and 4 m by 2 m, respectively.

6.2 Estimated Total Temporary Dewatering Rate and Permitting Requirements

Water takings in excess of 50,000 L/day are regulated by the Ministry of the Environment, Conservation and Parks (MECP). Certain takings of groundwater and stormwater for construction dewatering purposes with a combined total of less than 400,000 L/day qualify for self-registration on the MECP's Environmental Activity and Sector Registry (EASR). A Water Taking Plan and a Discharge Plan prepared by a qualified professional are required by the MECP if water is taken under the EASR process. A Category 3 PTTW application, submitted to the MECP for review and approval is required for water takings in excess of 400,000 L/day, accompanied by a hydrogeological investigation report.

Based on the assumptions stated above, the steady state groundwater inflow rate and initial removal of groundwater from storage for the:

- Utility corridor excavations individually may exceed 50 m^3/day but less than 400 m^3/day depending on subsurface conditions;
- SWM Pond may exceed 50 m^3/day but less than 400 m^3/day depending on the rate of excavation; and
- Features potentially requiring dewatering for construction at the sewage pump station may exceed 50 m^3/day but less than 400 m^3/day collectively.

In summary, an EASR for temporary construction dewatering should be anticipated at a minimum. If multiple features are dewatered simultaneously in close proximity to one another, the cumulative water takings could exceed 400,000 litres per day, and as such, a Category 3 PTTW would be required. A Category 3 PTTW, could provide the most flexibility for multiple excavations opened simultaneously, depending on sequencing. This dewatering assessment used geometric average hydraulic conductivity values; however, dewatering may vary across the SE Site due to soil variability.

Prior to any groundwater discharge to a municipal storm sewer system (e.g., drainage ditching, Black Creek Drain), approvals may be required from the municipality. These findings should be re-evaluated as site designs progress and construction plans are developed.

The design of the construction dewatering method(s) should be carried out by a specialist dewatering contractor who is a MECP-licensed Water Well Contractor, based on their own testing

and assessment of site conditions. It is recommended that a licensed, specialist dewatering subcontractor supervise the installation, operation and decommissioning of any dewatering systems for this project, in accordance with applicable legislation. A combination of dewatering methods may be used depending on the specialist dewatering contractor's preferences, equipment and their assessment of field conditions at the time of construction. In any event, dewatering should take place from properly filtered sumps and/or wellpoints/eductors to prevent loss of ground. The contractor should take care that surface runoff is diverted away from open excavations during construction the features discussed.

6.3 Potential Dewatering-Related Impacts

The dewatering zone of influence of the utility corridor excavations and the features potentially requiring dewatering for construction at the sewage pump station are estimated to be proximal (in the order of 10 m or less) to each excavation and would not extend off-site. The dewatering zone of influence of the SWM Pond is estimated to be 40 m which would not extend off-site. Accordingly, no impacts to off-Site groundwater users are anticipated as a result of construction dewatering activities.

7.0 HYDROLOGIC WATER BALANCE

Water balance assessment for the 39.85 ha SE Site was carried out to assess potential changes of on-site groundwater recharge under the post-development conditions both without and with Low Impact Development (LID) features to enhance recharge. A water balance assessment had been carried by WSP (2023a), an updated water balance assessment was carried out using updated surficial soil information and proposed LID measures.

7.1 Land Use

7.1.1 Pre-Development Conditions

Land use at the SE Site currently consists of grass fields, a residential house, and a nine hole golf course, which includes gravel roadways, a large wooded and a wetland area the central portion of the SE Site, as well three small ponds in the north and west limits. The pre-development land use is shown on the satellite imagery of Figure B.1, Site Location Map, of Appendix B. Pre-development topography is shown on the topographic survey by R-PE Surveying Ltd.; Appendix C).

7.1.2 Post-Development Conditions

Post-development land use at the site will include 118 single family home lots, a storm water management (SWM) pond, open space, wetlands, trails, landscaped areas, and a sanitary pumping station (see "Overall Development Concept" 2024 by Burnside in Appendix C).

Estimates of land use areas including trails, roads and roof area for the sanitary pumping station were estimated from the "Overall Development Concept" drawing (Burnside, 2024; Appendix C).

Each lot was assumed to have roof area of 345 m^2 and driveway area of 85 m^2, as per Figure 6 of the "Sample Lot Impervious Breakdown" drawing by Burnside (2023), included in Appendix C.

As part of the post-development design, the grade will be raised as much as 3.71 m, in the northwestern part of the SE Site. The grading plan post-development by Burnside included in Appendix C)

7.2 Methods

A water balance is an accounting of the distribution of components of the hydrologic cycle and can be simplified in the following equation:

$$P = ET + S + R + I$$

where: P = precipitation;

ET = evapotranspiration;

S = change in soil water storage;

R = runoff; and

I = infiltration (groundwater recharge).

Precipitation is the amount of water that falls on land as either rain or snow.

Evapotranspiration refers to water lost to the atmosphere through a combination of evaporation and transpiration by vegetation. Potential evapotranspiration refers to the loss of water to the atmosphere under conditions with an unlimited water supply. Potential evapotranspiration is calculated based on temperature, heat index, and an adjusting factor for latitude. Actual evapotranspiration is typical less than the potential evapotranspiration, and is calculated using the inputted precipitation, calculated potential evapotranspiration, and change in soil water storage.

Water remains in soil after actual evapotranspiration has been removed from the sum precipitation. Change in soil water storage occurs on a seasonal basis (e.g. typically dry conditions in the summer months and wet conditions in the spring and winter); changes on an annual are assumed to be negligible. The maximum soil storage capacity for different combinations of soils and land use is quantified using water holding capacities (WHC).

A water surplus occurs when precipitation exceeds evapotranspiration and available soil water storage. A water surplus represents the amount of water available for either runoff or infiltration. The proportion of the water surplus that infiltrates was calculated using the method presented in the Ontario Ministry of the Environment (MOE) now MECP, *Stormwater Management Planning and Design Manual* (MOE, 2003). There are three infiltration sub-factors that are used to determine the proportion of the water surplus that infiltrates:

- Soil: soils are grouped into five hydrologic soil types;
- Cover: either cultivated land or woodland; and
- Topography: average the slope.

The sum of these three sub-factors is used to estimate the infiltration factor, which is applied to estimate the proportion of water surplus that may infiltrate in an area with sufficient downward gradient. Runoff is calculated as the difference between the water surplus and infiltration.

The water balance assessment was calculated on an annual basis, and components of the hydrologic cycle are quantified as depths in millimetres (mm). These depth values are then converted to volumetric estimates, reported in cubic metres per (m^3), for areas with different land uses across the SE Site. The change in infiltration under pre- and post-development conditions across the whole SE Site are compared; the objective of the mitigated post-development condition is to maintain the pre-development infiltration rates.

Consistent with the approach by WSP (2023a), the water balance assessment assumes that water bodies and wetland have upward or negligible downward gradients, and that these areas provide increased evaporation and no infiltration. Furthermore, the use of irrigation was not included in the pre-development condition water balance, as water used for irrigation is assumed to be lost as evapotranspiration.

7.2.1 Meteorological Data

The water balance assessment was completed using historical meteorological records (1965 to 2022) obtained from Environment and Climate Change Canada's (ECCC) datasets for the Fergus Shand Dam Meteorological Station (ID 6142400) for soil with different WHC. The Shand Dam Meteorological Station is the closest station to the SE Site with expected similar meteorologic conditions where a substantial historical record exists (1965 to 2022). Data regarding precipitation, potential and actual evapotranspiration, and water surplus for soils with different WHC were obtained from ECCC are presented in Tables I.1 to I.7 of Appendix I.

The average annual precipitation between 1965 and 2022 at the Fergus Shand Dam station was 961 mm/yr and the average annual potential evapotranspiration was 596 mm/yr.

7.3 Water Balance Parameters

In addition to meteorological data, the water balance assessment was carried using information provided regarding the soil types at the SE Site as identified through subsurface investigations, the current and proposed land uses, and the topography.

7.3.1 Soil and Land Use Parameters

WSP (2023a) had previously estimated areal distributions of three hydrologic soil group based on their subsurface investigation: sand loam, silt loam, and clay loam. The areal estimates of these

three soil groups were updated using supplemental subsurface information (surficial soil descriptions and grain size analyses) obtained as part of the geotechnical drilling program completed by GEMTEC (GEMTEC, 2023):

- Sand loam soil was observed to be present in the northeast end of SE Site, and estimated to represent approximately 18.39 hectares (ha) of surficial soil;
- Silt loam soil was observed to be present in the centre of the SE Site, and estimated to represent approximately 18.01 hectares (ha) of surficial soil.
- Clay loam soil was observed in the southwest end of the SE Site, and estimated to represent approximately 3.45 hectares (ha) of surficial soil.

Water holding capacities were assigned to each soil group and land use combination present at the SE Site using values listed in *Table 3.1: Hydrologic Cycle Component Values* in MOE (2003). The same soil sub-factors used by WSP (2023a) for each of these soil groups were used in this assessment, summarized in Table 7.1. For this assessment, it assumed that in areas where the grade will be changed, that surficial soil after grading will be of a similar hydrologic soil grouping to the pre-development condition soil.

The following land uses were included for the pre- and post development conditions:

- Forested area: mature forest;
- Undeveloped area: pasture shrubs;
- Lawns: golf course lawns, residential lawns and landscaping (urban lawn);
- Water courses: wetland, existing ponds, stormwater management ponds; and
- Impervious areas: rooftops, roads, driveways and pathways.

The same land cover sub-factors were used in this assessment as were used by WSP (2023a) for each land use. These are summarized for forested areas, undeveloped areas and lawns in Table 7.1. No infiltration is assumed to occur from water courses, and the water surplus is assumed to be equal to precipitation minus potential evapotranspiration. Similarly, no infiltration is assumed to occur under impervious areas, and the water surplus is assumed to be equal to 90% of precipitation.

The same topographic sub-factors used by WSP (2023a), were used in this assessment for the pre-development condition. For the post-development condition, the grading plan (Burnside, 2023; Appendix C) were used to estimate the average slope for each soil group. The post-development plan show a change in slope in the western portion of the site, resulting in a different topographic factor pre-development versus post development for the silt and clay loam soil. The soil, land cover and topographic sub-factors applied are summarized in Table 7.1.

Table 7.1 – Summary of Applied Water Holding Capacities and Infiltration Factors for Soil and Land Cover Combinations at the SE Site

Land Use: Soil Group	WHC (mm)	Infiltration Sub-Factors			
		Soil	Land Cover	Topography Factor Pre- : Post	Infiltration Factor Pre- : Post
Forested: Sand Loam	300	0.40	0.20	0.15	0.75
Forested: Silt Loam	400	0.30	0.20	0.1	0.6
Lawns or Open Space / Landscaping: Sand Loam	75	0.40	0.10	0.15	0.65
Lawns or Open Space / Landscaping: Silt Loam	125	0.30	0.10	0.10 : 0.15	0.50 : 0.55
Lawns or Open Space / Landscaping: Clay Loam	100	0.20	0.10	0.10 : 0.15	0.40 : 0.45
Undeveloped (Pasture and Shrubs): Sand Loam	150	0.40	0.10	0.15 : 0.15	0.65
Undeveloped Pasture and Shrubs): Clay Loam	250	0.2	0.1	0.1 : 0.1	0.40

7.4 Results

A portion of the SE Site, is located within a WHPA-Q, presented on Figure B.1, Site Plan, of Appendix B. As per the Grand River Source Protection Plan for the County of Wellington, Policy WC-MC-23.5, to ensure that a Recharge Reducing Activity does not become a significant drinking water threat and to maintain pre-development recharge to the greatest extent feasible, a water balance assessment is required for new developments.

As such, a water budget for the pre-development, post-development, and mitigated post-development for entire SE Site as well as the portion of the SE Site within the WHPA-Q was carried out.

The pre-development, post-development, and mitigated post-development water balance results and inputs including the areal estimates each land use, the WHC applied to each soil group, and infiltrations factors and sub-factors for each land cover combination applied are summarized in Table I.7 to I.12 of Appendix I.

7.4.1 Pre-Development

The average annual pre-development water balance assessment for the SE Site and the portion of the site within the WHPA-Q is summarized in Table 7.2.

Table 7.2 – Average Annual Pre-Development Water Balance Results

	Hydrologic Cycle Components			
	Precipitation (P)	Evapotranspiration (ET)	Infiltration (I)	Runoff (R)
SE Site	382,959	223,826	86,483	72,650
WHPA-Q Area	40,782	24,525	8,271	7,986

7.4.2 Post-Development

The average annual post-development water balance assessment for the SE Site and the portion of the site within the WHPA-Q is summarized in Table 7.3.

Table 7.3 – Average Annual Post-Development Water Balance Results

	Hydrologic Cycle Components			
	Precipitation (P)	Evapotranspiration (ET)	Infiltration (I)	Runoff (R)
SE Site	382,957	175,143	62,914	144,900
WHPA-Q Area	40,782	18,370	8,153	14,259

As presented in the water balance assessment summaries (Table 7.2 and Table 7.3.), the proposed development without mitigation is estimated to result in an increase in runoff of 99% (from 72,650 m^3/year to 144,900 m^3/year) on annual basis across the entire site compared to the pre-development condition, and a decrease in infiltration across the entire site of 27% (from 86,483 m^3/year to 62,915 m^3/year) on annual basis.

Similarly, the portion within the WHPA-Q post-development is expected to have increase in runoff of 79% (from 7,986 to 14,259 m^3/year) and infiltration is expected to decrease by 1 % (from 8,271 to 8,153 m^3/year remain compared to pre-development conditions.

7.4.3 Mitigated Post-Development

As presented above, without any mitigation, the volume of infiltration post-development is expected to decrease and the volume of runoff post-development is expected to increase relative the pre-development condition. Recharge at the SE Site is expected to contribute to maintaining a seasonally elevated water table which is understood to support the central wetland area (WSP, 2023). Furthermore, as discussed in Section 7.4.0, as a portion of the SE Site is within the WHPA-Q, this would be required to maintain pre-development recharge to the greatest extent feasible within the WHPA-Q.

Mitigation of the decrease to infiltration is proposed by constructing low impact development features (LID) that are designed to increase infiltration by diverting water that would otherwise runoff. The proposed LID measures have been incorporated into the detailed design of the SE Site are indicated in a table by Burnside ("House Grades Tables", 2024, included in Appendix C):

- 85 lots - Soakaway pits receiving the water surplus for the entire roof area; and
- 33 lots – Downspout disconnection.

In addition to subsurface LIDs, it is understood that a foundation drain collector (FDC) is proposed for a number of lots within the southern portion of the SE Site. The FDC would convey groundwater to the Black Creek Drain on the downstream side of the central wetland; water conveyed in the FDC would be segregated from the stormwater management system, and thus maintain the thermal properties of groundwater discharge to the creek. The placement of the FDC was selected so that seasonally changes in groundwater elevations would be maintained while directing groundwater from the FDC to Black Drain.

Lots were selected to have soak away pits based on Burnside's comparison of the proposed grading for the detailed site design versus the seasonally high groundwater level. The following assessment assumes a 1 m separation will be maintained between the bottom of the soak away pit and the seasonally high groundwater table.

WSP (2023a) had estimated the infiltration rates of the three soil groups over time and calculated the resulting percent runoff reduction from the implementation of infiltration trenches (an LID similar in design to a soakaway pit) to 91 lots and downspout disconnection to the remaining 27 lots. GEMTEC applied a similar approach. Note that the number of sub-surface LIDs have decreased in the current water balance assessment compared to WSP (2023a).

Using the length and width of the soak away pits specified in Figure 6 of the *Fergus Golf Course – SE Site Stormwater Management Report* by Burnside (2023) (Appendix C), an assumed depth of 0.7 m, an assumed infiltration rate for each soil type from published sources and incorporating a 2.5 factor of safety as was used by WSP (2023a), a percent runoff reduction was calculated by estimating the volume of water that would be diverted from runoff overtime by being detained in

the soak away pit and infiltrating into the soil below over a ten year period between 2014 and 2023. No infiltration is assumed to occur in January and February. A runoff reduction factor of 69%, 81% and 83% for the clay loam soils, silt loam soils, and sand loam soils was calculated respectively.

The reduction of runoff from the implementation of downspout disconnections were estimated to be 25%, 25% and 50% for the clay loam soils, silt loam soils, and sand loam soils respectively as per volumetric runoff reduction estimates provided in *Table 4.3.2: Low Impact Development Stormwater Management Planning and Design Guide* (CVC and TRCA, 2010).

In-situ infiltration rate testing is recommended to support detailed design of LID features. The infiltration rates of native soils and imported fill materials in areas where the grade is raised should be confirmed via field testing.

Table 7.4 – Average Annual Mitigated Post-Development Water Balance Results (m^3/year)

	Hydrologic Cycle Components			
	Precipitation (P)	**Evapotranspiration (ET)**	**Infiltration (I)**	**Runoff (R)**
SE Site	382,958	175,143	84,445	123,370
WHPA-Q Area	40,782	18,370	10,310	12,102

As presented in the water balance assessment summaries (Table 7.4), the proposed LID scheme described above is estimated to increase the average annual infiltration by 21,531 m^3/year over the entire SE Site compared to the unmitigated post-development conditions. The mitigated post-development conditions will still have a lower rate of infiltration compared to pre-development conditions, with a decrease of 2% (from 86,483 m^3/year to 84,445 m^3/year) on annual basis. The mitigated post-development runoff is estimated to increase by 70% (from 72,650 m^3/year to 123,370 m^3/year) on an annual basis compared to the pre-development condition.

Similarly, the portion within the WHPA-Q post-development is expected to have increase in runoff of 52% (from 7,986 to 12,102 m^3/year) and infiltration is expected to increase by 25% relative to pre-development conditions.

8.0 DISCUSSION

GEMTEC was retained to conduct a hydrogeological investigation as part of the detailed plan submission process and provide an update to the hydrogeological conceptual model for the proposed residential redevelopment of the Fergus Golf Club property. Previous site

characterisation had been completed by others (Section 3.0), and a water balance assessment had previously been prepared by WSP (2023a).

8.1 Hydrogeological Conceptual Model

As part of the hydrogeological investigation 46 boreholes were advanced at the Site, including 25 boreholes at the SE Site and 21 boreholes at the NW Site. A total of 16 monitoring wells were constructed including two bilevel installation: 10 monitoring wells were installed at the SE Site and 6 boreholes at the NW Site.

At the SE Site, surficial soils were observed to be consist of native silt to silty clay and native sand to silty sand to sand and silt to clayey sand, overlying the till describe as silt till to silty clay till to clayey silt till. Single well response test were conducted at 10 wells as part of the investigation, and the estimated hydraulic conductivity of tested saturated soil ranged between 6 x 10^{-9} m/s to 6 x 10^{-7} m/s across the Site, with a geometric average of 2 x 10^{-7} m/s on the SE Site and a 4 x 10^{-8} m/s on the NW Site. The results of the hydraulic conductivity analyses completed by GEMTEC are generally consistent with the testing carried out by WSP (2023a) and literature values for till (Fetter, 1994).

The water table was observed near the ground surface on both the NW Site and the SE Site. Shallow groundwater follows topography, discharging to the Black Creek Drain over most of the SE Site and to Belwood Lake on eastern portion of the SE Site. Bi-level monitoring well installation in the NW Site and SE Site indicate that vertical gradients are generally downward where observed. Staff gauge and piezometer pairs installed in water courses and wetlands across the Site indicate variable recharging and discharging conditions. The additional groundwater level monitoring completed by GEMTEC is generally consistent with that previously reported for the site by WSP (2023a).

8.2 Groundwater Quality

Water samples were collected in December 2023 from the Black Creek Drain and monitoring wells constructed in Boreholes BH23-20S, BH23-33 and BH23-41. The results were compared to the Schedule A and Schedule B Limits of the Centre Wellington Sewer Use By-Law # 2022-66 and the PWQO. The surface water sample from the Black Creek Drain met the PWQO, and the concentrations of all sampled parameters in the groundwater sample collected from Borehole BH23-33 met the Schedule A and Schedule B Limits and the PWQO.

Exceedances of TSS and total iron were identified at BH23-20S and BH23-41 and an exceedance of total cobalt was identified at BH23-20S. It is noted that for aluminum, only total aluminum was analysed, the PWQO only applies to dissolved aluminum; in samples where TSS was elevated (Boreholes BH23-20S and BH23-41), total aluminum exceeded the PWQO for dissolved aluminum. The elevated TSS at Boreholes BH23-20S and BH23-41 is considered to be due to the difficulty of developing a monitoring well in cohesive glacial till soils to a sediment-free

condition prior to sampling. The elevated concentrations of aluminum, cobalt, and iron may therefore be in part related to the presence of suspended sediment in the samples due to the dissolution of sediment during sample acidification and where groundwater is properly filtered prior to discharge, the discharged groundwater should be within acceptable limits.

8.3 Dewatering Assessment

A dewatering assessment was carried out for features require subsurface excavations including utility corridors, the SWM Pond and feature within the sewage pump station. Each of these were expected to require dewatering above 50 m^3/day but less than 400 m^3/day. Accordingly, the need to obtain an EASR for temporary construction dewatering should be anticipated at a minimum. If multiple features are dewatered simultaneously in close proximity to one another, the cumulative water takings could exceed 400,000 litres per day, and as such, a Category 3 PTTW would be required.

8.4 Water Balance

A water balance assessment was carried out for the SE Site. Additionally, a feature specific water balance assessment was carried out for the portion of the SE Site located within a WHPA-Q. Post-development, it is estimated that infiltration will decrease by 27% and runoff will increase by 99% over the entire SE Site. Within the portion of the SE Site in the WHPA-Q, infiltration is estimated to decrease by 1% post-development, and run-off is expected to increase by 79%.

To mitigate the impacts on post-development conditions, LID features are proposed. With the inclusion of LID measures, infiltration is estimated to decrease relative to pre-development by 2% and runoff is estimated to increase by 70%. The results of the water balance assessment for the mitigated post-development conditions meet the Conservation Ontario Guidelines (Conservation Ontario, 2013), which suggest a post-development infiltration target of 80% of predevelopment infiltration rates to maintain groundwater recharge.

Within the portion of the SE Site in the WHPA-Q, infiltration is estimated to increase relative to pre-development by 25% and runoff increase by 52%, which meets the Grand River Source Protection Plan for the County of Wellington Policy WC-MC-23.5 to maintain pre-development recharge to the greatest extent feasible.

The previous water balance assessment (WSP, 2023a) had indicated no net loss of infiltration compared to pre-development conditions; however, it is noted that previously more sub-surface LID features were included to offset infiltration loss (91 lots with infiltration galleries vs. 85 lots with soak-away pits).

Note that, runoff reduction factors for LIDs assumed that surficial soil after grading will be of a similar hydrologic soil grouping to the pre-development condition soil; in-situ infiltration rate testing

is recommended to support detailed design of LID features. The infiltration rates of native soils and imported fill materials in areas where the grade is raised should be confirmed via field testing.

8.5 Monitoring Wells

The monitoring wells installed as part of the hydrogeological investigation were used to support detailed design. It is noted ongoing monitoring may be required to support other aspects of the site development, e.g., construction dewatering for the southeast parcel, for which a Water Taking Report and Discharge Plan has not yet been developed, which should be considered prior to abandonment. It is recommended that any unused monitoring wells and piezometers be decommissioned in accordance with the *Wells Regulation* (O.Reg 903).

9.0 CLOSURE

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

Regards,

GEMTEC Consulting Engineers and Scientists Limited



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APPENDIX A

Conditions and Limitations of This Report

Conditions and Limitations of This Report

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

   Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.
7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

8. **Decrease in property value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations. information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations. or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

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

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

    In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.
11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.

    During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not

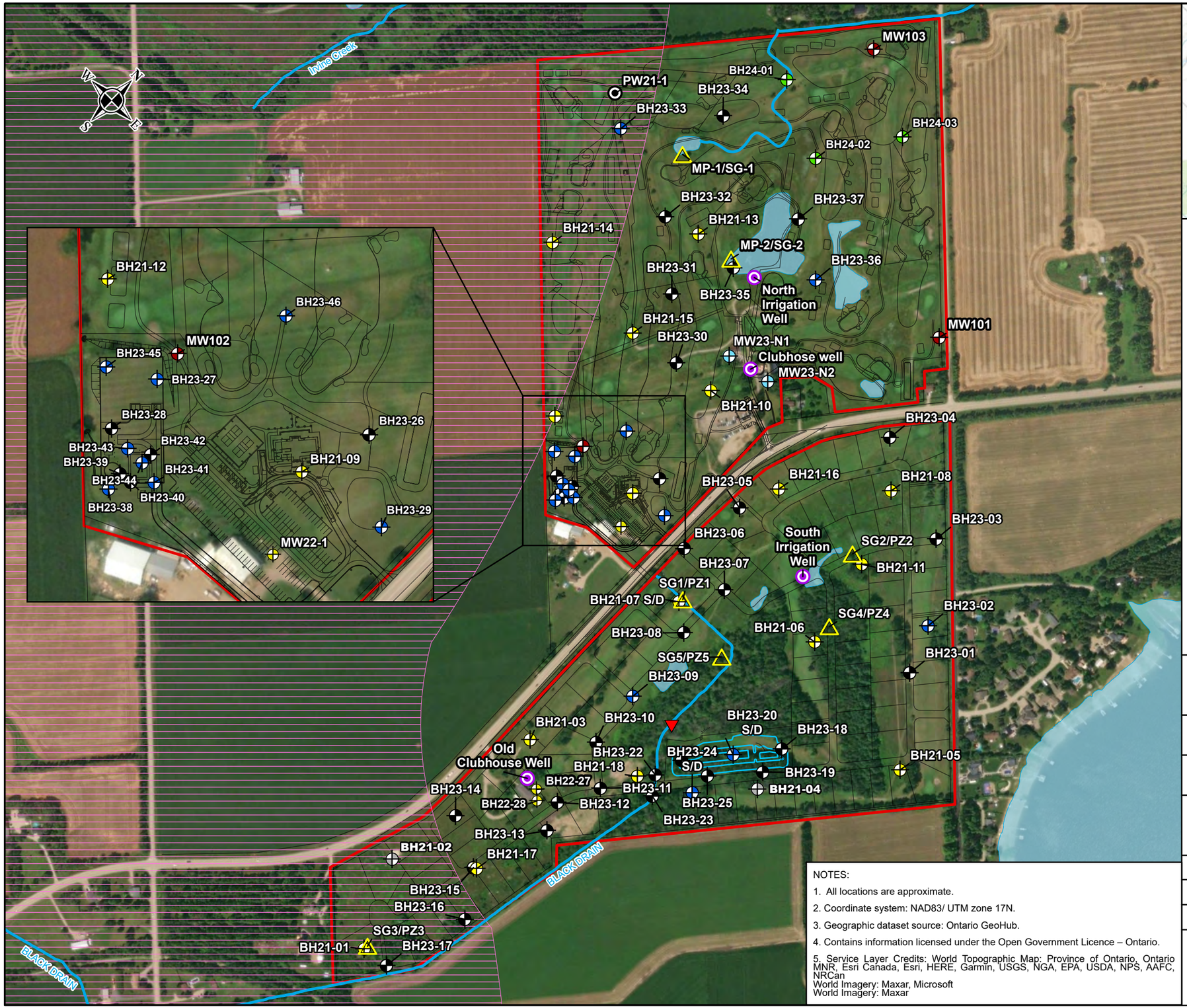
materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

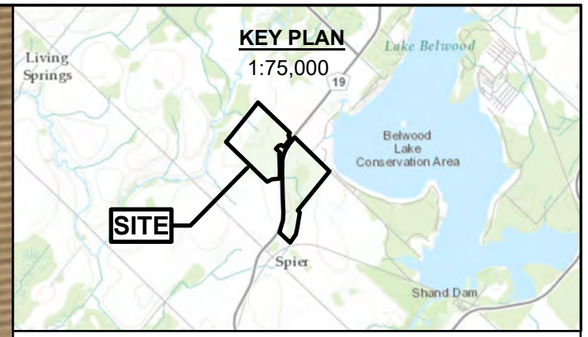
13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Figures

Figure B.1 Site Location Map
Figure B.2 Physiography and Drainage
Figure B.3 Quaternary Geology
Figure B.4 MECP Water Well Records of Private Supply Wells Off-site
Figure B.5 Shallow Groundwater Flow – March 11-12, 2024





Legend

- MONITORING WELL - GEMTEC (GEOTECH STUDY)
- BOREHOLE LOCATION - GEMTEC (GEOTECH STUDY)
- MONITORING WELL - GEMTEC (PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
- EXISTING MONITORING WELL - PREVIOUS STUDIES
- HISTORICAL BOREHOLE LOCATION - PREVIOUS STUDIES
- BURNSIDE MONITORING WELL
- BEDROCK MONITORING WELL
- BEDROCK TEST WELL
- EXISTING PRODUCTION WELL
- PIEZOMETER STAFF GAUGE PAIRS
- SURFACE WATER SAMPLING POINT
- SITE BOUNDARY
- WATERCOURSE
- WATERBODY
- WELL HEAD PROTECTION AREA QUANTITY (Q1 & Q2)

Scale:
1:6,250
0 50 100 200 300 400 500 Meters

Drawing
SITE LOCATION MAP

Client:
FERGUS DEVELOPMENT INC.

Project
UPDATED HYDROGEOLOGICAL INVESTIGATION REPORT
FERGUS GOLF COURSE REDEVELOPMENT
RESIDENTIAL DEVELOPMENT
FERGUS, ONTARIO

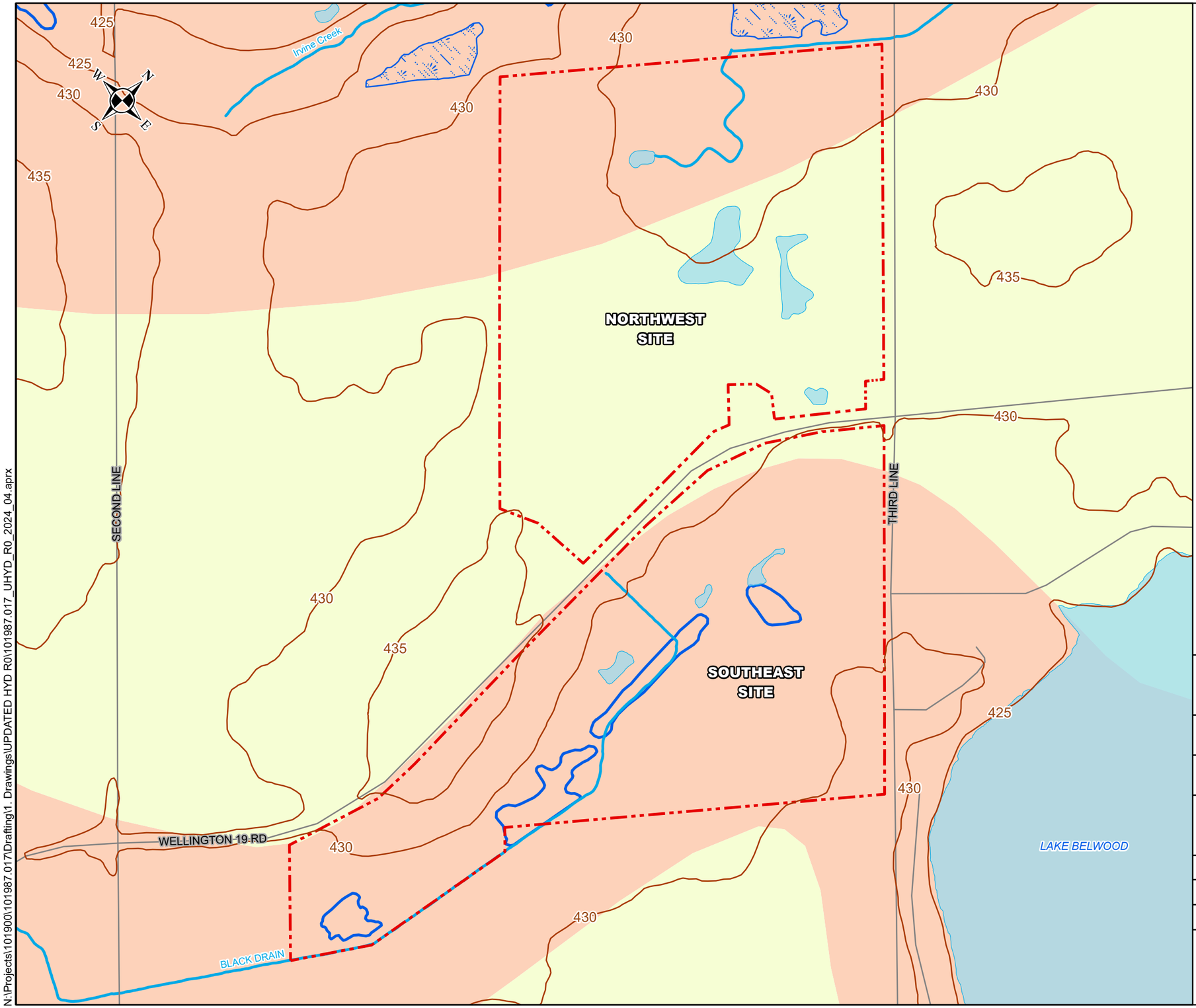
Drwn By:	S.J./ S.L.	Chkd By:	J.B.
Project No.	101987.017	Revision No.	0
Date	MAY 2024		**FIGURE B.1**

NOTES:

1. All locations are approximate.
2. Coordinate system: NAD83/ UTM zone 17N.
3. Geographic dataset source: Ontario GeoHub.
4. Contains information licensed under the Open Government Licence – Ontario.
5. Service Layer Credits: World Topographic Map: Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan
World Imagery: Maxar, Microsoft
World Imagery: Maxar

GEMTEC
Consulting Engineers and Scientists
850 Champlain Avenue, Unit 101
Oshawa, ON, L1J 8C3
www.gemtec.ca
gta@gemtec.ca

Folder: N:\Projects\101900\101987.017\Drafting\1. Drawings\UPDATED HYD R0\



LEGEND

- ELEVATION CONTOUR (IN METRES)
- ROADS
- PROPERTY BOUNDARY
- WATERCOURSE
- WATERBODY
- MAPPED WETLAND
- MNR MAPPED WETLAND
- SPILLWAYS
- TILL PLAINS (DRUMLINIZED)

GENERAL NOTES:

1. All locations are approximate
2. Coordinate system: NAD83/ UTM zone 17N.
3. Geographic dataset source: Ontario GeoHub.
4. Contains information licensed under the Open Government Licence – Ontario.
5. Service Layer Credits: World Topographic Canadian Style: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada, World Hillshade: Esri, NASA, NGA, USGS, FEMA

Scale:

1:6,500

0 90 180 360 540 Meters

Drawing: PHYSIOGRAPHY AND DRAINAGE

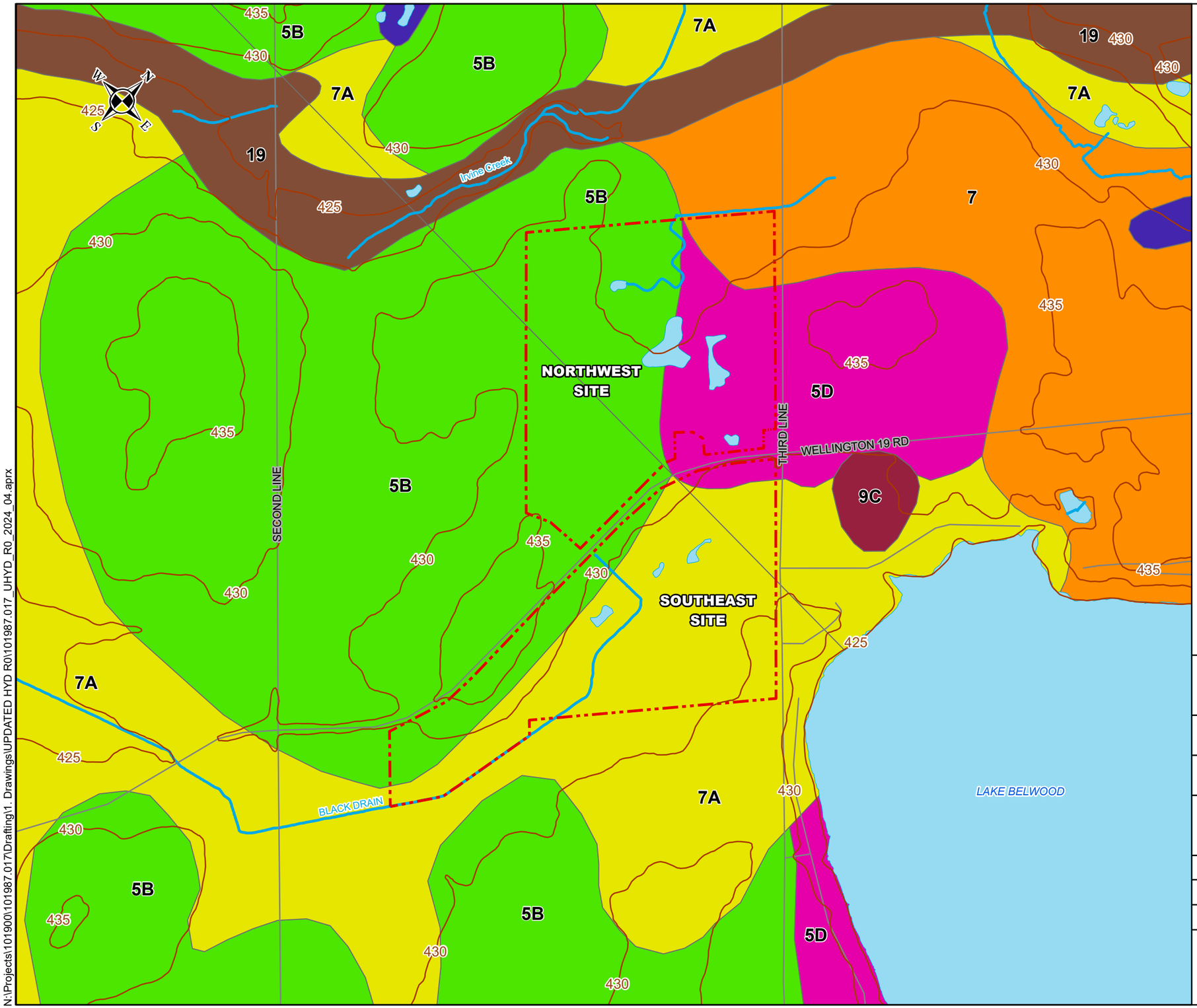
Client: FERGUS DEVELOPMENT INC.

Project: UPDATED HYDROGEOLOGICAL INVESTIGATION REPORT
FERGUS GOLF COURSE REDEVELOPMENT
RESIDENTIAL DEVELOPMENT
FERGUS, ONTARIO

Drwn By:	S.L.	Chkd By:	J.B.
Project No.	101987.017	Revision No.	0
Date	MAY 2024	**FIGURE B.2**	

GEMTEC
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Oshawa, ON, L1J 8C3
www.gemtec.ca
gta@gemtec.ca

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LEGEND

- ELEVATION CONTOUR (IN METRES)
- ROADS
- PROPERTY BOUNDARY
- WATERCOURSE
- WATERBODY

SURFICIAL GEOLOGY

- 19 FLUVIAL SILT, SAND, GRAVEL
- 20 ORGANIC DEPOSITS
- 5B ABLATION TILL
- 5D FINE GRAIN TILL
- 7 GLACIOFLUVIAL OUTWAH SAND & GRAVEL
- 7A DISTAL SAND & GRAVEL
- 9C GLACIOLACUSTRINE SILT & SAND DEPOSITS

GENERAL NOTES:

1. All locations are approximate
2. Coordinate system: NAD83/ UTM zone 17N.
3. Geographic dataset source: Ontario GeoHub.
4. Contains information licensed under the Open Government Licence – Ontario.
5. Service Layer Credits: World Topographic Canadian Style: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada, World Hillshade: Esri, NASA, NGA, USGS, FEMA

Scale: 1:10,000

0 140 280 560 840 Meters

Drawing: QUATERNARY GEOLOGY

Client: FERGUS DEVELOPMENT INC.

Project: UPDATED HYDROGEOLOGICAL INVESTIGATION REPORT
FERGUS GOLF COURSE REDEVELOPMENT
RESIDENTIAL DEVELOPMENT
FERGUS, ONTARIO

Drwn By:	S.L.	Chkd By:	J.B.
Project No.	101987.017	Revision No.	0
Date	MAY 2024		**FIGURE B.3**

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850 Champlain Avenue, Unit 101
Oshawa, ON, L1J 8C3
www.gemtec.ca
gta@gemtec.ca

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NORTHWEST SITE

SOUTHEAST SITE

PW21-1

North Irrigation Well

Clubhose well

South Irrigation Well

Old Clubhouse Well

THIRD LINE

SECOND LINE

WELLINGTON 19 RD

IRVINE CREEK

BLACK DRAIN

LAKE BELWOOD

LEGEND

- BEDROCK TEST WELL (GOLDER 2022)
- EXISTING PRODUCTION WELL (GOLDER 2022)
- ROADS
- PROPERTY BOUNDARY
- 500 METRE RADIUS AROUND PROPERTY BOUNDARY
- WATERCOURSE
- WATERBODY

WELL TYPE

- SHALLOW (<10M) DUG/BORED
- DEEP (>10M) DUG/BORED
- SHALLOW (<10M) DRILLED OVERBURDEN
- DEEP (>10M) DRILLED OVERBURDEN
- DRILLED BEDROCK
- NO INFORMATION/ALTERATION

WATER USE

- DOMESTIC, STOCK WATERING, A/C, WATER SUPLY
- MUNICIPAL, PUBLIC SUPLY
- ABANDONED
- OTHER

GENERAL NOTES:

1. MECP - Ministry of the Environment, Conservation and Parks
2. WWR - Water Well Records
3. All locations are approximate
4. Coordinate system: NAD83/ UTM zone 17N.
5. Geographic dataset source: Ontario GeoHub.
6. Contains information licensed under the Open Government Licence – Ontario.
7. Service Layer Credits: World Topographic Canadian Style: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada, World Topographic Canadian Style: Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada, World Hillshade: Esri, NASA, NGA, USGS, FEMA

Scale: 1:10,500

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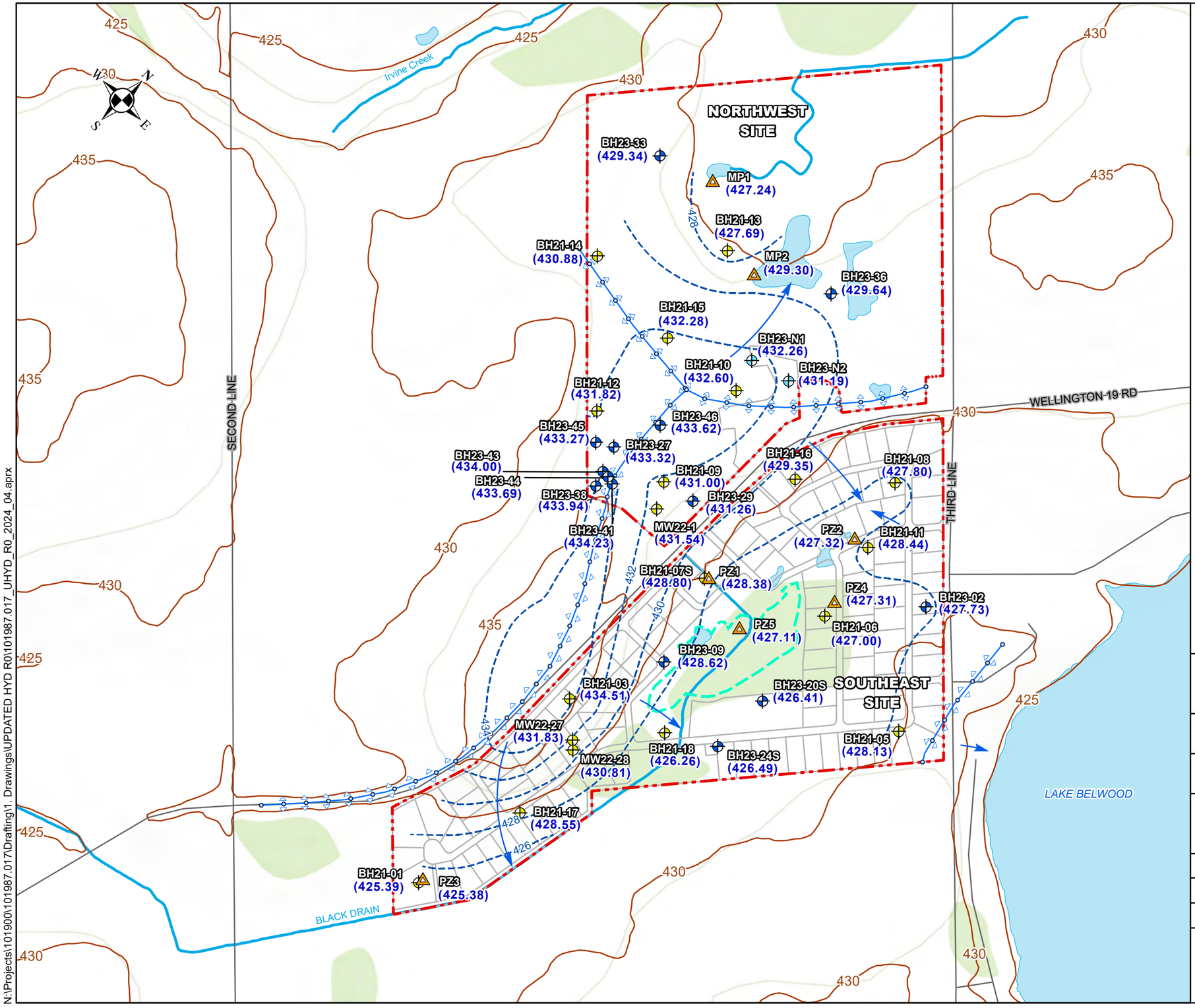
Drawing: MECP WWR OF PRIVATE SUPPLY WELLS OFFSITE

Client: FERGUS DEVELOPMENT INC.

Project: UPDATED HYDROGEOLOGICAL INVESTIGATION REPORT
FERGUS GOLF COURSE REDEVELOPMENT
RESIDENTIAL DEVELOPMENT
FERGUS, ONTARIO

Drwn By:	S.L. / S.J.	Chkd By:	J.B.
Project No.	101987.017	Revision No.	0
Date	MAY 2024		**FIGURE B.4**

GEMTEC
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850 Champlain Avenue, Unit 101
Oshawa, ON, L1J 8C3
www.gemtec.ca
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LEGEND

- MONITORING WELL - GEMTEC (GEOTECH STUDY)
- MONITORING WELL - GEMTEC (PHASE TWO ENVIRONMENTAL SITE ASSESSMENT)
- EXISTING MONITORING WELL - PREVIOUS STUDIES
- PIEZOMETER
- INFERRED SHALLOW GROUNDWATER FLOW DIVIDE
- INFERRED GROUNDWATER FLOW DIRECTION
- INFERRED GROUNDWATER CONTOUR
- ELEVATION CONTOUR (masl)
- ROADS
- PROPERTY BOUNDARY
- POST DEVELOPMENT PLAN
- PROTECTED FEATURES (WETLAND)
- WATERCOURSE
- WATERBODY
- 427.30 STATIC WATER LEVEL (masl. 11-12 MAR 2024)

GENERAL NOTES:

1. masl - metres above sea leval
2. All locations approximate
3. Coordinate system: NAD83/ UTM zone 17N.
4. Geographic dataset source: Ontario GeoHub.
5. Contains information licensed under the Open Government Licence – Ontario.
6. Service Layer Credits: World Topographic Canadian Style: Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada, World Hillshade: Esri, NASA, NGA, USGS, FEMA, World Hillshade: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Scale: 1:7,000

0 100 200 400 600 Meters

Drawing: SHALLOW GROUNDWATER FLOW
DATE - MARCH 11-12, 2024

Client: FERGUS DEVELOPMENT INC.

Project: UPDATED HYDROGEOLOGICAL INVESTIGATION REPORT
FERGUS GOLF COURSE REDEVELOPMENT
RESIDENTIAL DEVELOPMENT
FERGUS, ONTARIO

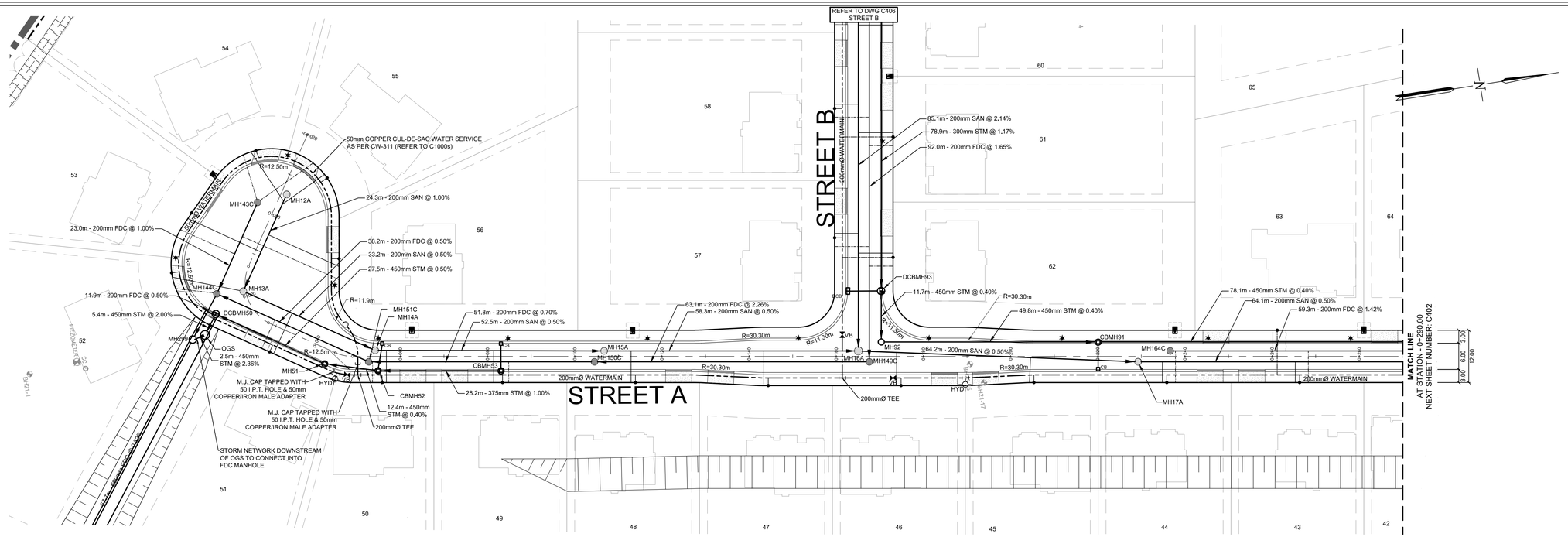
Drwn By:	S.L. / S.J.	Chkd By:	J.B.
Project No.	101987.017	Revision No.	0
Date	MAY 2024		**FIGURE B.5**

GEMTEC
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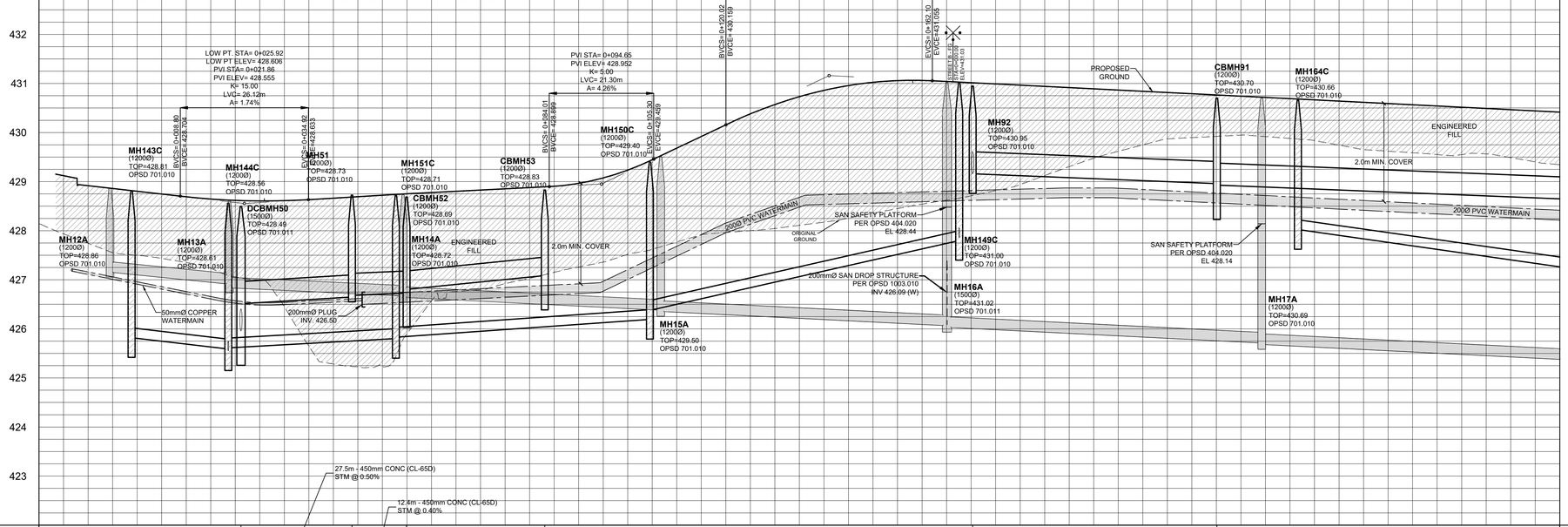
APPENDIX C

Supporting Documentation – Construction Drawings
Engineering Drawings, Plan and Profile
401 - 419; Burnside (2023)
Engineering Drawings, SWM Pond Plan View Regional
Storm Control; Burnside (2023)
Ultimate Earthworks; Burnside (2023)
Fergus Sewage Pumping Station 30% Design Report ,
Sewage Pump Station Drawing; TyLin (2023)
Elevations Sketch; R-PE Surveying Ltd. (2021)
Overall Development Concept; Burnside (2024)
Sample Lot Impervious Breakdown; Burnside (2023)
Engineering Drawings, Grading Plan; Burnside (2023)

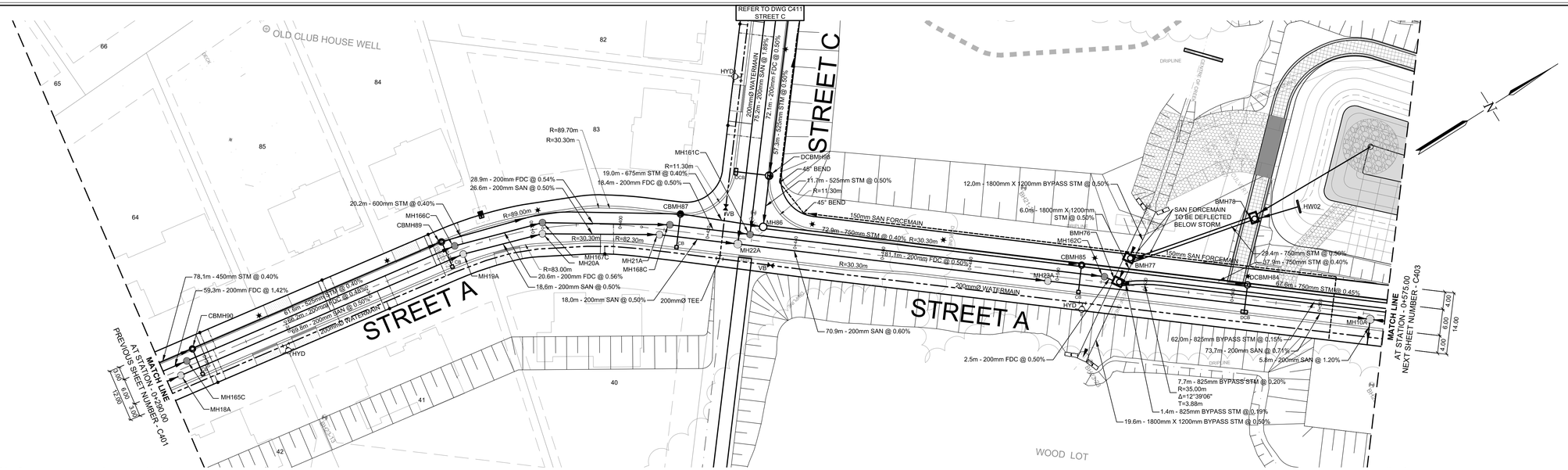


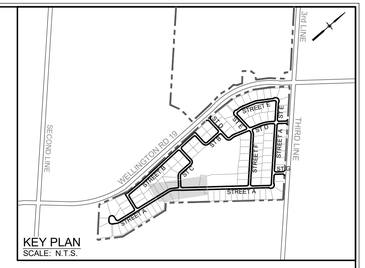
LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



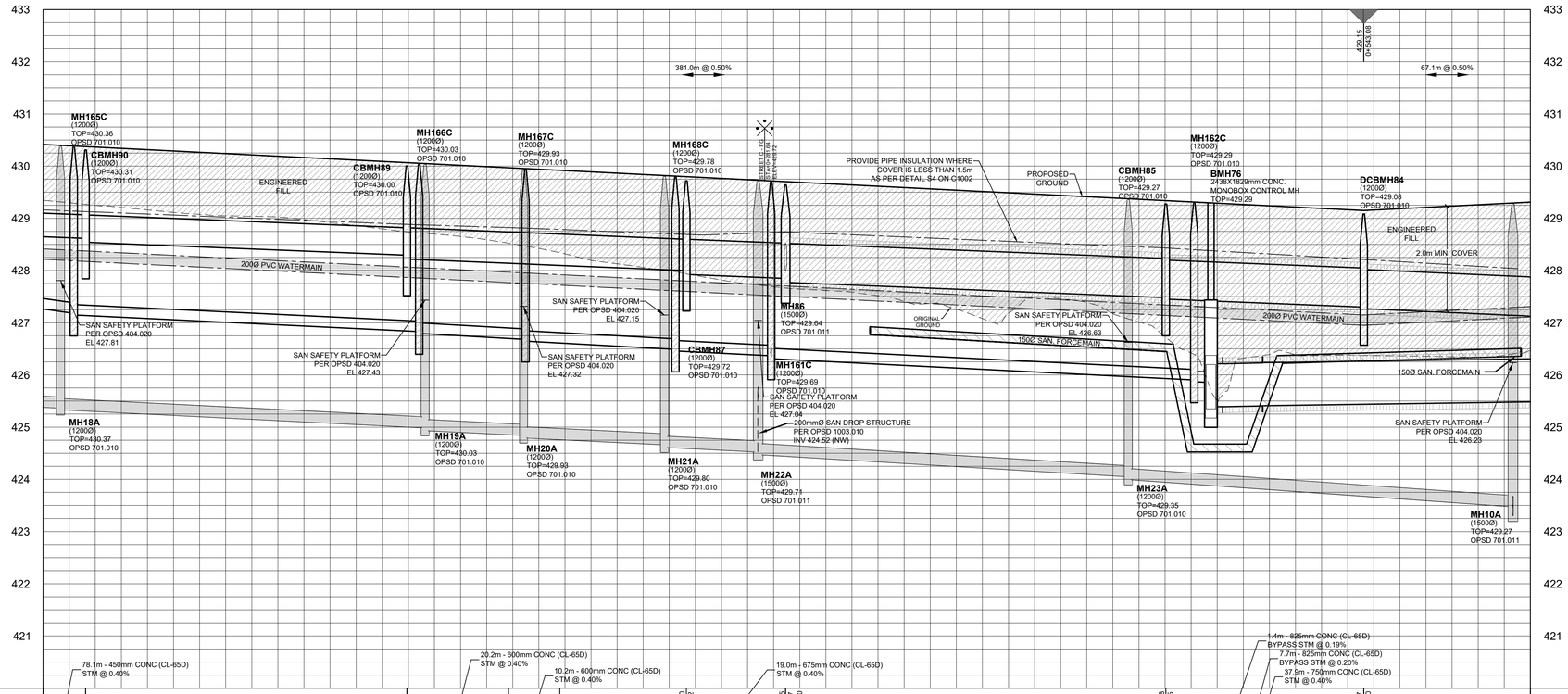
| | | |





LEGEND

- LIMIT OF PROPERTY
- MH11B STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- d^{25} SINGLE / ab^{DCB} DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

1. This drawing is the exclusive property of R. J. Burnside & Associates Limited. The reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

GERANIUM *From the ground up™*

No.	Issue / Revision	Date	Auth.

BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Ave. W., Unit 20
Guelph, Ontario, N1H 1C4
telephone (519) 823-4995
fax (519) 836-5477
web www.rjburnside.com

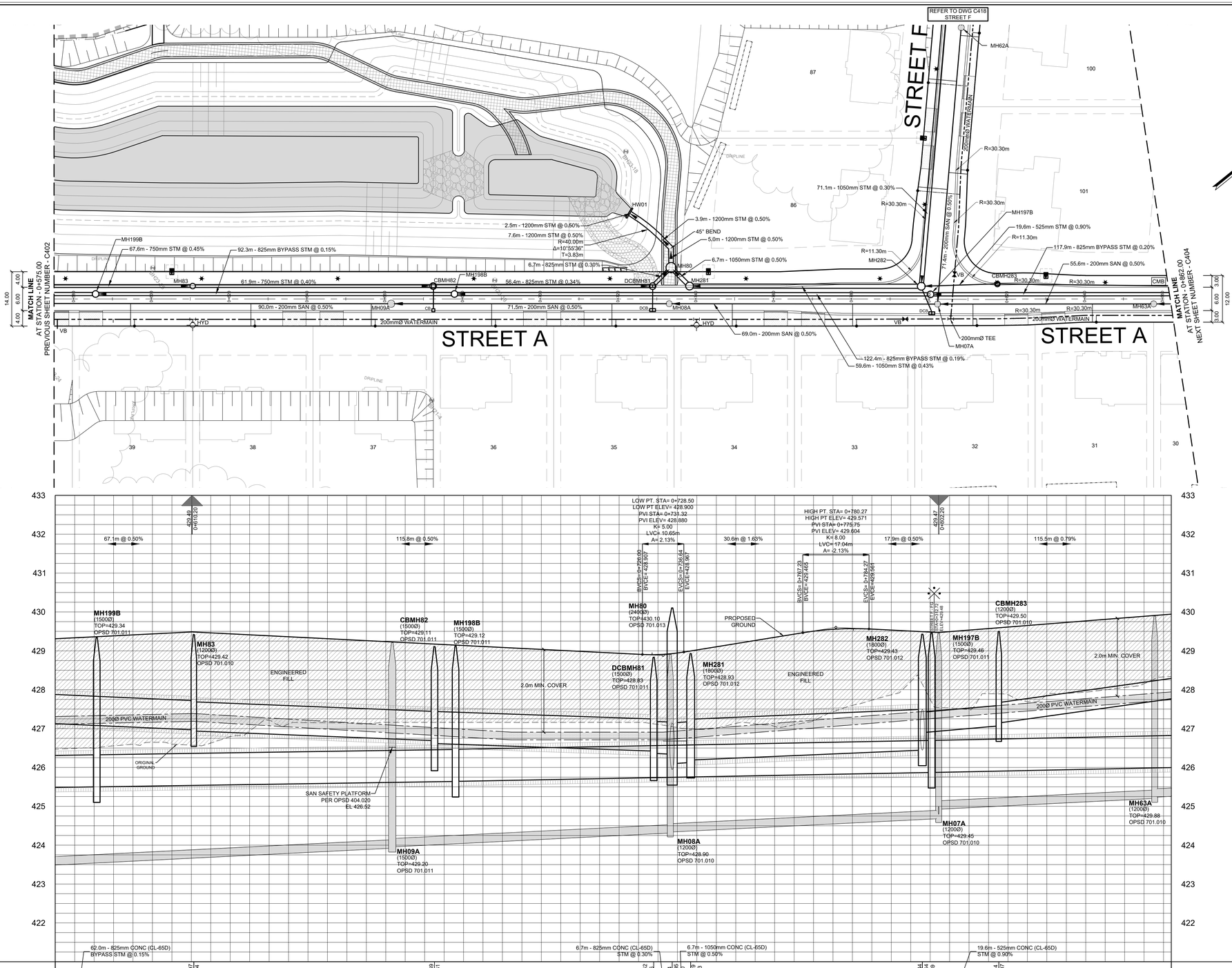
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

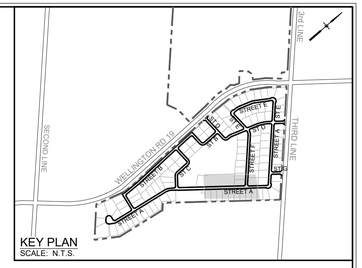
Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
STREET A
STA 0+290 TO STA 0+575

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C402**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale	H 1:500 V 1:50	0 5.0 10.0 20.0 30.0m			

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LEGEND

- LIMIT OF PROPERTY
- MH11B STORM SEWER/MANHOLE
- MH11BB BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- d^25 SINGLE / d^DCB DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015001 HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

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From the ground up™

No.	Issue / Revision	Date	Auth.

BURNSIDE

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Guelph, Ontario, N1H 1C4
telephone (519) 823-4995
fax (519) 836-5477
web www.rjburnside.com

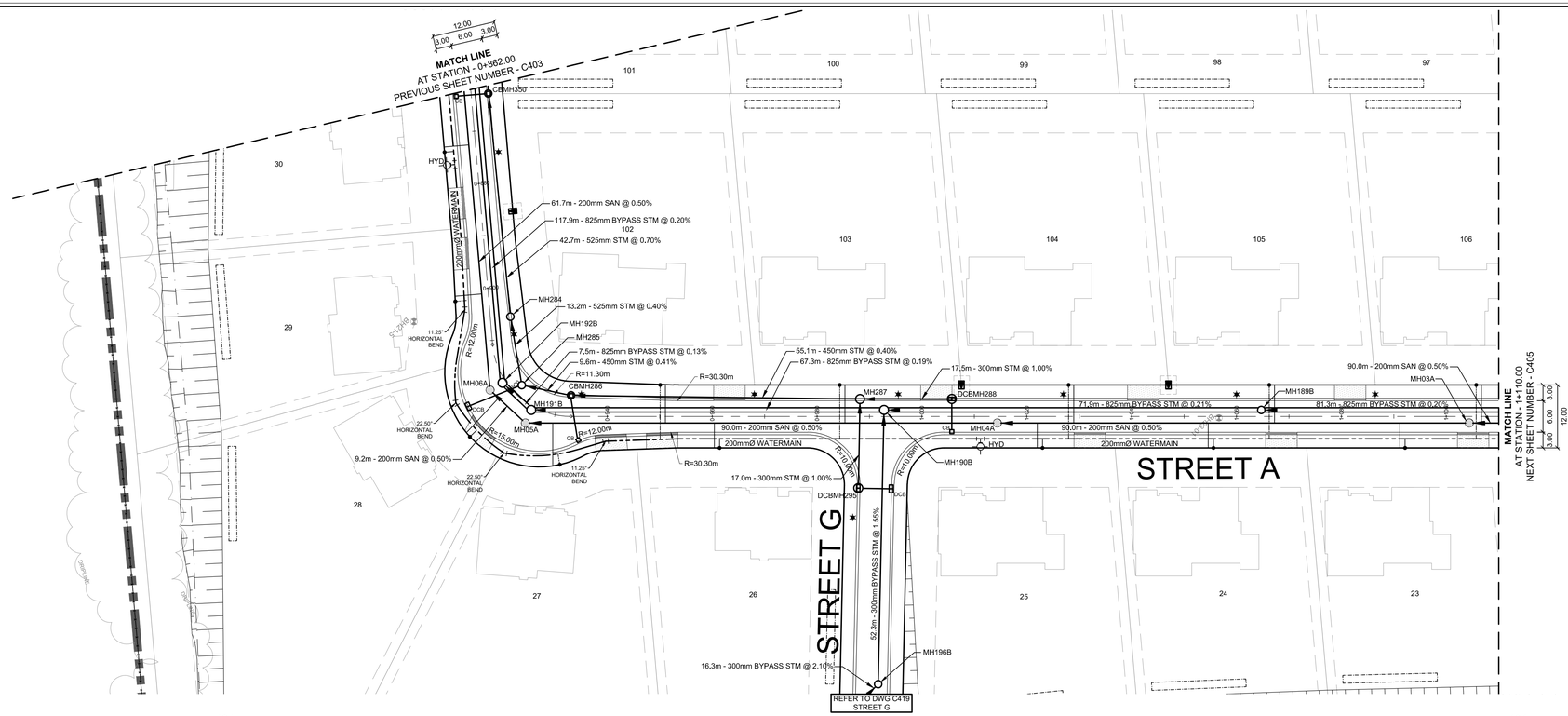
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

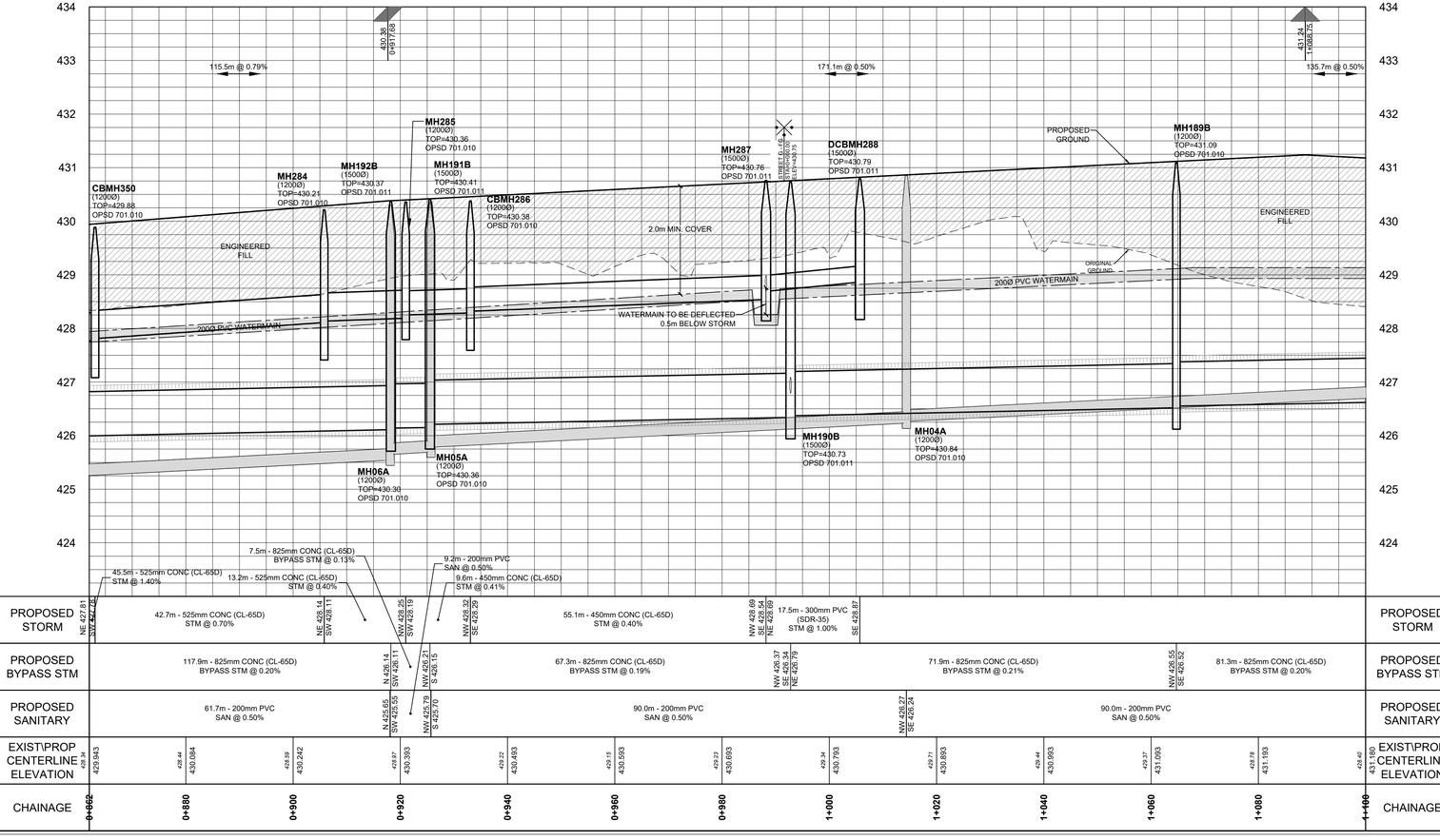
Drawing Title
FERGUS GOLF COURSE

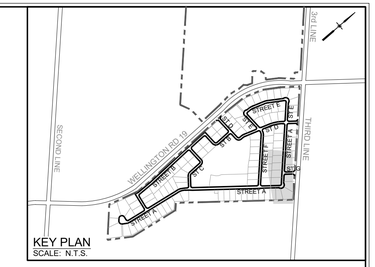
PLAN AND PROFILE
STREET A
STA 0+575 TO STA 0+862

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	C403
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
H 1:500 V 1:50		0 5.0 10.0 20.0 30.0m			

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LEGEND

- LIMIT OF PROPERTY
- MH11B STORM SEWER/MANHOLE
- MH11BB BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes
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3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.

BURNSIDE
R.J. Burnside & Associates Limited
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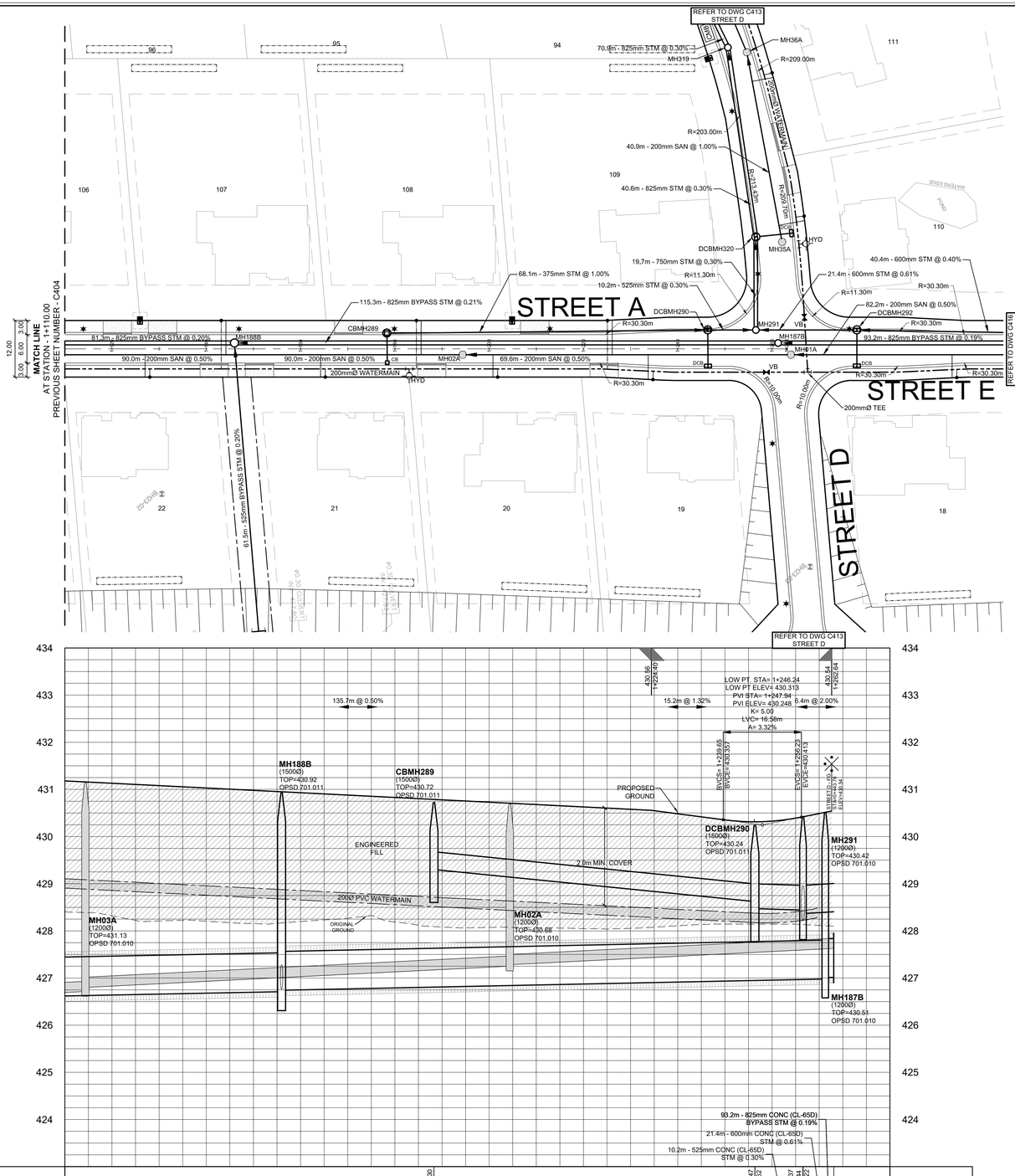
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
STREET A
STA 0+862 TO STA 1+100

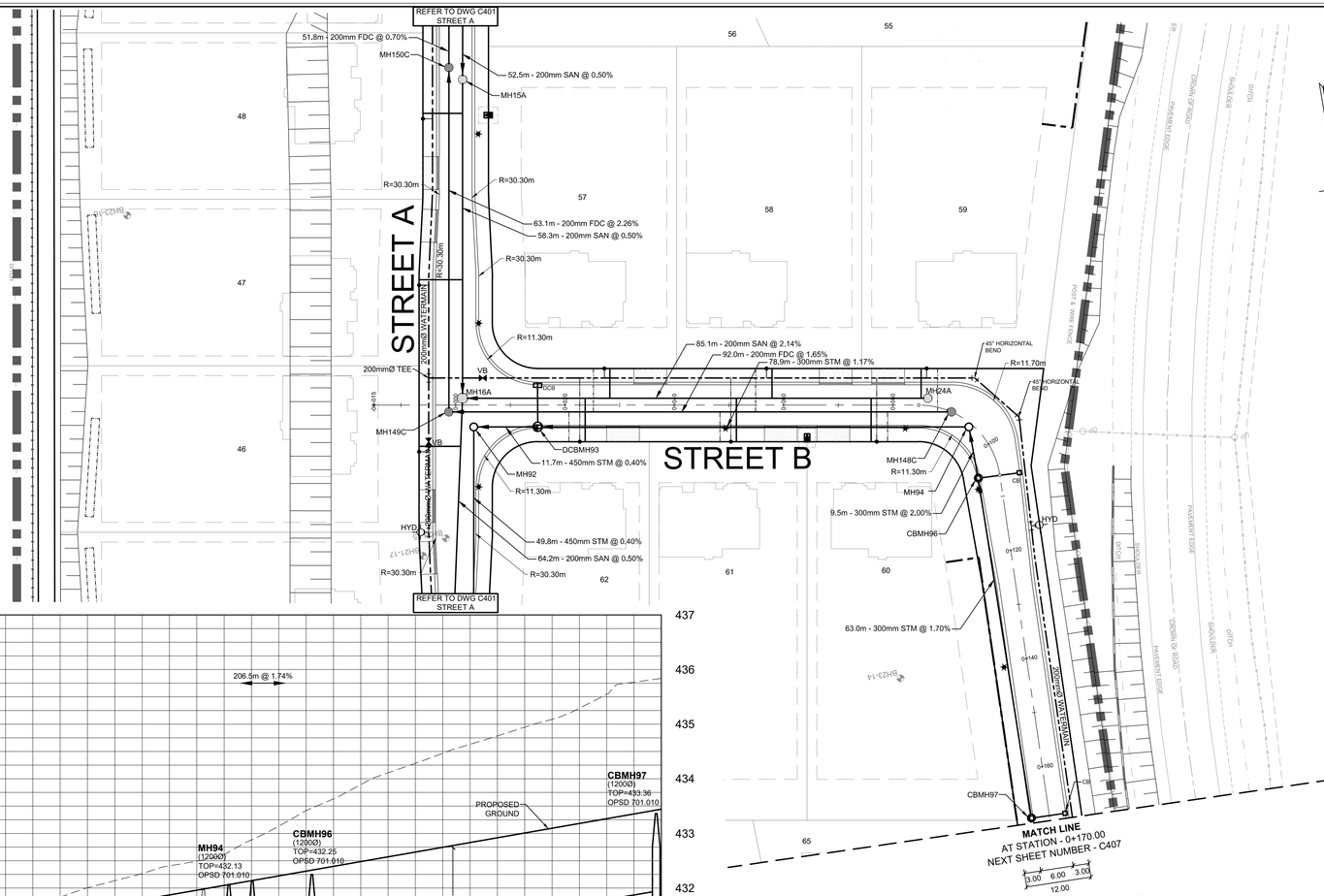
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KT	BF	MB	SR	23/10/27	C404
Project No. 052719.2000		Contract No. ----		Revision No. 0	
Scale H 1:500 V 1:50					

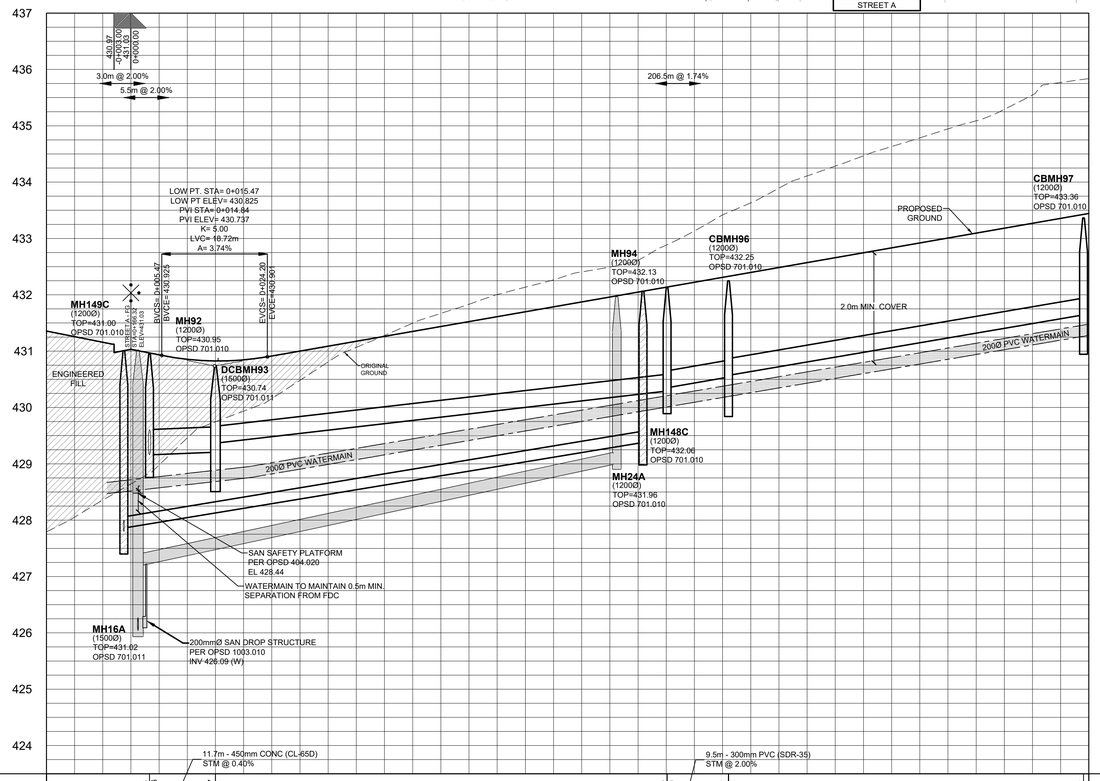
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REFER TO DWG C413
STREET D
REFER TO DWG C416
STREET E
MATCH LINE
AT STATION - 1+110.00
PREVIOUS SHEET NUMBER - C404
STREET A
STREET D
STREET E
MH36A
MH319
R=209.00m
70.6m - 825mm STM @ 0.30%
200mmØ WATERMAIN
R=203.00m
40.9m - 200mm SAN @ 1.00%
R=213.00m
R=209.00m
40.6m - 825mm STM @ 0.30%
DCBMH320
MH35A
HYD
19.7m - 750mm STM @ 0.30%
R=11.30m
10.2m - 525mm STM @ 0.30%
68.1m - 375mm STM @ 1.00%
115.3m - 825mm BYPASS STM @ 0.21%
DCBMH290
MH291
VB
R=30.30m
40.4m - 600mm STM @ 0.40%
21.4m - 600mm STM @ 0.61%
R=11.30m
R=30.30m
82.2m - 200mm SAN @ 0.50%
DCBMH292
R=30.30m
93.2m - 825mm BYPASS STM @ 0.19%
MH187B
MH187A
81.3m - 825mm BYPASS STM @ 0.20%
MH188B
CBMH289
90.0m - 200mm SAN @ 0.50%
90.0m - 200mm SAN @ 0.50%
CB
MH02A
69.6m - 200mm SAN @ 0.50%
DCB
200mmØ WATERMAIN
HYD
R=30.30m
R=10.00m
R=10.00m
200mmØ TEE
R=30.30m
R=30.30m
61.5m - 525mm BYPASS STM @ 0.20%
20 CDAB
22
21
20
19
18
106
107
108
109
110
111
94
95
96
WATERS EDGE
POND
12.00
2.00
6.00
2.00
3.00

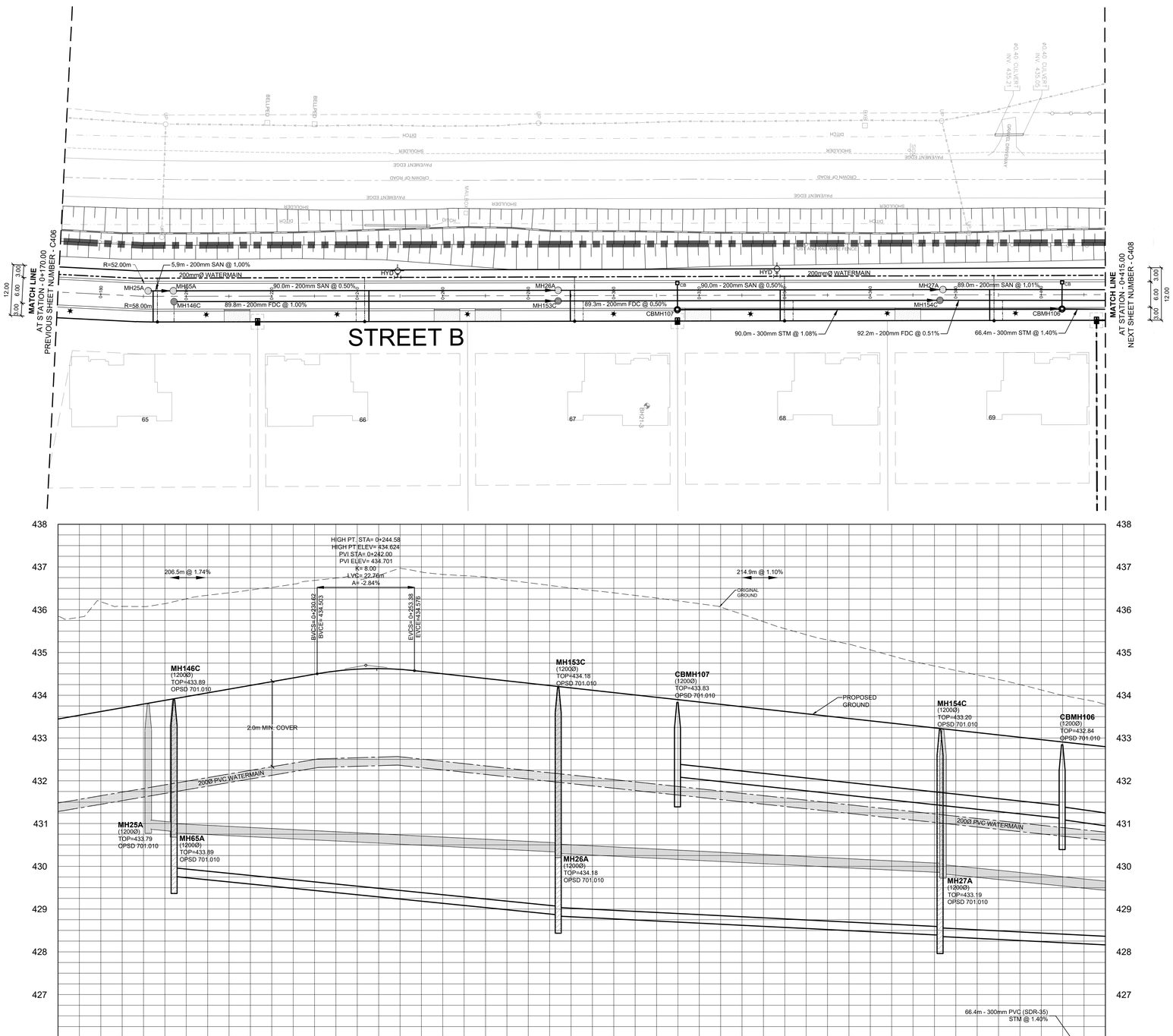
434
433
432
431
430
429
428
427
426
425
424
135.7m @ 0.50%
15.2m @ 1.32%
6.4m @ 2.00%
430.66
1+224.040
430.64
1+262.664
LOW PT. STA= 1+246.24
LOW PT ELEV= 430.313
PVI STA= 1+247.94
PVI ELEV= 430.248
K= 5.00
LVC= 16.58m
A= 3.32%
BVCS= 1+239.65
BVCE= 430.357
EVCS= 1+256.23
EVCE= 430.413
MH188B
(1500Ø)
TOP=430.92
OPSD 701.011
CBMH289
(1500Ø)
TOP=430.72
OPSD 701.011
PROPOSED GROUND
DCBMH290
(1500Ø)
TOP=430.24
OPSD 701.011
MH291
(1200Ø)
TOP=430.42
OPSD 701.010
ENGINEERED FILL
2.0m MIN. COVER
200Ø PVC WATERMAIN
ORIGINAL GROUND
MH03A
(1200Ø)
TOP=431.13
OPSD 701.010
MH02A
(1200Ø)
TOP=430.68
OPSD 701.010
MH187B
(1200Ø)
TOP=430.55
OPSD 701.010
93.2m - 825mm CONC (CL-65D)
BYPASS STM @ 0.19%
21.4m - 600mm CONC (CL-65D)
STM @ 0.61%
10.2m - 525mm CONC (CL-65D)
STM @ 0.30%

| | | |

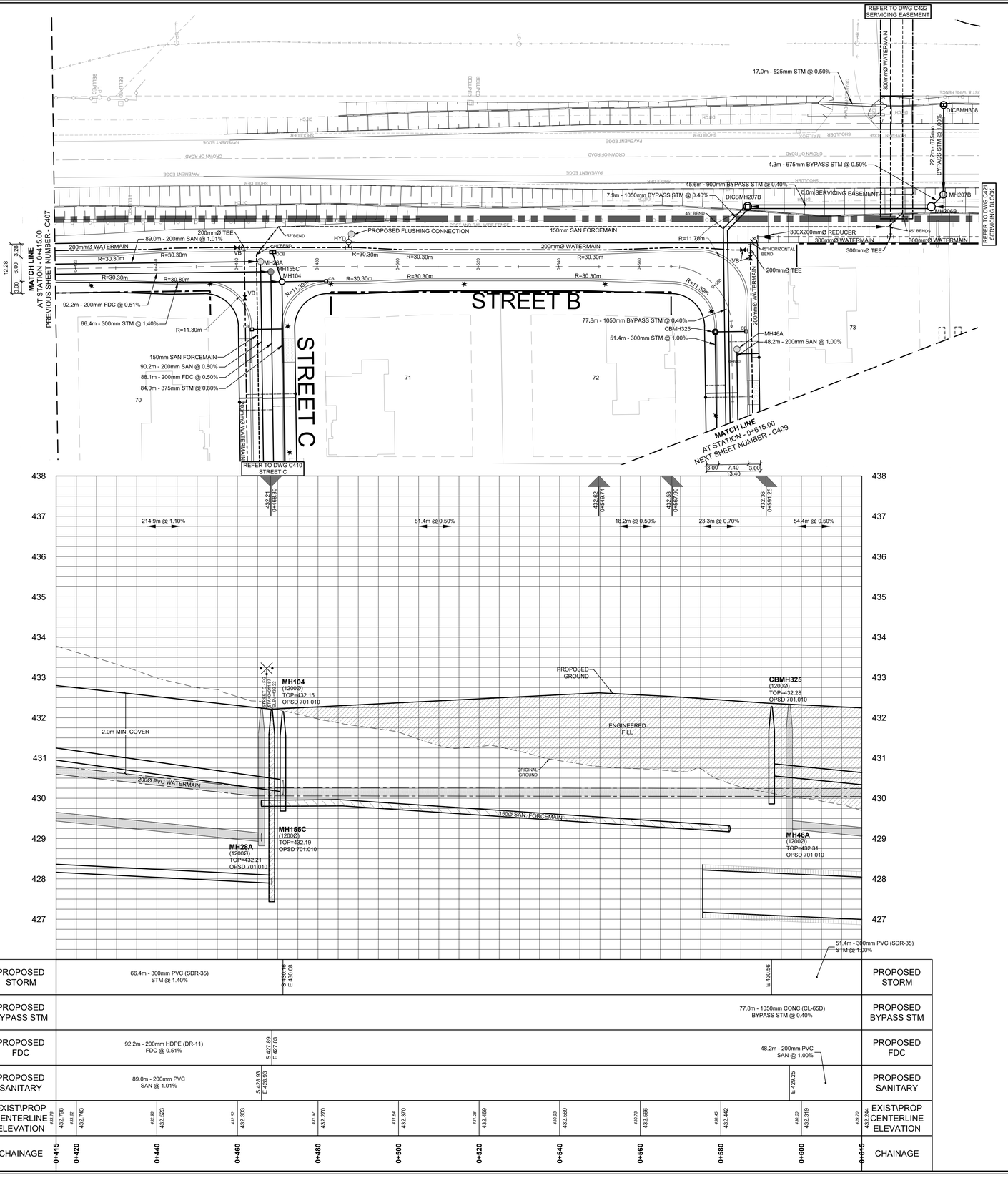

REFER TO DWG C401
STREET A
51.8m - 200mm FDC @ 0.70%
MH150C
52.5m - 200mm SAN @ 0.50%
MH15A
R=30.30m
63.1m - 200mm FDC @ 2.26%
58.3m - 200mm SAN @ 0.50%
STREET A
200mmØ WATERMAIN
R=11.30m
85.1m - 200mm SAN @ 2.14%
92.0m - 200mm FDC @ 1.65%
78.9m - 300mm STM @ 1.17%
45° HORIZONTAL BEND
R=11.70m
200mmØ TEE
VB
MH16A
DCB
MH24A
MH149C
DCBMH93
11.7m - 450mm STM @ 0.40%
MH92
MH148C
R=11.30m
MH94
9.5m - 300mm STM @ 2.00%
CBMH96
STREET B
HYD
49.8m - 450mm STM @ 0.40%
64.2m - 200mm SAN @ 0.50%
63.0m - 300mm STM @ 1.70%
200mmØ WATERMAIN
CBMH97
MATCH LINE
AT STATION - 0+170.00
NEXT SHEET NUMBER - C407
REFER TO DWG C401
STREET A
48
47
46
56
55
57
58
59
62
61
60
65
POST & WIRE FENCE
DRIVEWAY
PAVEMENT EDGE
DITCH
SHOULDER

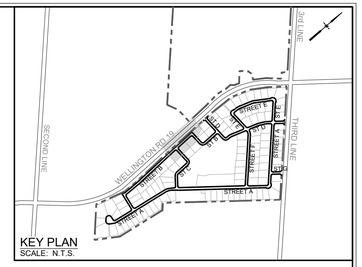

437
436
435
434
433
432
431
430
429
428
427
426
425
424
400.87
-0.100%
451.69
0+000.00
3.0m @ 2.00%
5.5m @ 2.00%
206.5m @ 1.74%
LOW PT. STA= 0+015.47
LOW PT. ELEV= 430.825
PVI STA= 0+014.84
PVI ELEV= 430.737
K= 5.00
LVC= 18.72m
A= 3.74%
BVCS= 0+005.47
BVCE= 430.925
EVCS= 0+024.20
EVCE= 430.991
MH149C
(1200Ø)
TOP=431.00
OPSD 701.010
MH92
(1200Ø)
TOP=430.95
OPSD 701.010
DCBMH93
(1500Ø)
TOP=430.74
OPSD 701.011
MH16A
(1500Ø)
TOP=431.02
OPSD 701.011
MH94
(1200Ø)
TOP=432.13
OPSD 701.010
CBMH96
(1200Ø)
TOP=432.25
OPSD 701.010
CBMH97
(1200Ø)
TOP=433.36
OPSD 701.010
MH148C
(1200Ø)
TOP=432.06
OPSD 701.010
MH24A
(1200Ø)
TOP=431.96
OPSD 701.010
PROPOSED GROUND
ORIGINAL GROUND
ENGINEERED FILL
2.0m MIN. COVER
200Ø PVC WATERMAIN
SAN SAFETY PLATFORM
PER OPSD 404.020
EL 428.44
WATERMAIN TO MAINTAIN 0.5m MIN.
SEPARATION FROM FDC
200mmØ SAN DROP STRUCTURE
PER OPSD 1003.010
INV 426.09 (W)
11.7m - 450mm CONC (CL-65D)
STM @ 0.40%
9.5m - 300mm PVC (SDR-35)
STM @ 2.00%

| | | |


MATCH LINE
AT STATION - 0+170.00
PREVIOUS SHEET NUMBER - C406
MATCH LINE
AT STATION - 0+415.00
NEXT SHEET NUMBER - C408
STREET B
R=52.00m
R=58.00m
5.9m - 200mm SAN @ 1.00%
200mmØ WATERMAIN
MH25A
MH65A
MH146C
89.8m - 200mm FDC @ 1.00%
90.0m - 200mm SAN @ 0.50%
MH26A
MH153C
89.3m - 200mm FDC @ 0.50%
CBMH107
90.0m - 200mm SAN @ 0.50%
HYD
MH27A
MH154C
89.0m - 200mm SAN @ 1.01%
CBMH106
90.0m - 300mm STM @ 1.08%
92.2m - 200mm FDC @ 0.51%
66.4m - 300mm STM @ 1.40%
65
66
67
68
69
438
437
436
435
434
433
432
431
430
429
428
427
206.5m @ 1.74%
214.9m @ 1.10%
HIGH PT STA= 0+244.58
HIGH PT ELEV= 434.624
PVI STA= 0+242.00
PVI ELEV= 434.701
K= 8.00
LVC= 22.76m
A= -2.84%
BVCS= 0+230.62
BVCE= 434.503
EVCS= 0+253.38
EVCE= 434.576
ORIGINAL GROUND
PROPOSED GROUND
2.0m MIN. COVER
200Ø PVC WATERMAIN
MH146C (1200Ø) TOP=433.89 OPSD 701.010
MH25A (1200Ø) TOP=433.79 OPSD 701.010
MH65A (1200Ø) TOP=433.89 OPSD 701.010
MH26A (1200Ø) TOP=434.18 OPSD 701.010
MH153C (1200Ø) TOP=434.18 OPSD 701.010
CBMH107 (1200Ø) TOP=433.83 OPSD 701.010
MH154C (1200Ø) TOP=433.20 OPSD 701.010
MH27A (1200Ø) TOP=433.19 OPSD 701.010
CBMH106 (1200Ø) TOP=432.84 OPSD 701.010
66.4m - 300mm PVC (SDR-35) STM @ 1.40%

| | | |





LEGEND

- LIMIT OF PROPERTY
- MH118 STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015006I HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes
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No.	Issue / Revision	Date	Auth.
1.	ISSUED FOR FIRST SUBMISSION	23/12/20	SR

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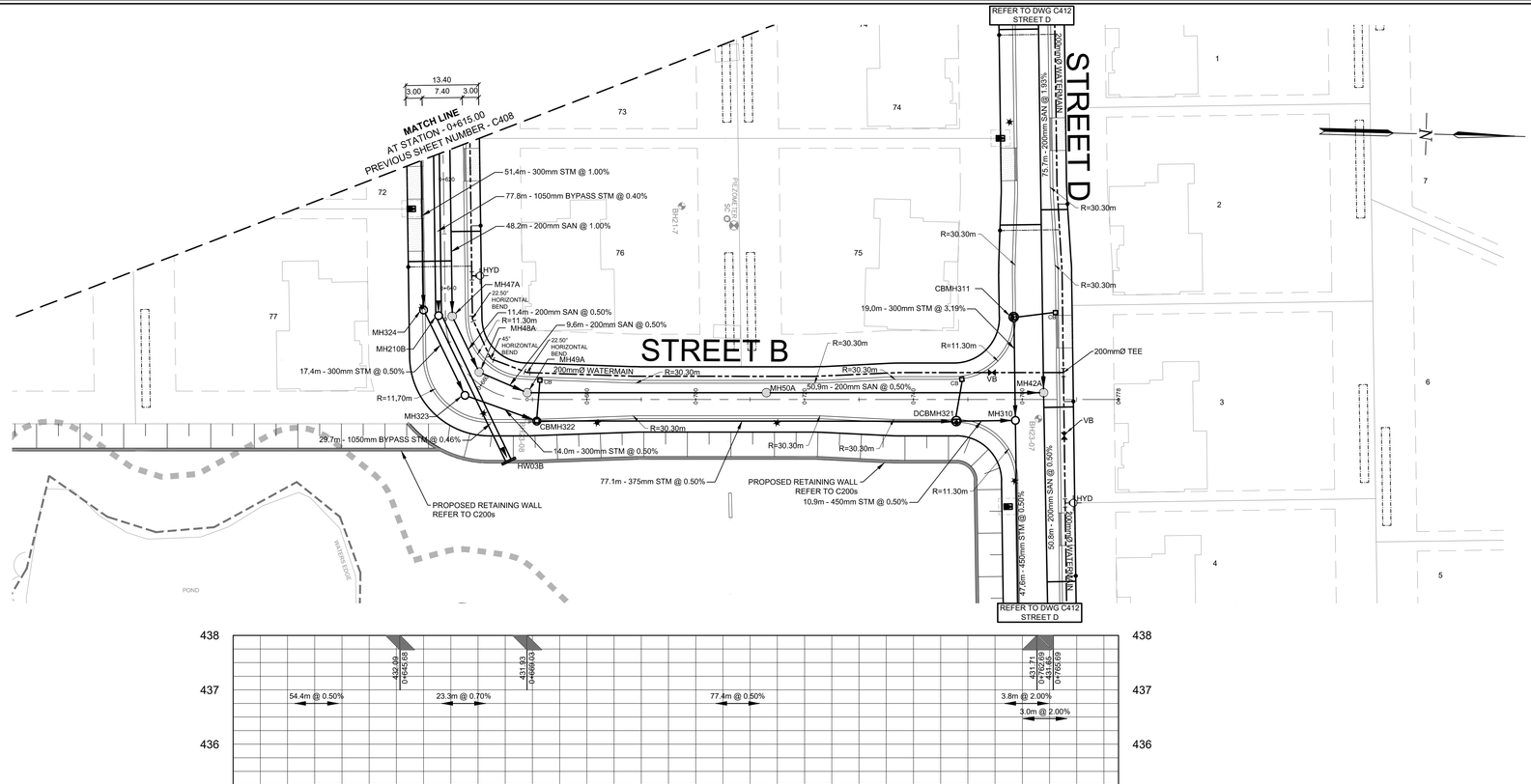
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
STREET B
STA 0+415 TO STA 0+615

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C408**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
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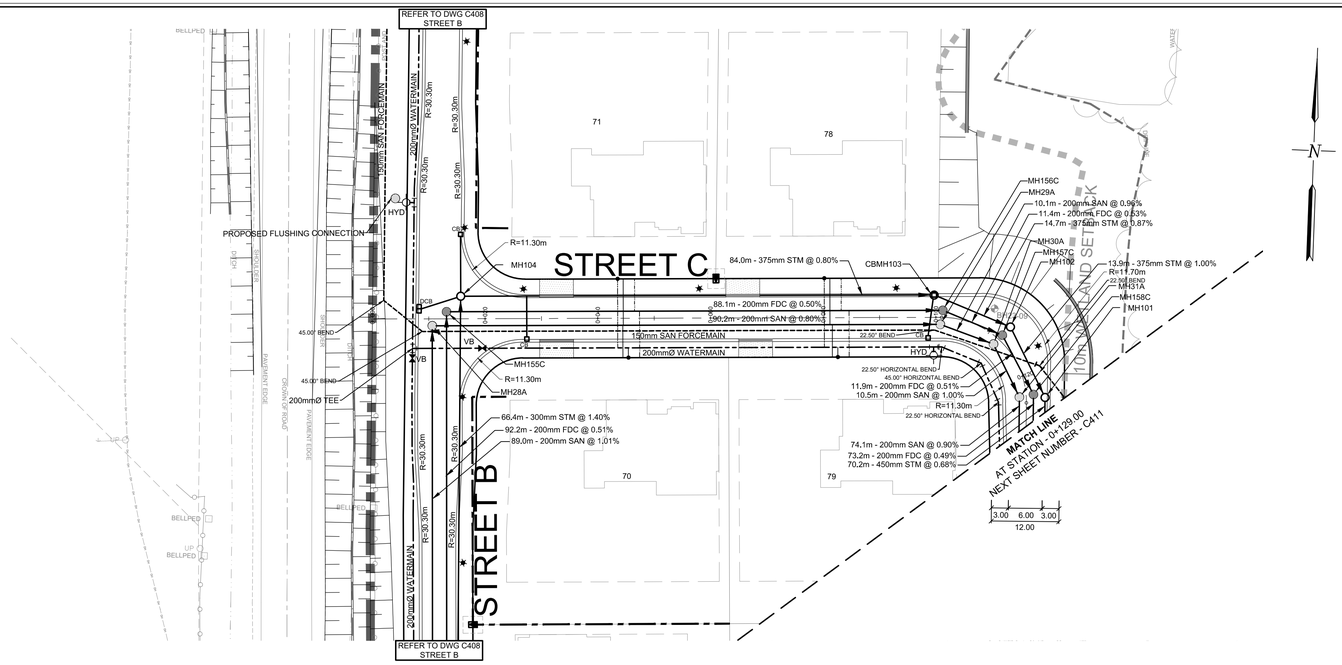
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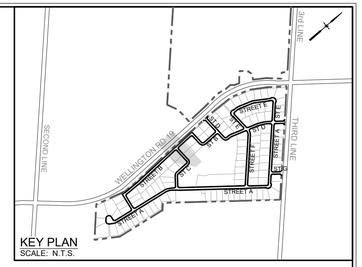


LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

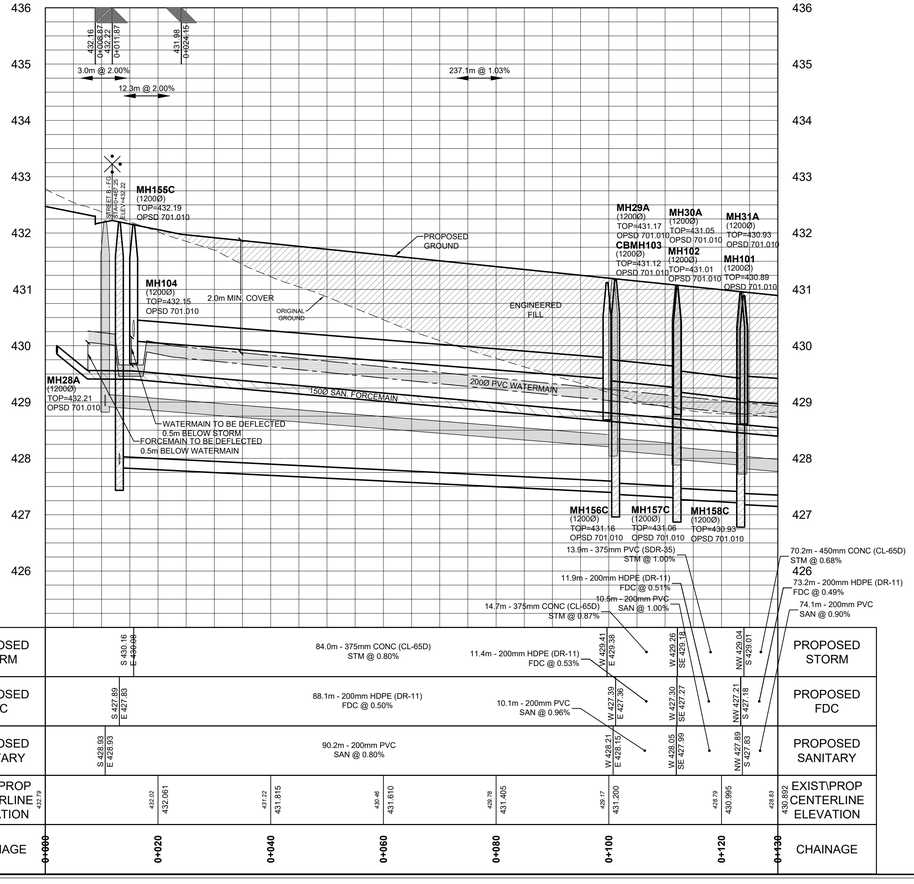
| | | |





LEGEND

- LIMIT OF PROPERTY
- MH11B — STORM SEWER/MANHOLE
- MH11BB — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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GERANIUM — From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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292 Speedvale Ave. W., Unit 20
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web www.rjburnside.com

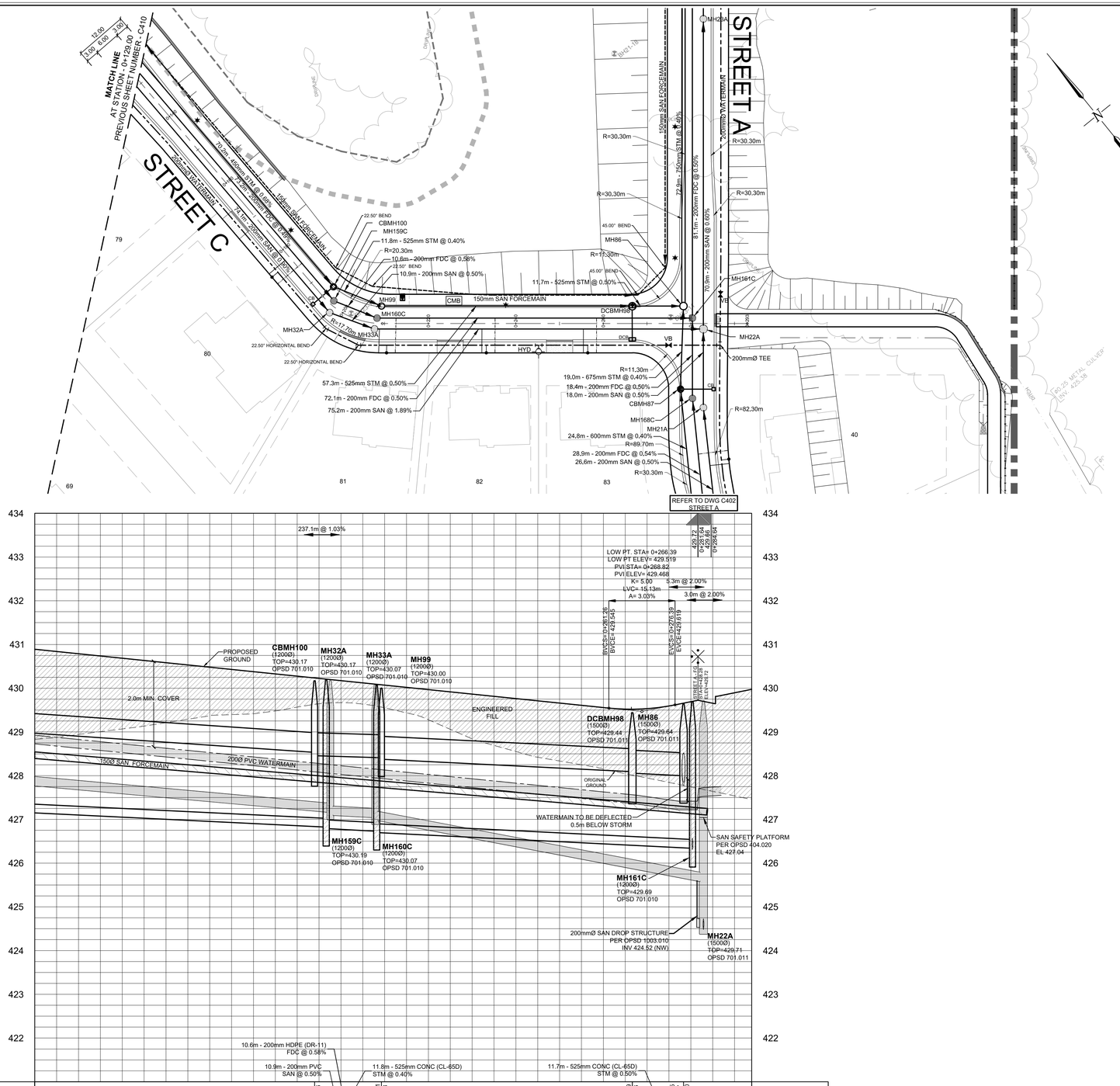
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

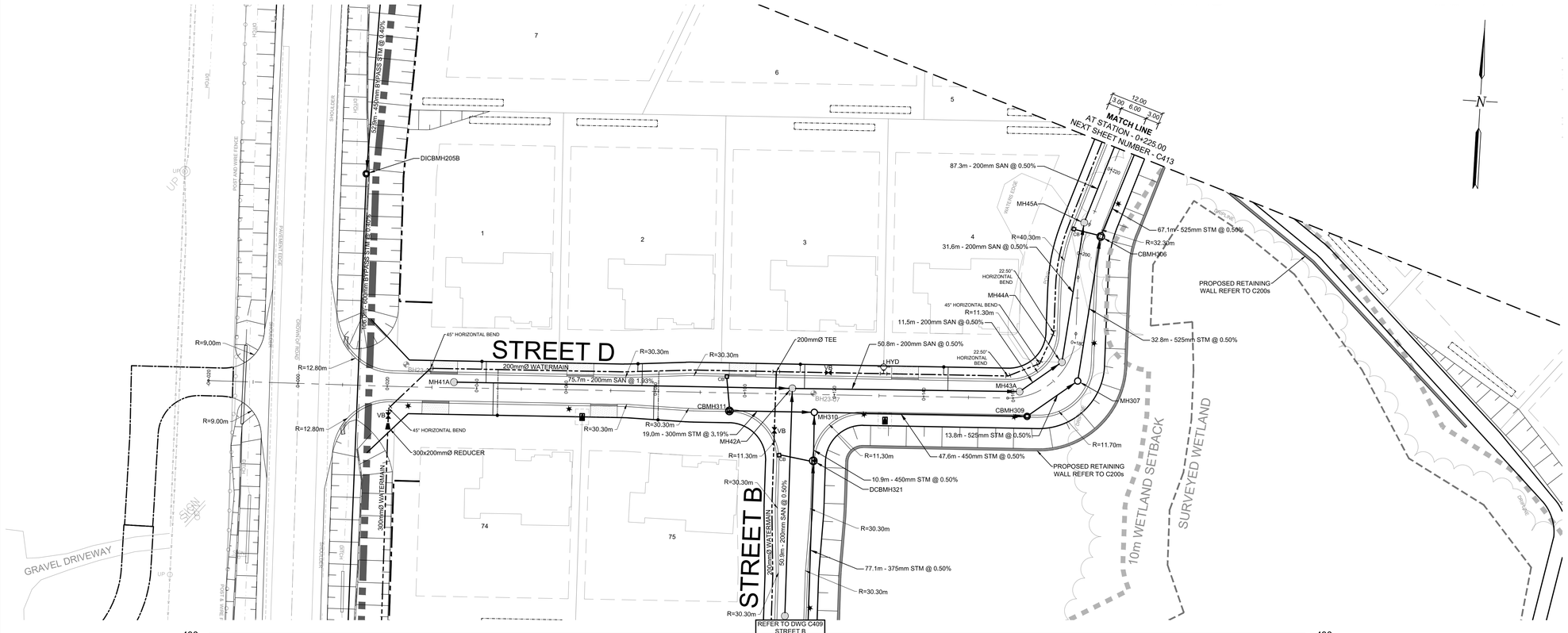
Drawing Title
FERGUS GOLF COURSE

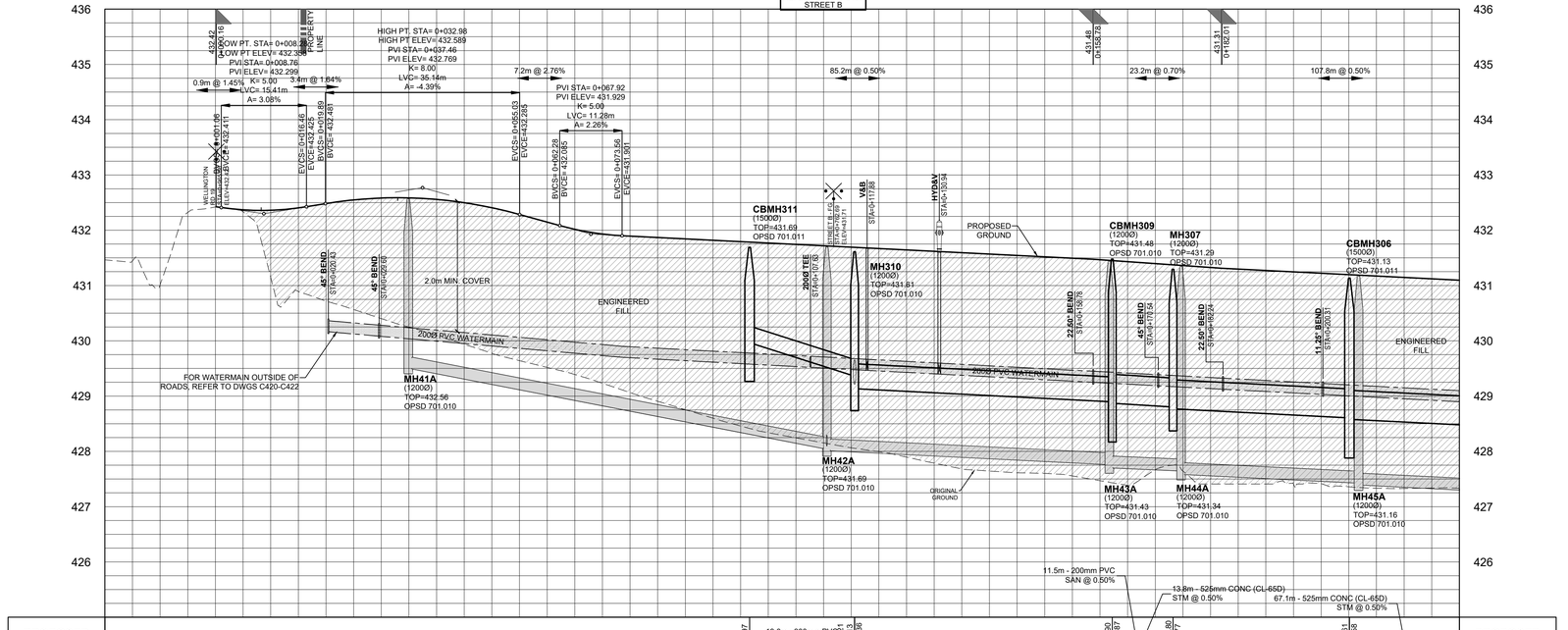
PLAN AND PROFILE
STREET C
STA 0+000 TO STA 0+130

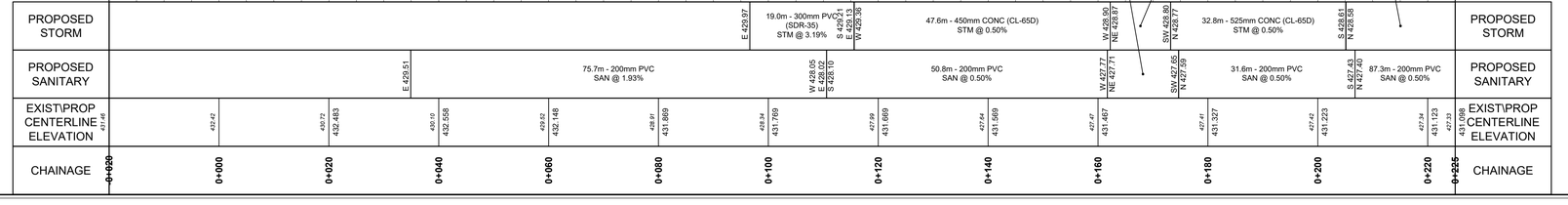
Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C410**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
H 1:500 V 1:50					

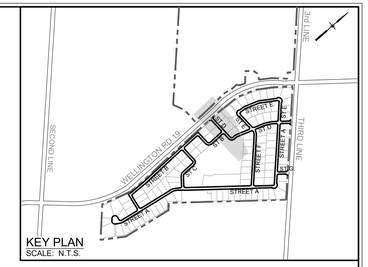
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MATCH LINE
AT STATION - 0+129.00
PREVIOUS SHEET NUMBER - C410
12.00
3.00
6.00
3.00
STREET C
STREET A
70.4m - 450mm STM @ 0.68%
70.4m - 450mm SAN @ 0.68%
70.4m - 200mm FDC @ 0.68%
70.4m - 200mm SAN @ 0.68%
150mm SAN FORCEMAIN
200mm WATERMAIN
22.50° BEND
CBMH100
MH159C
11.8m - 525mm STM @ 0.40%
R=20.30m
10.6m - 200mm FDC @ 0.58%
22.50° BEND
10.9m - 200mm SAN @ 0.50%
MH99
CMB
150mm SAN FORCEMAIN
MH160C
MH32A
R=12.70m
MH33A
22.50° HORIZONTAL BEND
22.50° HORIZONTAL BEND
57.3m - 525mm STM @ 0.50%
72.1m - 200mm FDC @ 0.50%
75.2m - 200mm SAN @ 1.89%
HYD
DCBMH98
DCB
VB
11.7m - 525mm STM @ 0.50%
R=11.30m
19.0m - 675mm STM @ 0.40%
18.4m - 200mm FDC @ 0.50%
18.0m - 200mm SAN @ 0.50%
CBMH87
MH168C
MH21A
24.8m - 600mm STM @ 0.40%
R=89.70m
28.9m - 200mm FDC @ 0.54%
26.6m - 200mm SAN @ 0.50%
R=30.30m
MH29A
150mm SAN FORCEMAIN
STM @ 0.40%
R=30.30m
R=30.30m
R=30.30m
45.00° BEND
MH86
R=11.30m
45.00° BEND
72.4m - 750mm STM @ 0.50%
81.1m - 200mm FDC @ 0.60%
70.9m - 200mm SAN @ 0.60%
MH161C
VB
MH22A
200mmØ TEE
R=82.30m
REFER TO DWG C402
STREET A
R=30.30m
R=30.30m
R=30.30m









LEGEND

- LIMIT OF PROPERTY
- MH118 STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015001 HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes
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NOT FOR CONSTRUCTION

GERANIUM *From the ground up™*

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE
R.J. Burnside & Associates Limited
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telephone (519) 823-4995
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web www.rjburnside.com

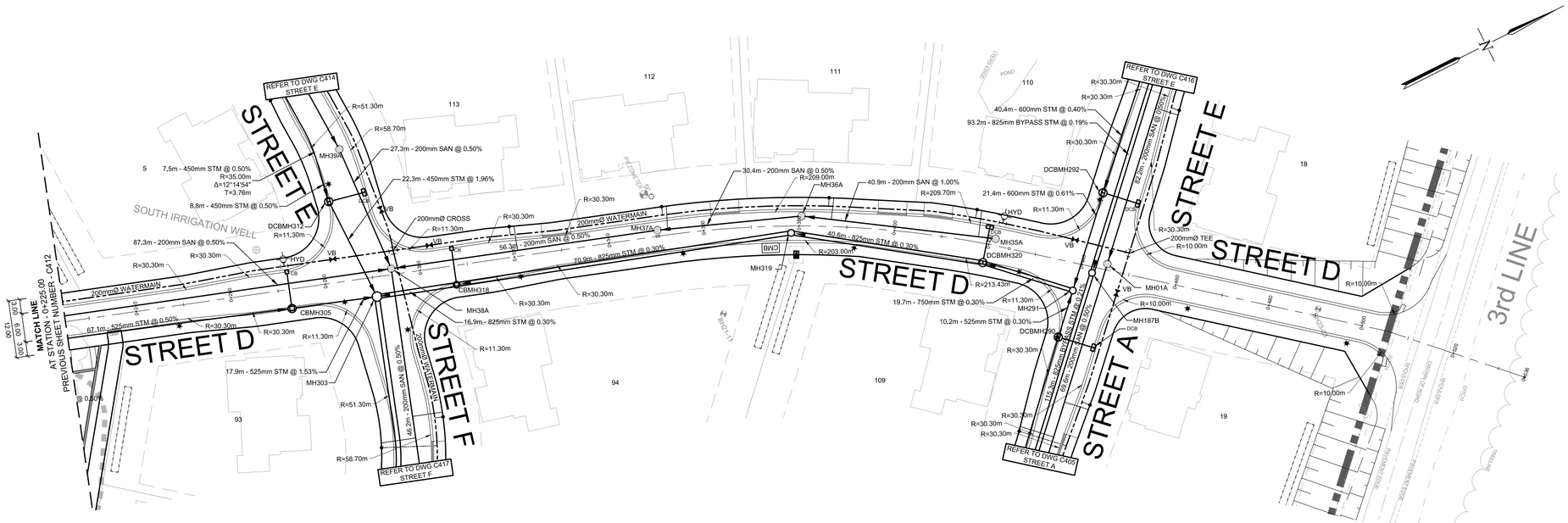
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
STREET D
STA 0+270 TO STA 0+535.70

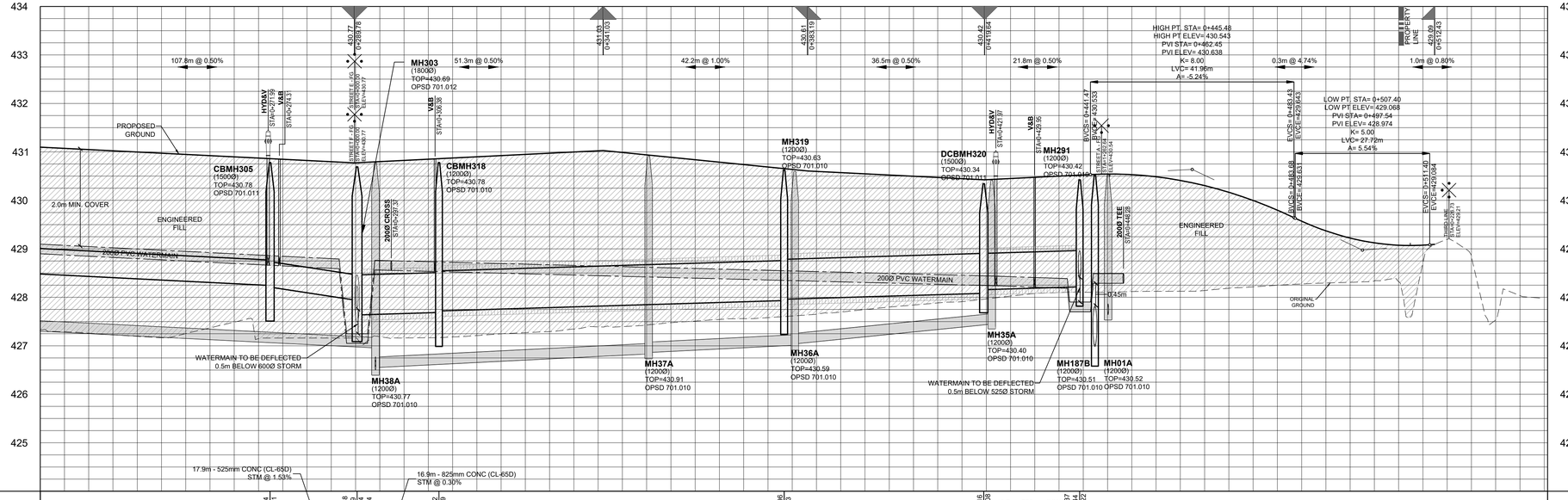
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Project No.		Contract No.		Revision No.	
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H 1:500 V 1:50					

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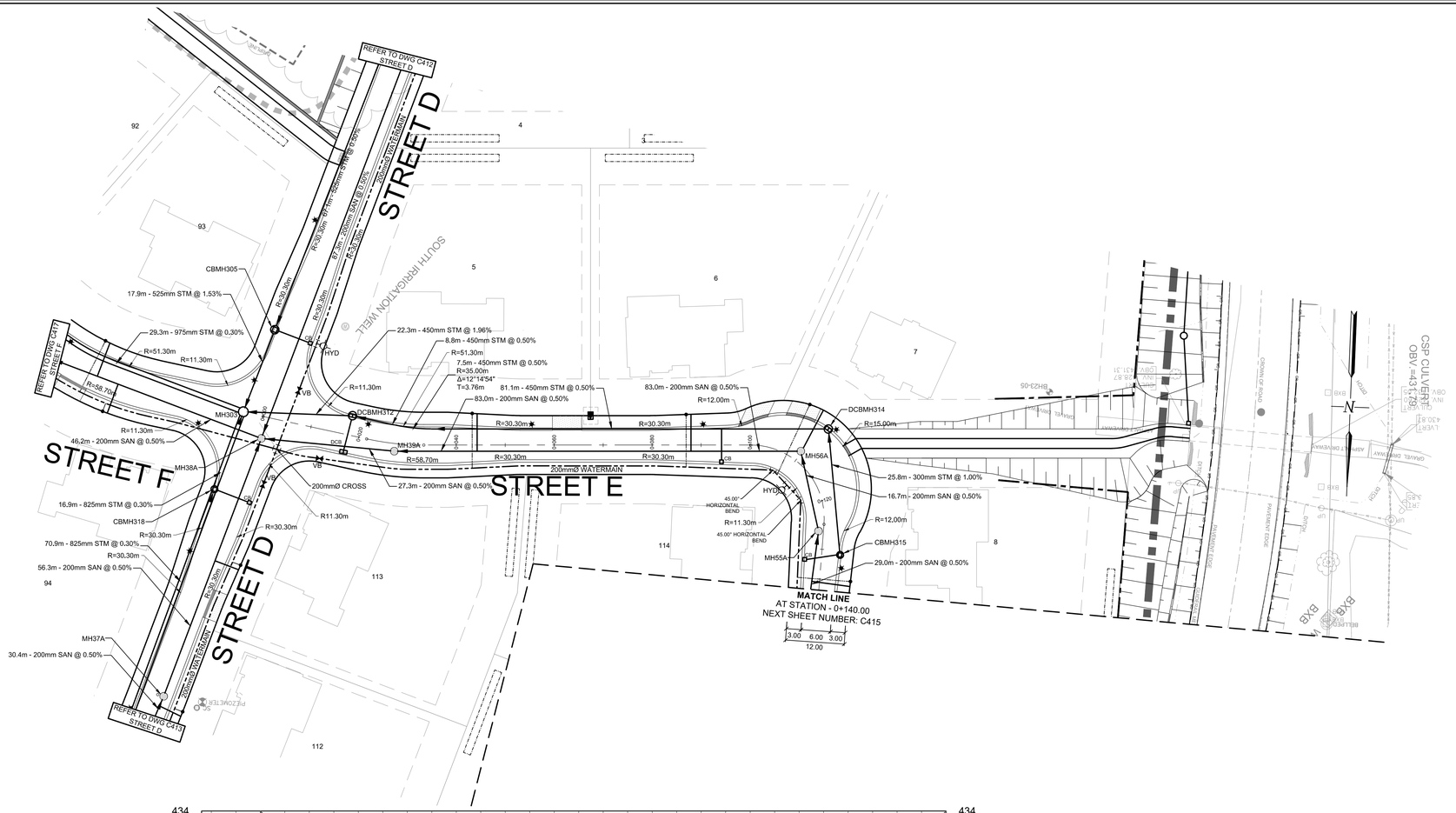


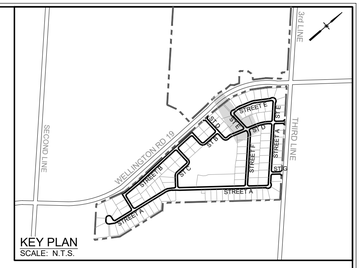
LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



| | | |

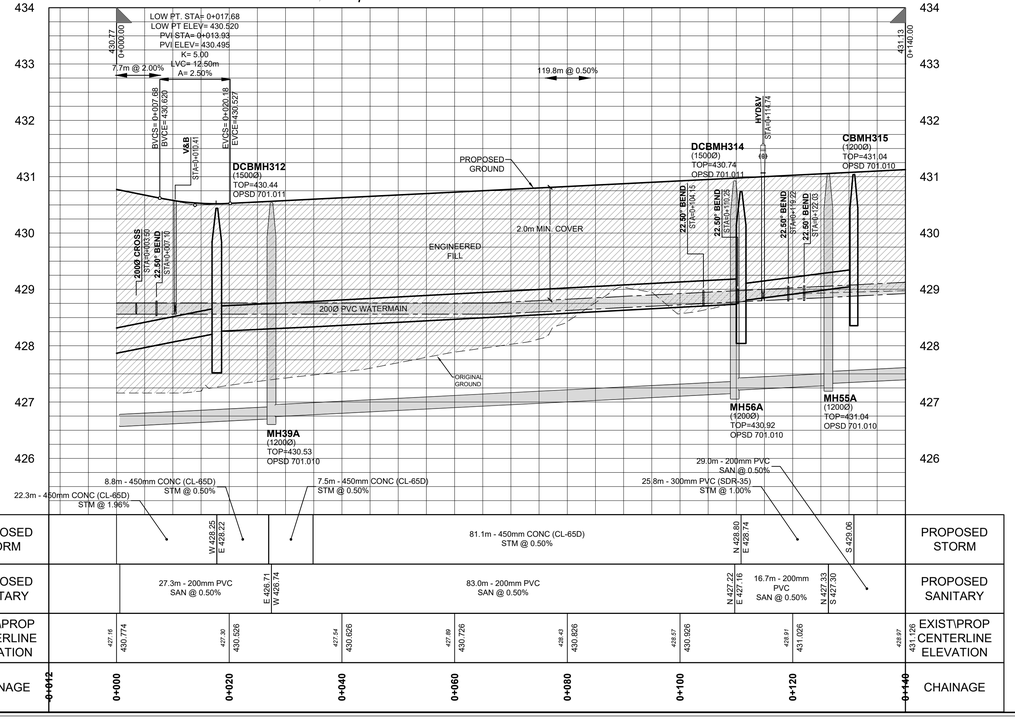




KEY PLAN
SCALE: N.T.S.

LEGEND

- LIMIT OF PROPERTY
- MH118 STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
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- EASEMENT



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015006 1 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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NOT FOR CONSTRUCTION

GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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fax (519) 836-5477
web www.rjburnside.com

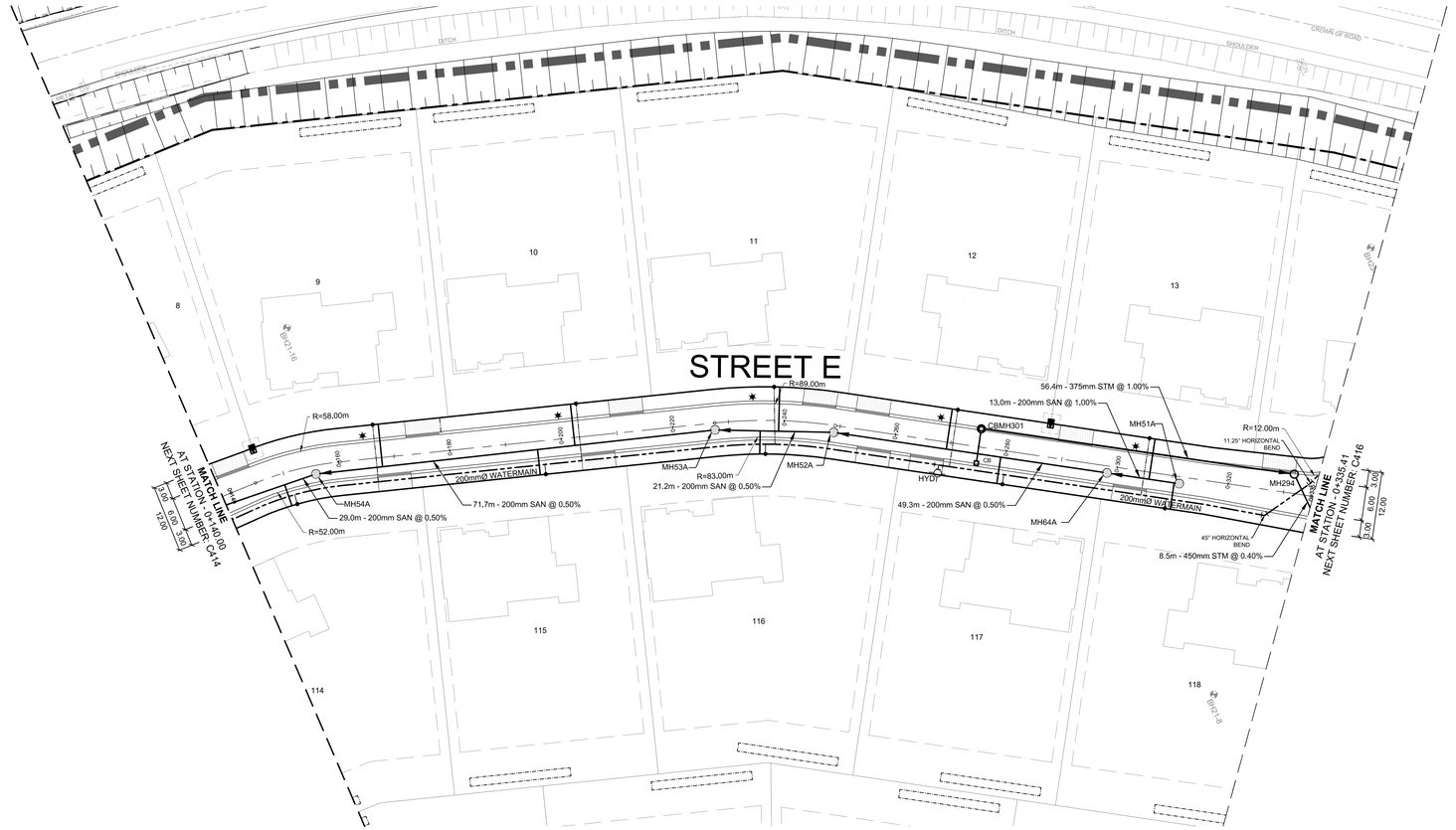
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

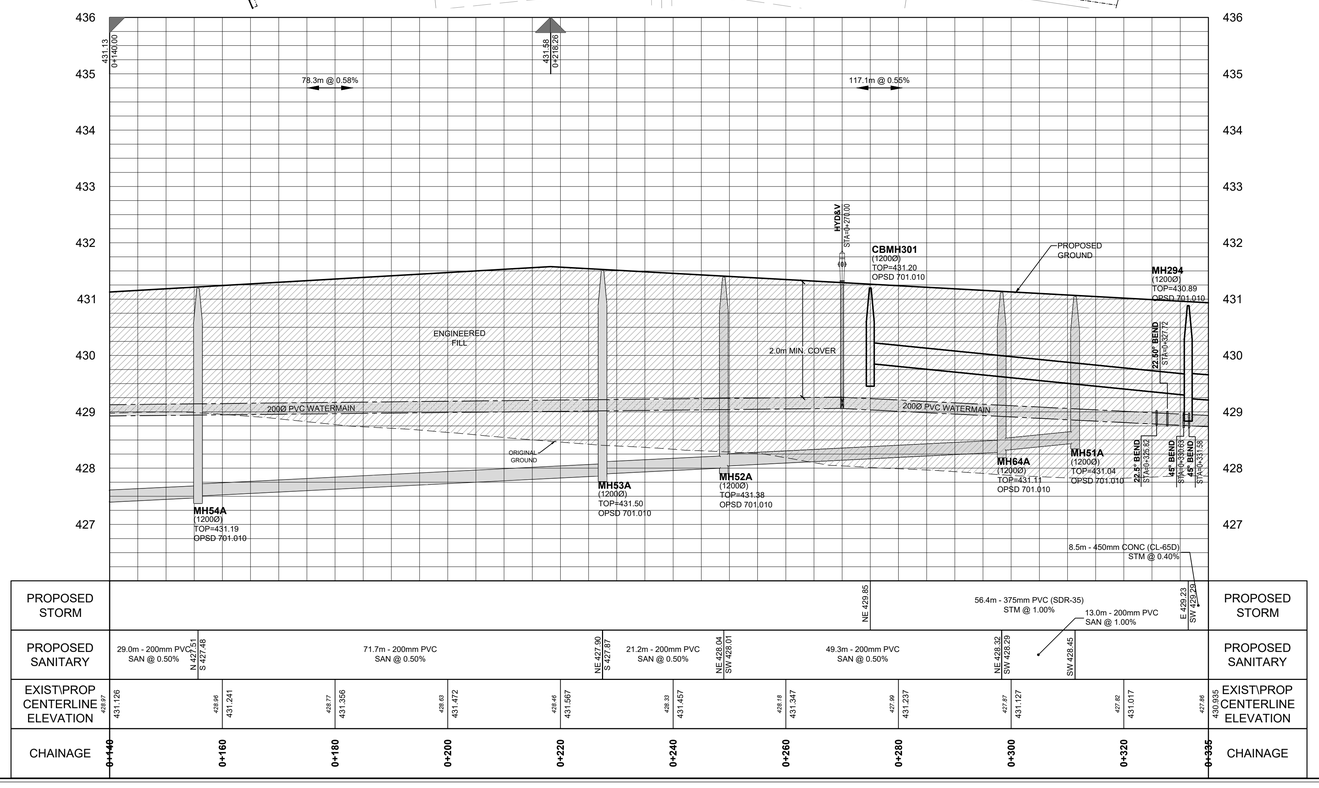
Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
STREET E
STA 0+000 TO STA 0+140

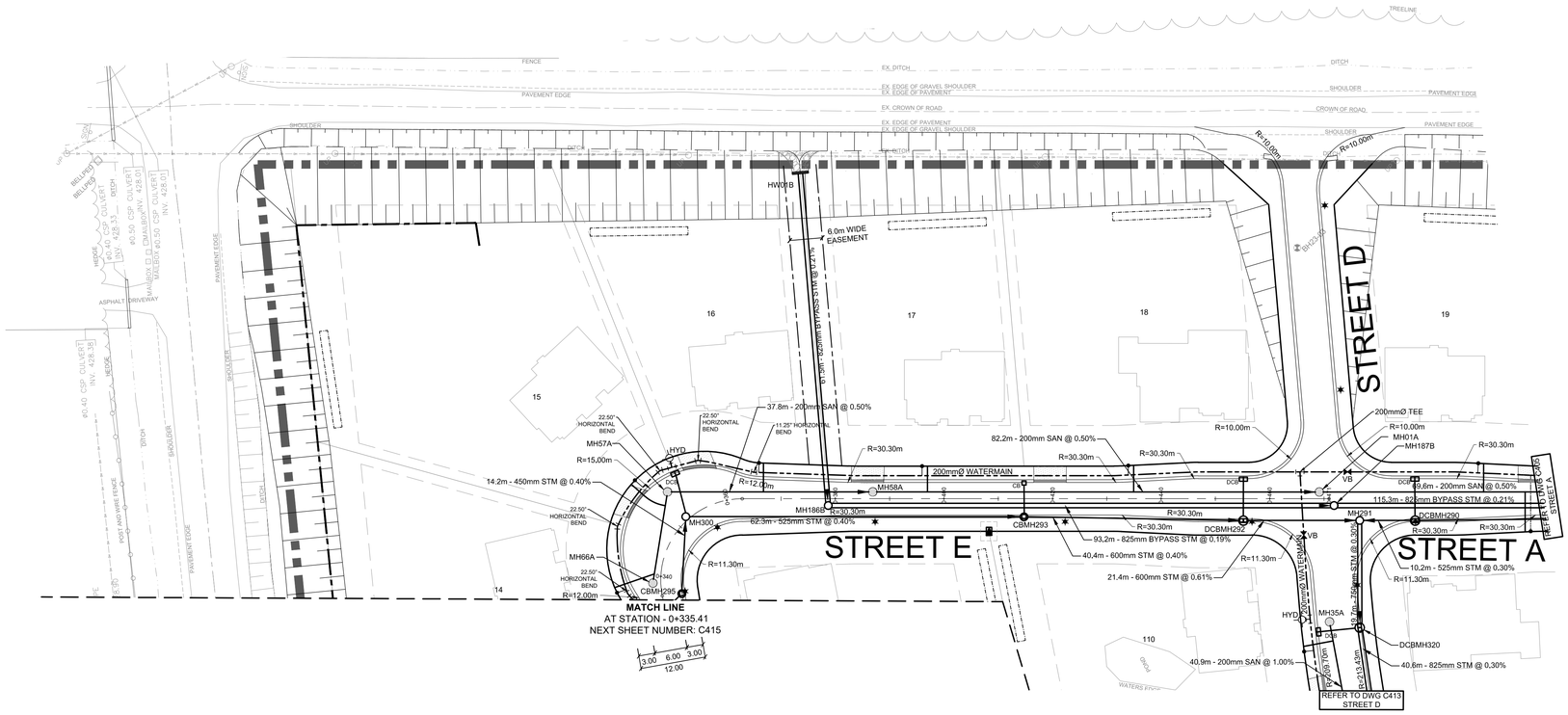
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KT	BF	MB	SR	23/10/27	C414
Project No.		Contract No.		Revision No.	
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Scale					
H 1:500 V 1:50					

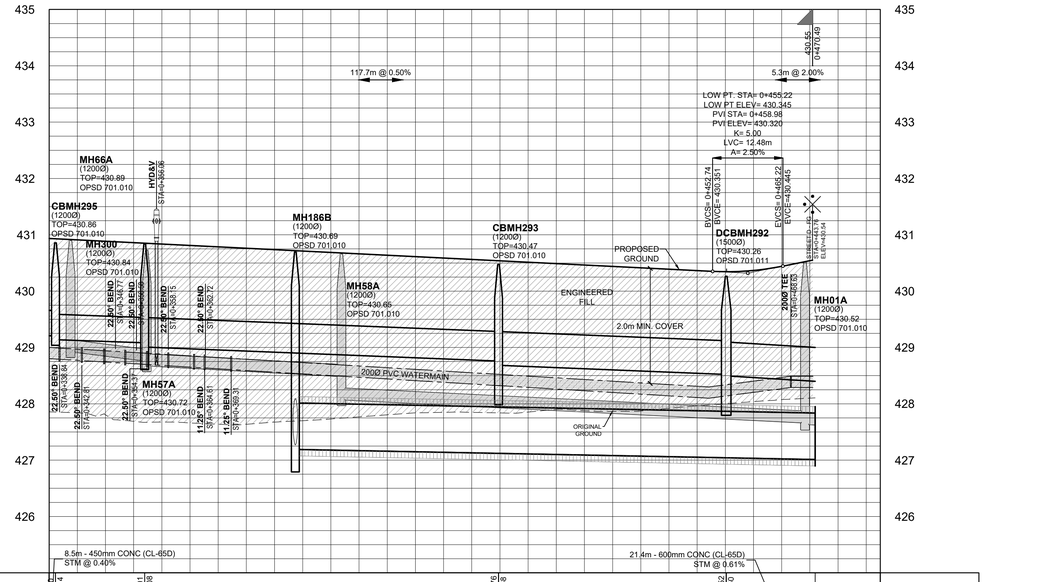
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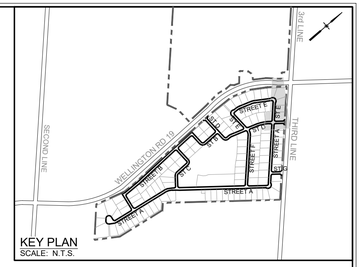

STREET E
R=89.00m
R=58.00m
R=52.00m
56.4m - 375mm STM @ 1.00%
13.0m - 200mm SAN @ 1.00%
CBMH301
MH51A
R=12.00m
11.25° HORIZONTAL BEND
MH294
MH54A
29.0m - 200mm SAN @ 0.50%
200mmØ WATERMAIN
71.7m - 200mm SAN @ 0.50%
MH53A
R=83.00m
21.2m - 200mm SAN @ 0.50%
MH52A
HYDT
49.3m - 200mm SAN @ 0.50%
MH64A
45° HORIZONTAL BEND
8.5m - 450mm STM @ 0.40%
MATCH LINE
AT STATION - 0+340.00
NEXT SHEET NUMBER: C414
MATCH LINE
AT STATION - 0+335.41
NEXT SHEET NUMBER: C416
DITCH
SHOULDER
CROWN OF ROAD
ENTRANCE
8
9
10
11
12
13
114
115
116
117
118


436
435
434
433
432
431
430
429
428
427
431.13
0+140.00
431.58
0+218.26
78.3m @ 0.58%
117.1m @ 0.55%
HYD3V
STA 0+276.00
CBMH301
(1200Ø)
TOP=431.20
OPSD 701.010
PROPOSED GROUND
MH294
(1200Ø)
TOP=430.89
OPSD 701.010
22.5° BEND
STA=0+327.72
ENGINEERED FILL
2.0m MIN. COVER
200Ø PVC WATERMAIN
200Ø PVC WATERMAIN
ORIGINAL GROUND
MH54A
(1200Ø)
TOP=431.19
OPSD 701.010
MH53A
(1200Ø)
TOP=431.50
OPSD 701.010
MH52A
(1200Ø)
TOP=431.38
OPSD 701.010
MH64A
(1200Ø)
TOP=431.11
OPSD 701.010
MH51A
(1200Ø)
TOP=431.04
OPSD 701.010
22.5° BEND
STA=0+282.64
45° BEND
STA=0+276.00
45° BEND
STA=0+31.58
8.5m - 450mm CONC (CL-65D)
STM @ 0.40%

| | | |







LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- CB — END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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GERANIUM *From the ground up™*

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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fax (519) 836-5477
web www.rjburnside.com

Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

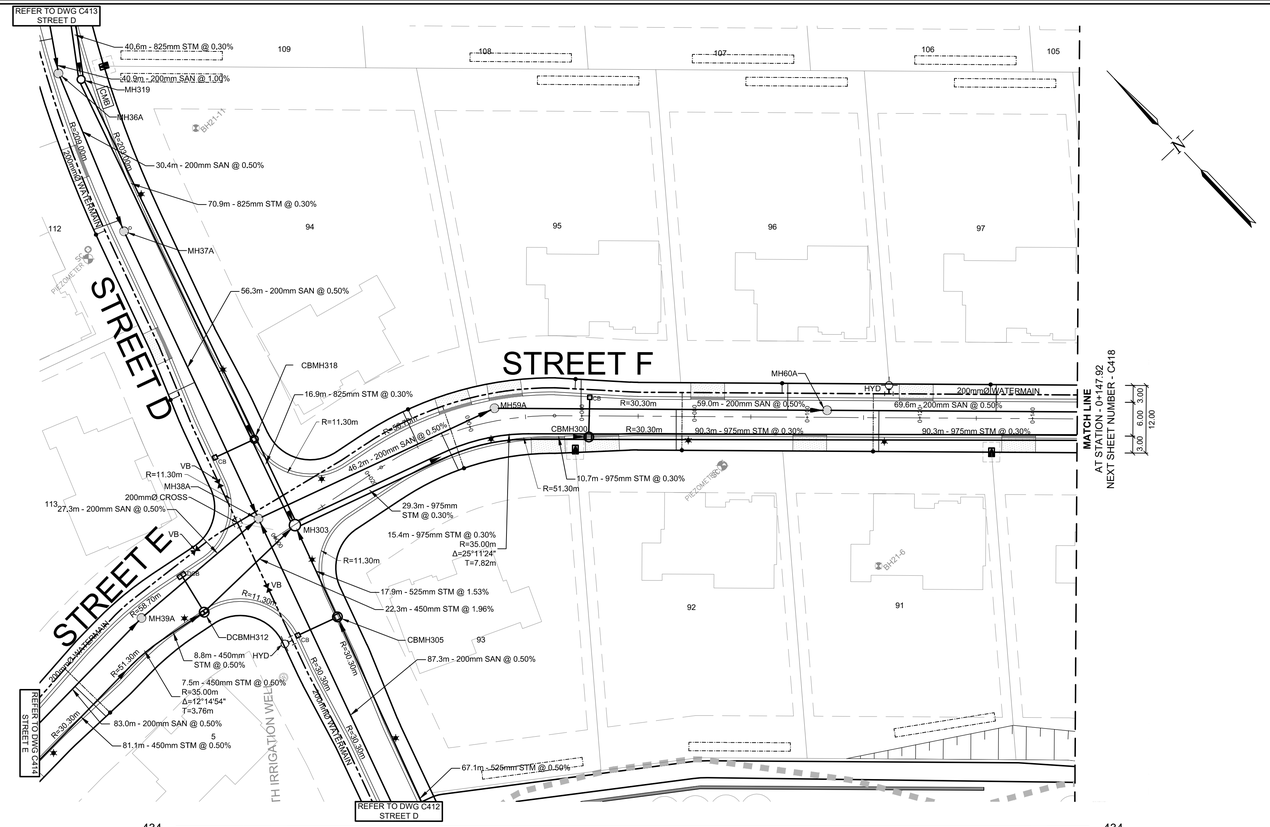
Drawing Title
FERGUS GOLF COURSE

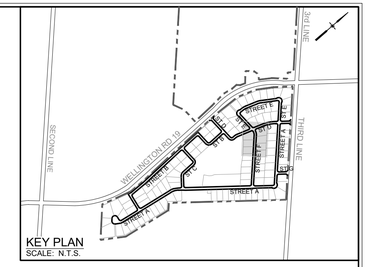
PLAN AND PROFILE
STREET E
STA 0+337 TO STA 0+472.64

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C416**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	

Scale H 1:500 V 1:50 (0 5.0 10.0 20.0 30.0m)

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LEGEND

- LIMIT OF PROPERTY
- MH118 STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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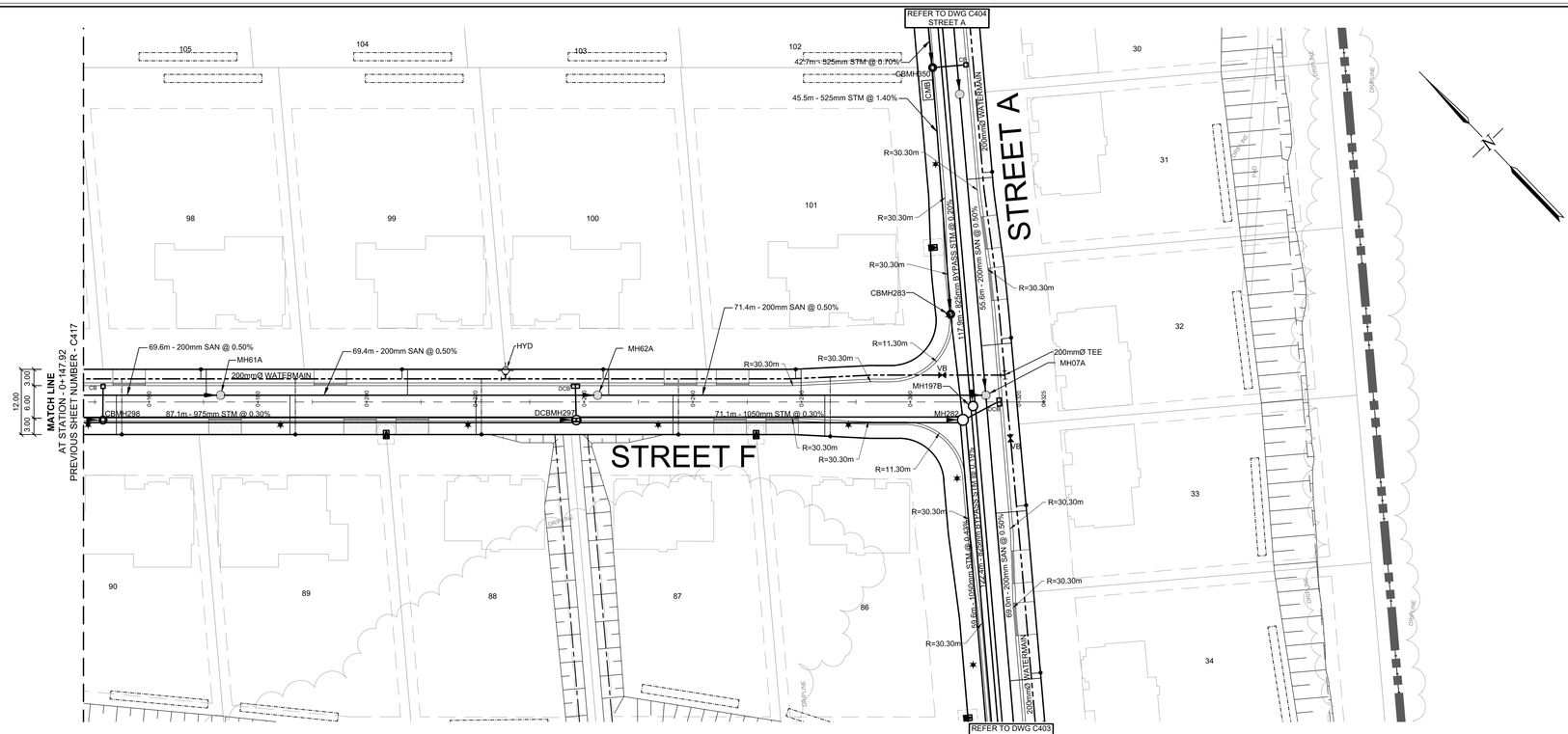
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

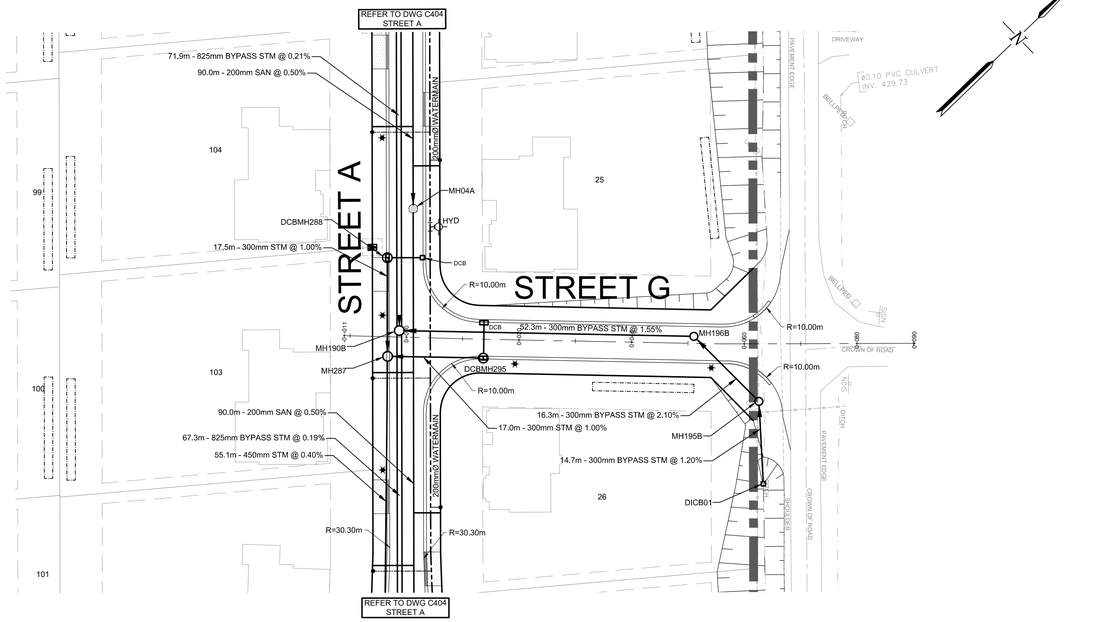
Drawing Title
FERGUS GOLF COURSE

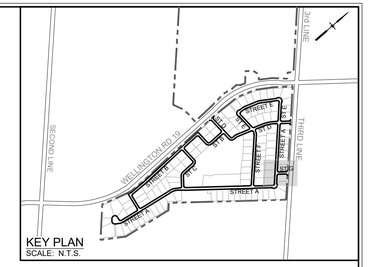
PLAN AND PROFILE
STREET F
STA 0+150 TO STA 0+326.62

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	C417
Project No. 052719.2000		Contract No. ----		Revision No. 0	
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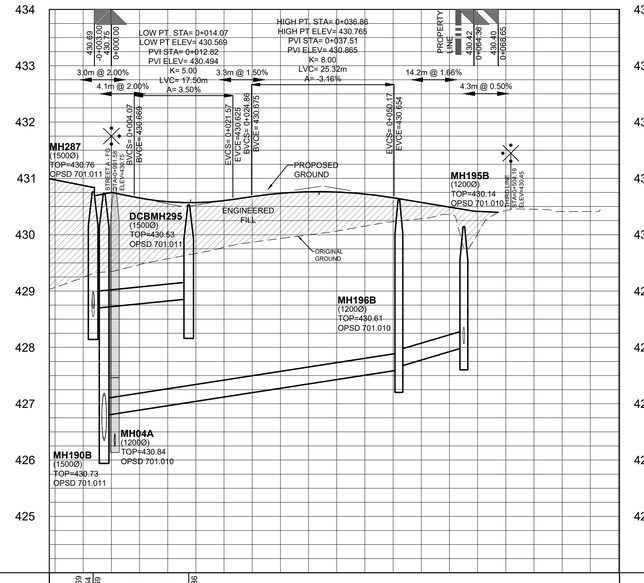

REFER TO DWG C404
STREET A
105
104
103
102
101
100
99
98
30
31
32
33
34
90
89
88
87
86
STREET A
STREET F
427.7m - 525mm STM @ 0.70%
45.5m - 525mm STM @ 1.40%
CBMH300
CMB
200mmØ WATERMAIN
R=30.30m
R=11.30m
CBMH283
71.4m - 200mm SAN @ 0.50%
200mmØ BYPASS STM @ 0.30%
117.9m - 250mm SAN @ 0.40%
55.6m - 250mm SAN @ 0.40%
69.6m - 200mm SAN @ 0.50%
69.4m - 200mm SAN @ 0.50%
MH61A
200mmØ WATERMAIN
HYD
MH62A
VB
MH197B
200mmØ TEE
MH07A
CBMH298
87.1m - 975mm STM @ 0.30%
DCBMH297
71.1m - 1050mm STM @ 0.30%
MH282
69.6m - 1400mm STM @ 0.30%
127.4m - 450mm STORM SEWER @ 0.30%
69.0m - 200mm SAN @ 0.50%
200mmØ WATERMAIN
REFER TO DWG C403
STREET A
DRAINAGE
DRAINAGE
DRAINAGE





LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



PROPOSED STORM	NW 426.69 SE 426.34 NE 426.69	17.0m - 300mm PVC (SDR-35) STM @ 1.00%	SW 426.86	16.3m - 300mm PVC (SDR-35) BYPASS STM @ 2.10%			PROPOSED STORM
PROPOSED BYPASS STM	NW 426.37 SE 426.34 NE 426.79	52.3m - 300mm PVC (SDR-35) BYPASS STM @ 1.55%		E 427.66 SW 427.60	SE 428.06 W 428.00		PROPOSED BYPASS STM
PROPOSED SANITARY	NW 426.27 SE 426.24						PROPOSED SANITARY
EXIST\PROP CENTERLINE ELEVATION 429.03	430.36	430.760	429.78	430.604	429.66	430.759	430.38	430.490	429.41	EXIST\PROP CENTERLINE ELEVATION
CHAINAGE	0+011	0+000	0+020	0+040	0+060	0+080	0+090.17	CHAINAGE

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015006 I HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

GERANIUM — From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Ave. W., Unit 20
Guelph, Ontario, N1H 1C4
telephone (519) 823-4995
fax (519) 836-5477
web www.rjburnside.com

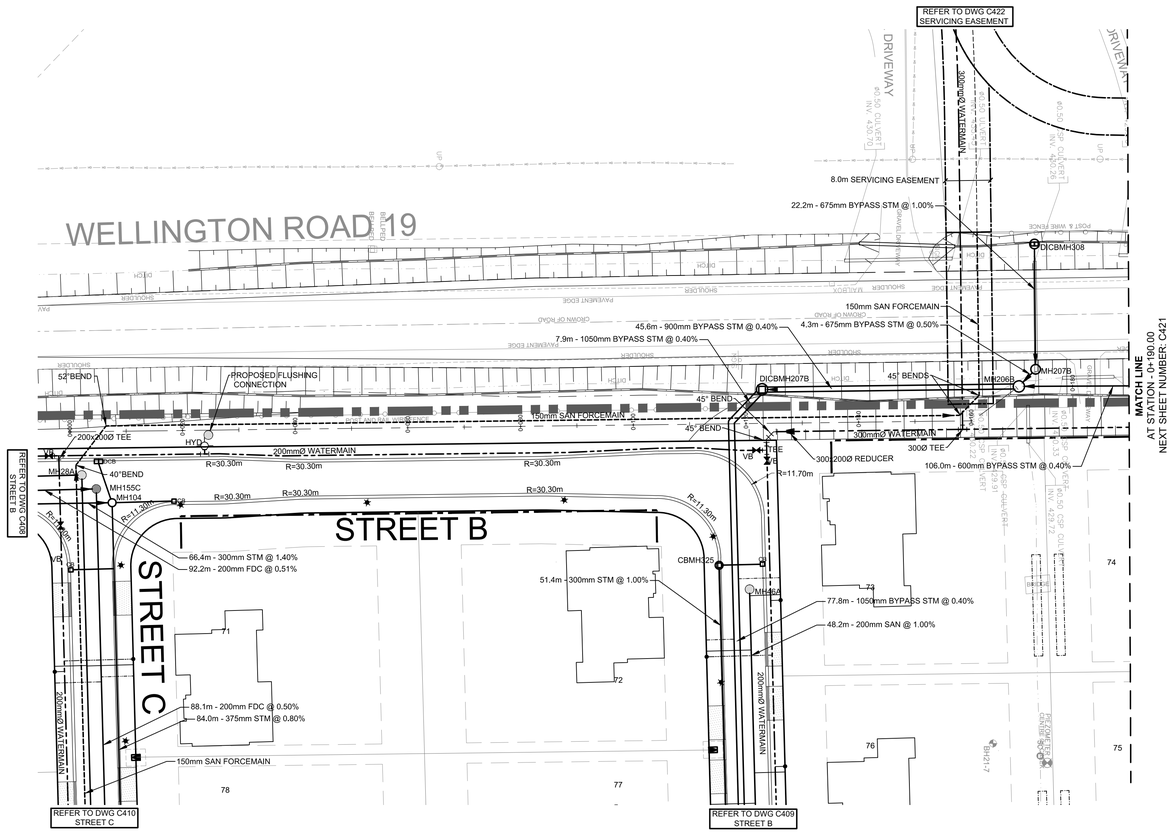
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

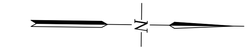
Drawing Title
FERGUS GOLF COURSE

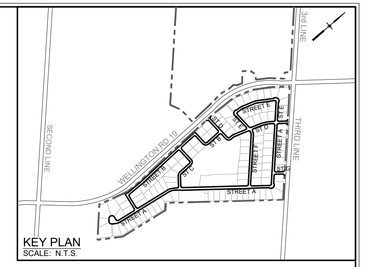
PLAN AND PROFILE
STREET G
STA -0+011.00 TO STA 0+090.17

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	C419
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
H 1:500 V 1:50					

file: \\burnside\data files\052719 Fergus Golf Course\052719.2000 - Fergus Golf Course Revised Design\4_Production\dwg\052719.2000 - PP STREET G.dwg, Sara Hallett, June 14, 2024 - 8:15 AM

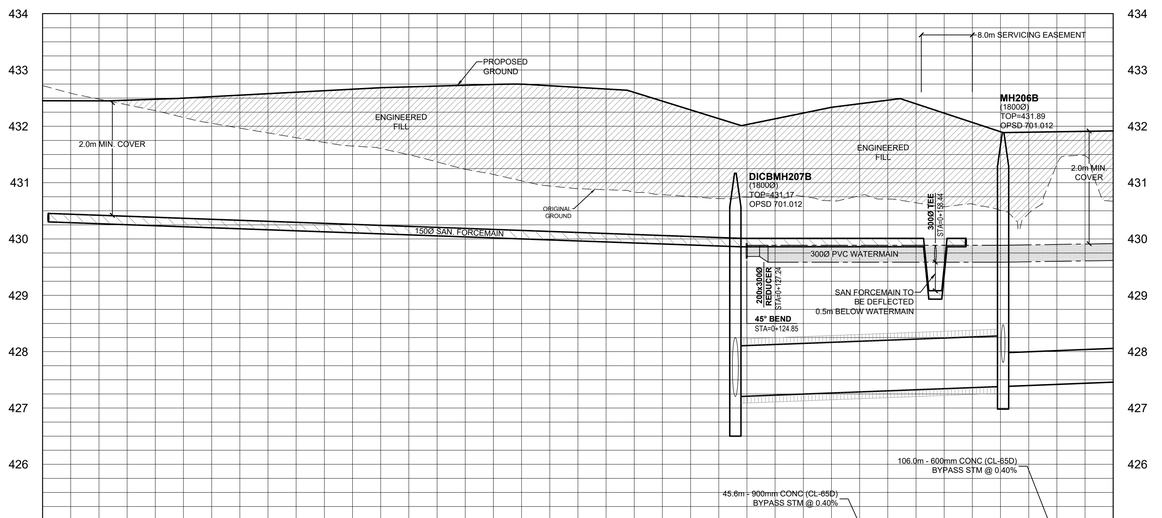






LEGEND

- LIMIT OF PROPERTY
- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



PROPOSED BYPASS STM								N 427.20 SE 427.20		NW 427.80 SW 427.38 N 427.38				PROPOSED BYPASS STM
EXIST\PROP CENTERLINE ELEVATION	432.49	432.454	432.48	432.478	432.38	432.584	432.08	432.684	432.74	432.745	432.66	432.662	431.97	431.975	432.34	432.337	432.18	432.179	431.89	431.890	431.92	431.918	EXIST\PROP CENTERLINE ELEVATION
CHAINAGE	0+000		0+020		0+040		0+060		0+080		0+100		0+120		0+140		0+160		0+180		0+190		CHAINAGE

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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NOT FOR CONSTRUCTION

GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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web www.rjburnside.com

Client

FERGUS DEVELOPMENT Inc.

3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

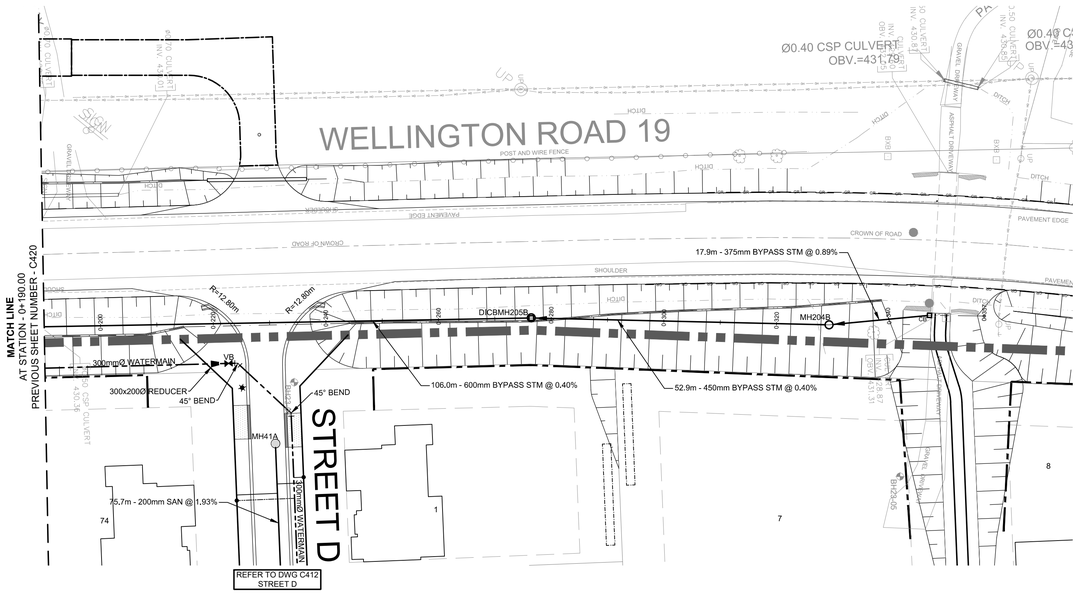
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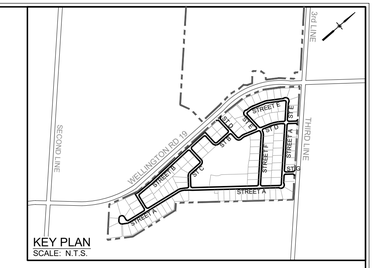
FERGUS GOLF COURSE

PLAN AND PROFILE
SERVICING BLOCK
STA 0+000 TO STA 0+190

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	ET	ET	SR	23/10/27	**C420**
Project No.		Contract No.		Revision No.	
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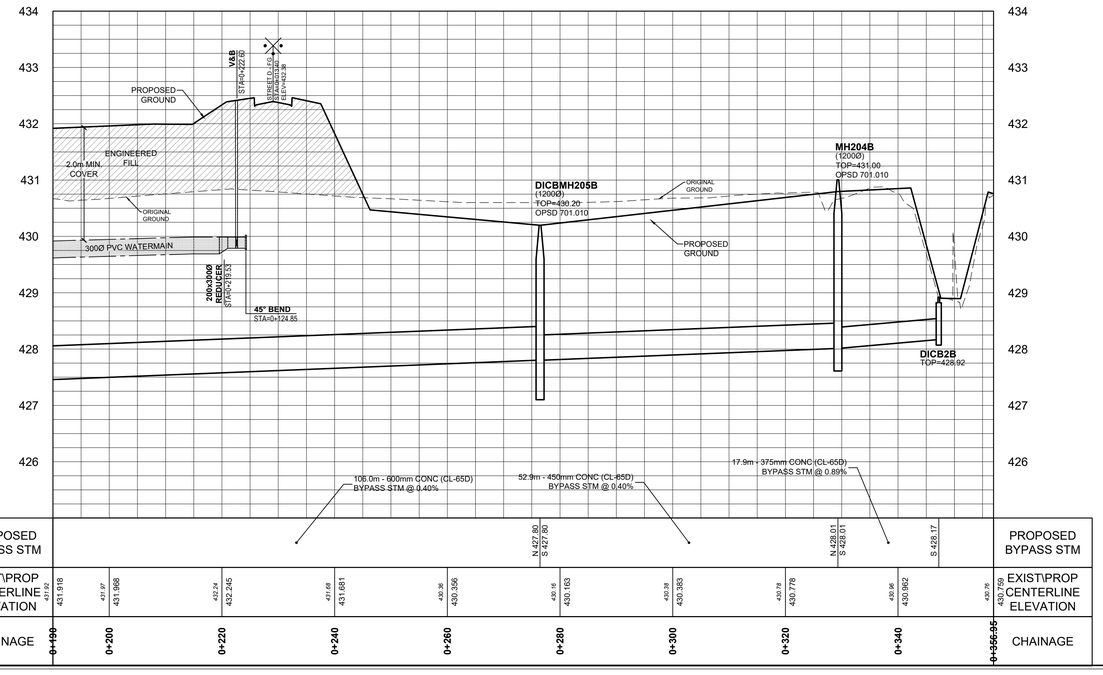
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LEGEND

- LIMIT OF PROPERTY
- MH11B — STORM SEWER/MANHOLE
- MH11BB — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- MH106C — FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- d^{DI} dm^{DCB} — SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 — PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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NOT FOR CONSTRUCTION

GERANIUM — From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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web www.rjburnside.com

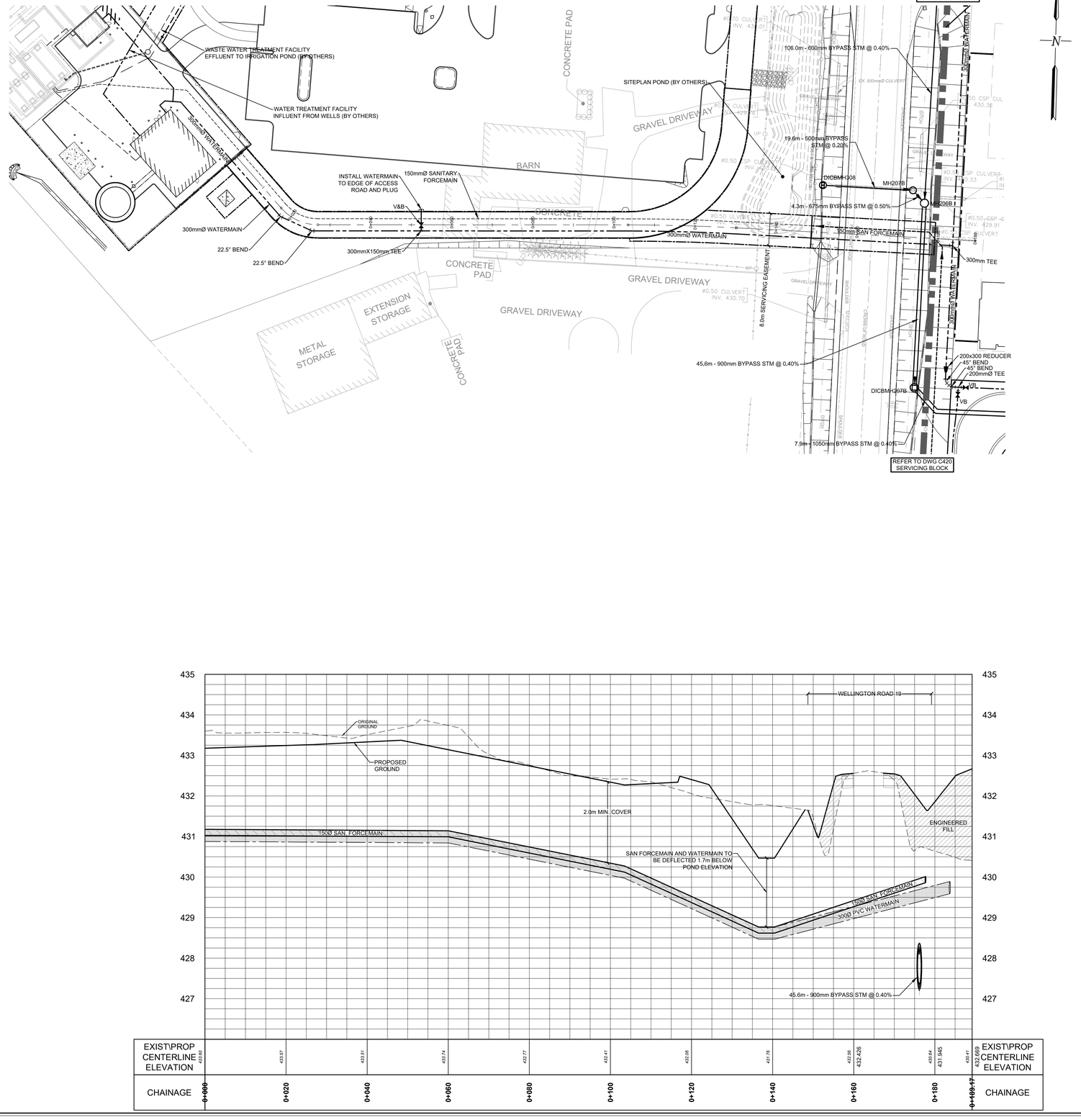
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

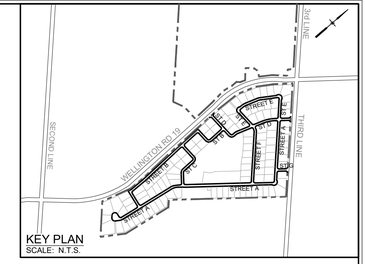
Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
SERVICING BLOCK
STA 0+190 TO 0+356.95

Drawn	Checked	Designed	Checked	Date	Drawing No.
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Project No.		Contract No.		Revision No.	
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Bar Name/Scheme Date Created/2021/10 Fergus Golf Course/052719.2000 - Fergus Golf Course Servicing Design/3.0 Production/Dwg/052719.2000 - PP SERVICING BLOCK.dwg Sheet Name: Cover Tab Date: 4:11 PM





LEGEND

- LIMIT OF PROPERTY
- MH118 STORM SEWER/MANHOLE
- MH118B BYPASS STORM SEWER/MANHOLE
- MH106A SANITARY SEWER/MANHOLE
- MH106C FDC SEWER/MANHOLE
- SANITARY FORCEMAIN
- FDC SINGLE HOUSE CONNECTION
- SANITARY SINGLE HOUSE CONNECTION
- WATER SERVICE AND CURB STOP
- WATERMAIN
- FIRE HYDRANT
- VALVE & BOX
- TEE
- d^{25} dm^{DCB} SINGLE / DOUBLE CATCHBASIN
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- 140 PROPOSED LOT NUMBER
- COMMUNITY MAILBOX
- END OF SIDEWALK, c/w TACTILE WARNING PLATE PER OPSD 310.033
- EASEMENT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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NOT FOR CONSTRUCTION

GERANIUM *From the ground up™*

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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Guelph, Ontario, N1H 1C4
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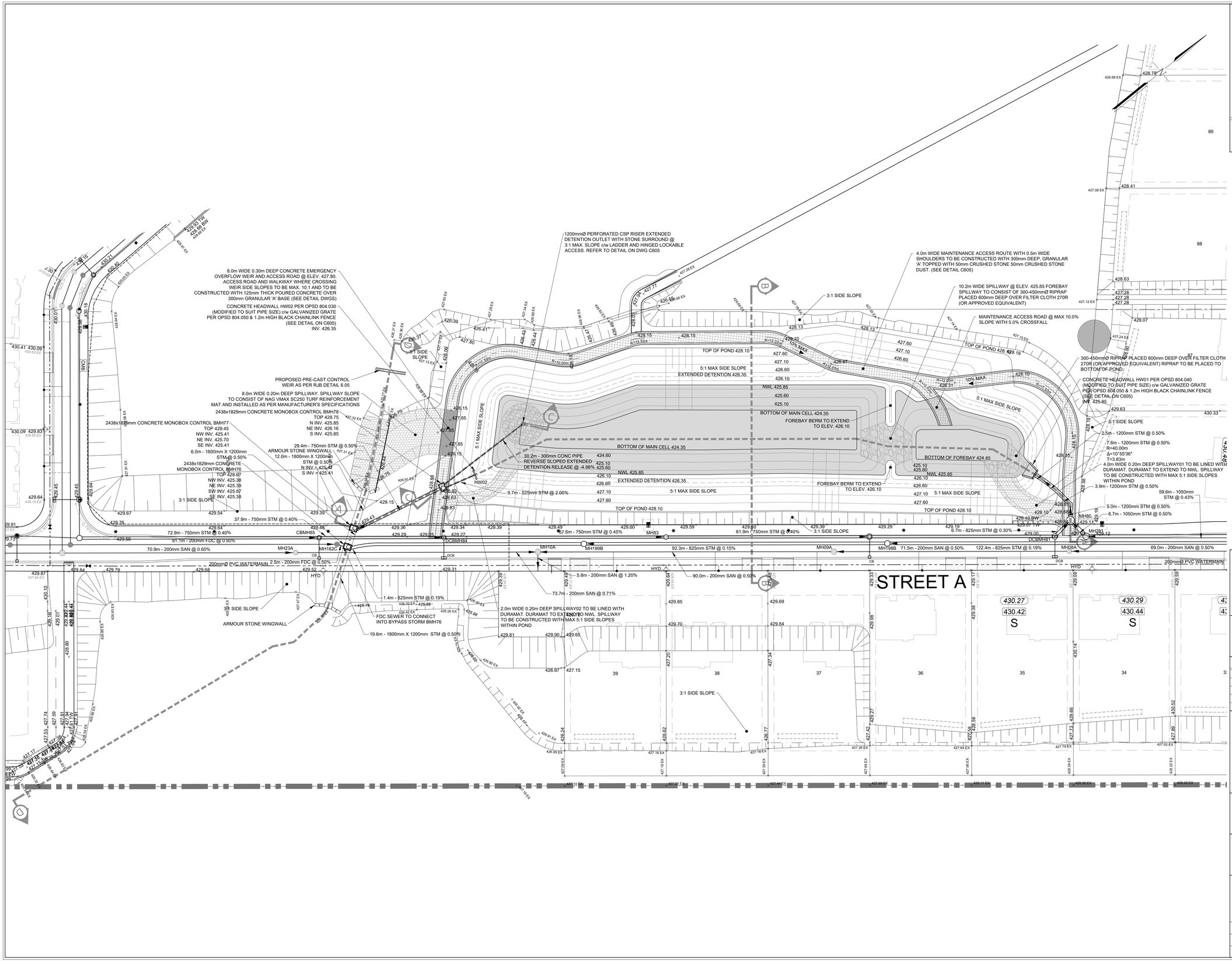
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

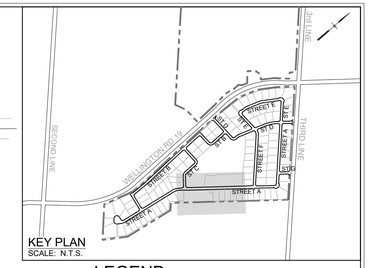
Drawing Title
FERGUS GOLF COURSE

PLAN AND PROFILE
SERVICING EASEMENT
STA 0+000 TO STA 0+241.54

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Project No.		Contract No.		Revision No.	
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LEGEND

- MH118 — STORM SEWER/MANHOLE
- MH118B — BYPASS STORM SEWER/MANHOLE
- MH106A — SANITARY SEWER/MANHOLE
- SANITARY FORCEMAIN
- WATERMAIN
- FIRE HYDRANT
- SINGLE / DOUBLE CATCHBASIN

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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NOT FOR CONSTRUCTION

GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Ave. W., Unit 20
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telephone 1-800-265-9662
web www.rjburnside.com

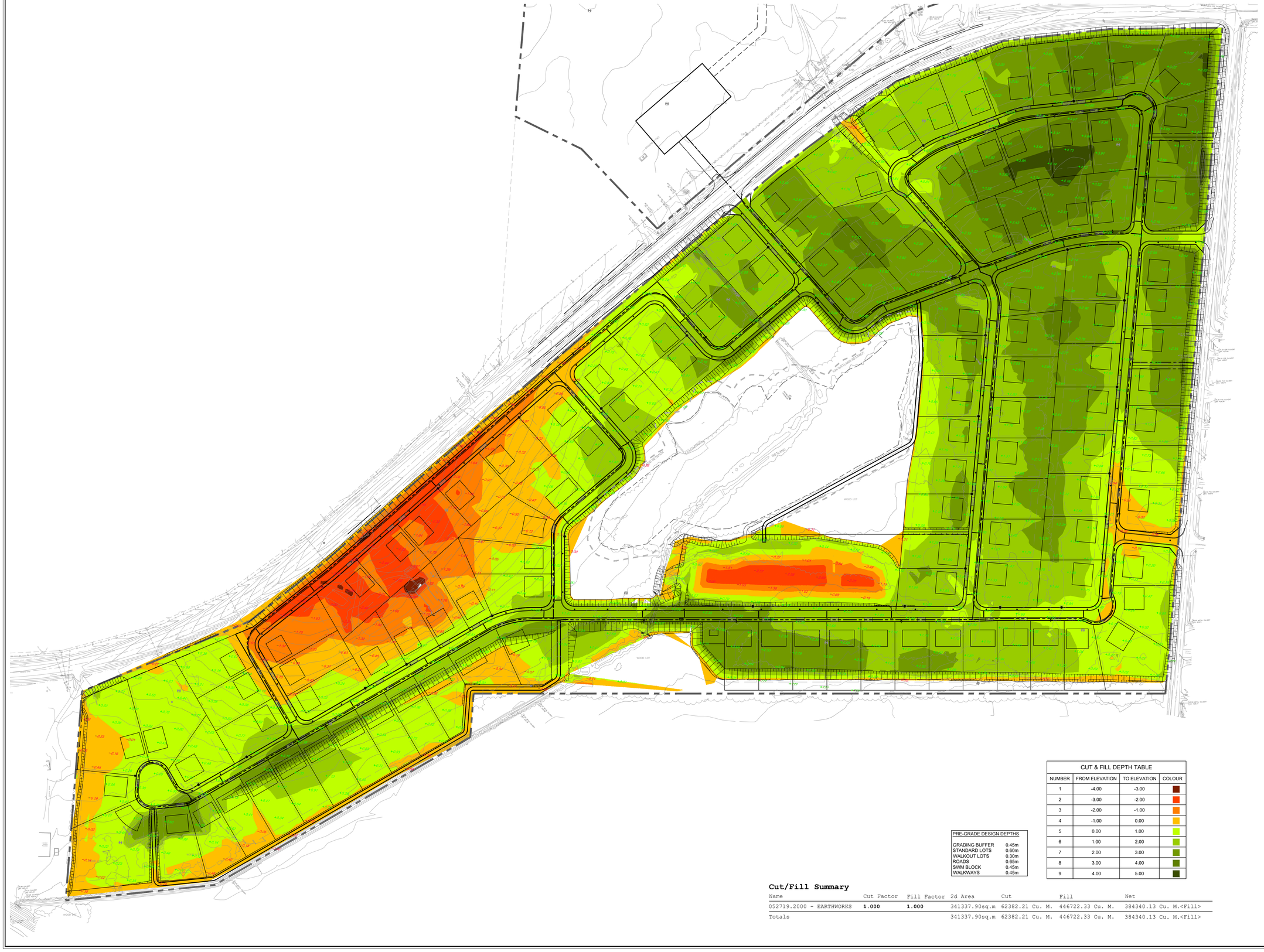
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

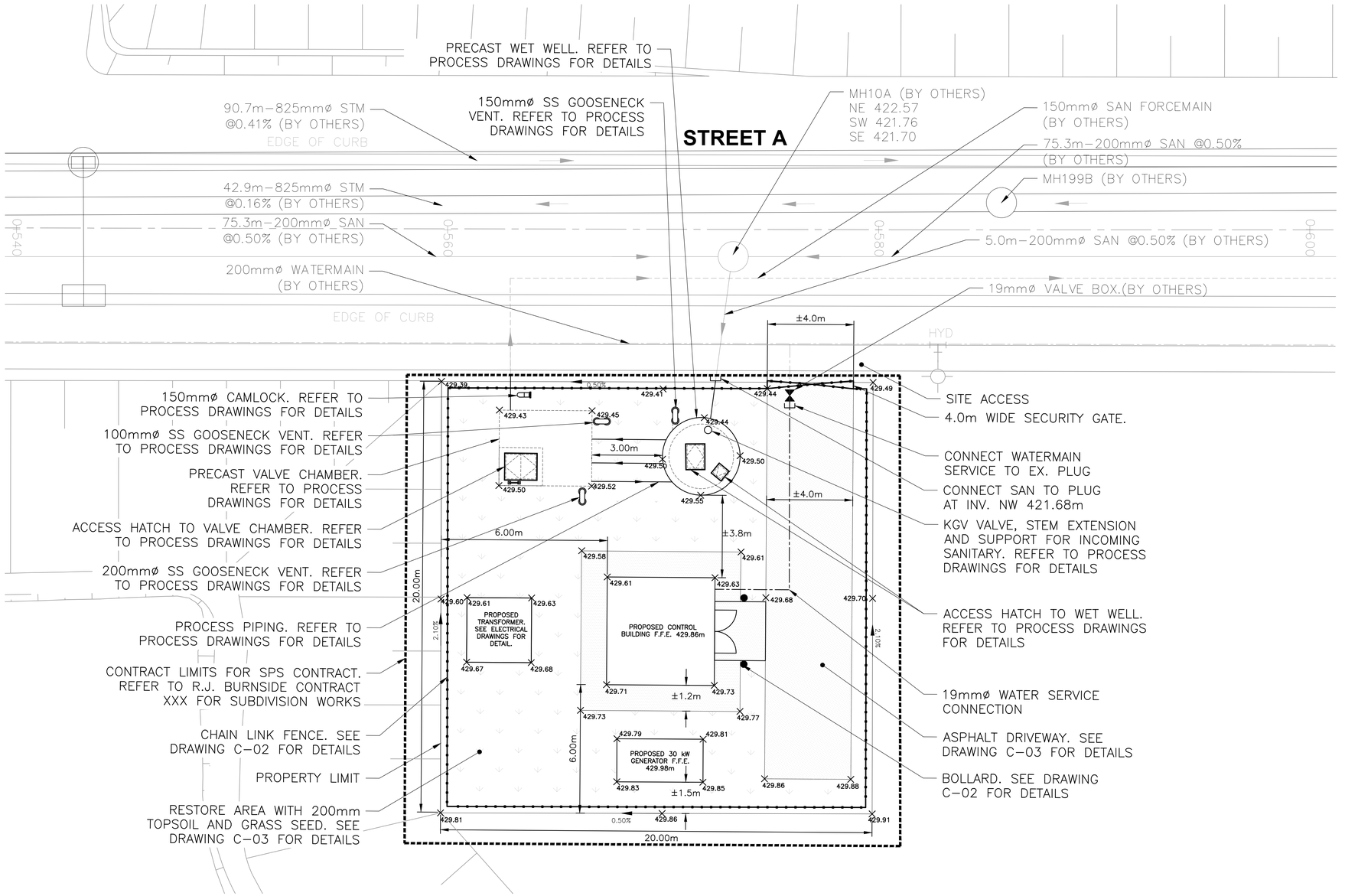
Drawing Title
FERGUS GOLF COURSE

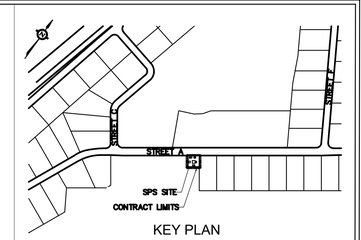
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Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	LG	SR	23/10/27	C601
Project No. 052719.2000		Contract No. ----		Revision No. 0	
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WOOD LOT
WOOD LOT
WOOD LOT
WETLAND
WETLAND
WETLAND
PARKING
100R WETLAND SETBACK
100R WETLAND SETBACK
100R WETLAND SETBACK
DRIVE
DRIVE
DRIVE





KEY PLAN

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. PRIOR TO CONSTRUCTION, THE SITE WILL BE PRE-GRADED BY THE DEVELOPER FOLLOWING THE GRADING DESIGN BY R.J. BURNSIDE PROJECT XXX DRAWING XXX DATED XXX.
3. ALL UTILITIES SHOWN ON THE DRAWING ARE IN APPROXIMATE LOCATIONS. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING U/G AND OVERHEAD UTILITIES. VARIOUS UTILITIES REQUIRE ADVANCE NOTICE PRIOR TO DIGGING, FOR STAKE OUT.
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE CURRENT TOWNSHIP OF CENTER WELLINGTON DESIGN STANDARDS, SPECIFICATIONS AND DETAILS, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) UNLESS OTHERWISE NOTED.
5. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS AND LICENSES BEFORE PROGRESSING WITH ANY WORK.
6. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. ELEVATIONS, SIZES, MATERIAL PRIOR TO COMMENCEMENT OF CONSTRUCTION.
7. ACCESS HATCHES TO COME EQUIPPED WITH SECONDARY GRATING.

No.	REVISIONS	Date	By	Approved
1.	ISSUED FOR 30% SUBMISSION	DEC 2023	M.L.	

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

P. Eng.
Approved By

TYLin
8800 Dufferin Street, Suite 200, Vaughan, ON L4K 0C5
p: 905.738.5700
f: 705.738.0065

GERANIUM
From the ground up™
3190 Steeles Ave. Suit 300, Markham, ON L3R 1G9
p: 905.477.1177

Centre Wellington
1 Macdonald Square, Elora, ON N0B 1S0

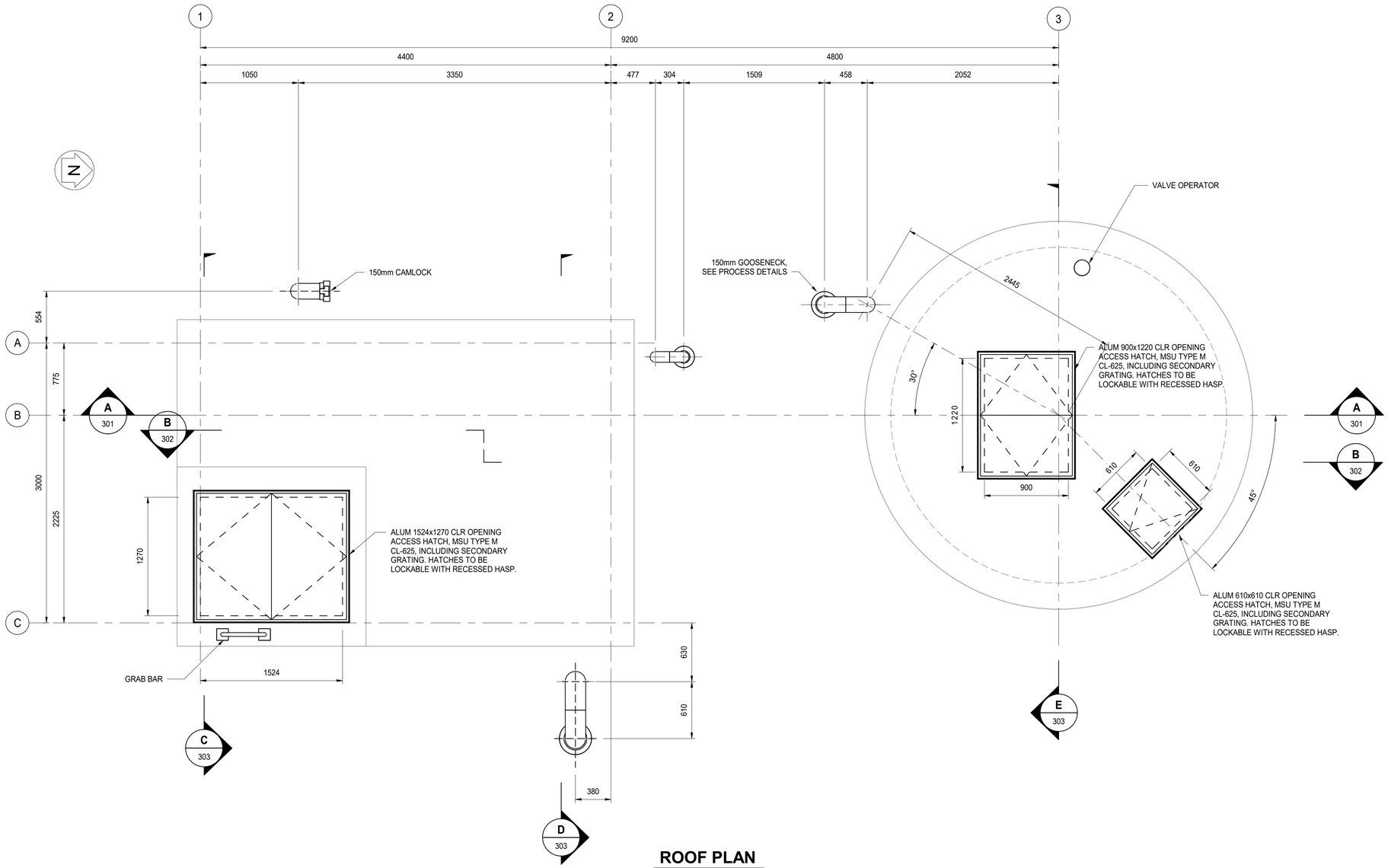
FERGUS GOLF COURSE REDEVELOPMENT
SEWAGE PUMP STATION

CIVIL SITE PLAN AND GRADING

CIVIL SERVICING

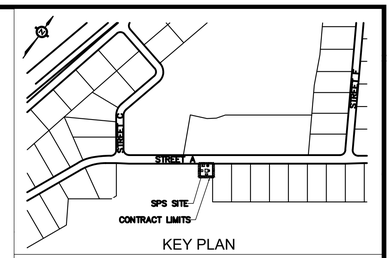
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Drawn By: S.M.	
Designed By: S.M.	
Checked By: A.K.	Drawing No. SPS-C-101
Date: 12/12/2023	
Project No.: 10402	

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ROOF PLAN

SCALE: 1 : 25



KEY PLAN

NOTES:

No.	REVISIONS	Date	By
A	ISSUED FOR 30% DESIGN SUBMISSION	DEC 2023	M.L.

PRELIMINARY NOT FOR CONSTRUCTION

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P. Eng.

Approved By

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p: 905.477.1177

Centre Wellington
1 Macdoald Square, Elora, ON N0B 1S0

FERGUS GOLF COURSE REDEVELOPMENT

SEWAGE PUMP STATION

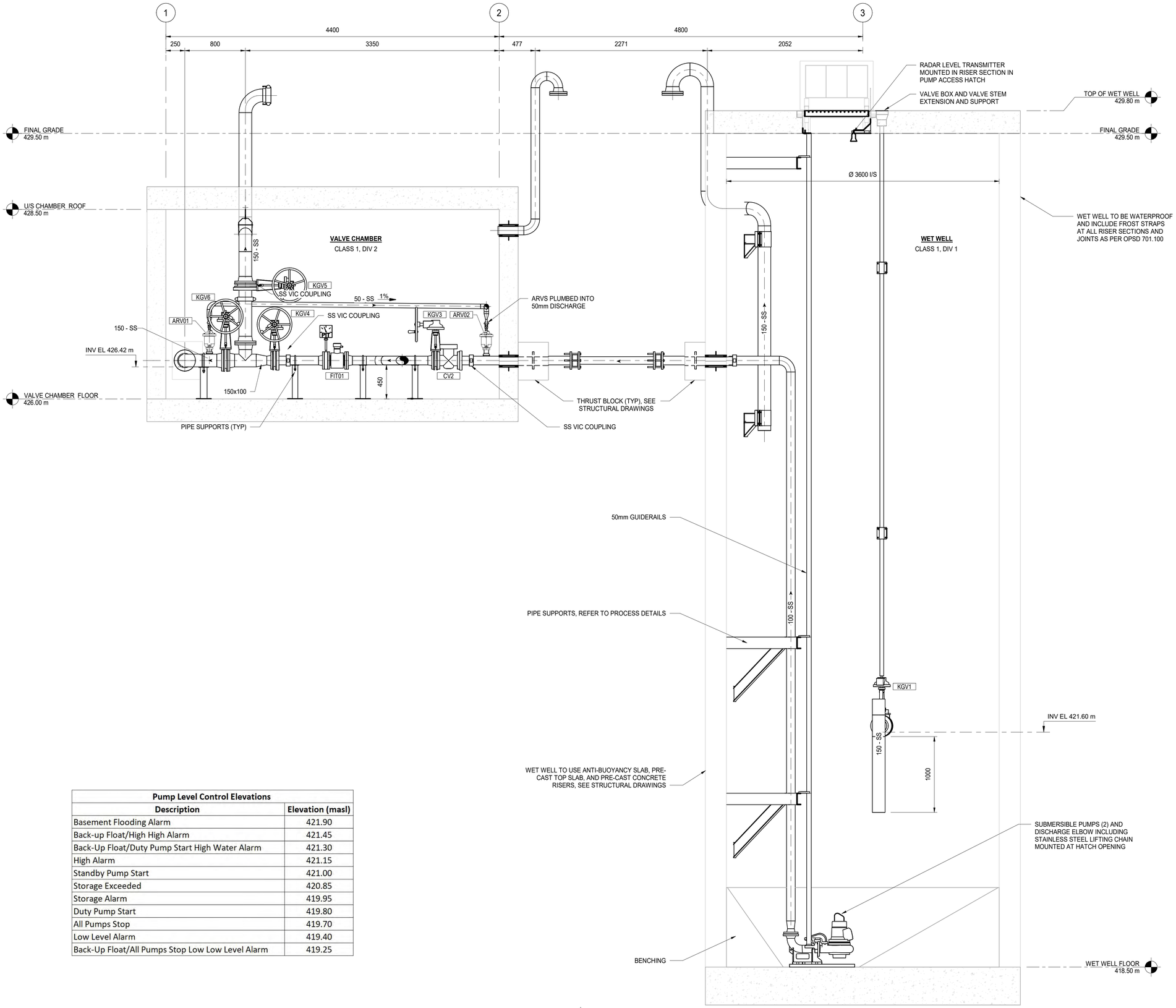
PROCESS PIPING ROOF PLAN

PROCESS MECHANICAL

Scale: 1 : 25	Contract No. #####
Drawn By: P.A.	
Designed By: S.G.	
Checked By: M.L.	Drawing No. SPS- PM-102
Date: 10/24/2023	
Project No.: 10402	

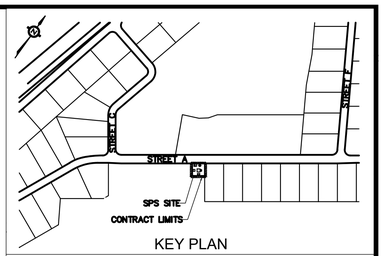
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2023-12-15 14:58:34



A SECTION
101 SCALE: 1 : 25

Pump Level Control Elevations	
Description	**Elevation (masl)**
Basement Flooding Alarm	421.90
Back-up Float/High High Alarm	421.45
Back-Up Float/Duty Pump Start High Water Alarm	421.30
High Alarm	421.15
Standby Pump Start	421.00
Storage Exceeded	420.85
Storage Alarm	419.95
Duty Pump Start	419.80
All Pumps Stop	419.70
Low Level Alarm	419.40
Back-Up Float/All Pumps Stop Low Low Level Alarm	419.25



KEY PLAN

NOTES:

1. CONTRACTOR TO PROVIDE VERTICAL PIPE SUPPORTS WITHIN THE WET WELL FOR DROP PIPE, DISCHARGE PIPING, SUMP PUMP DISCHARGE, AND AIR RETURN LINE.
2. 2. BENCHING TO BE INSTALLED 45 DEGREES FROM PUMP SUPPORT BASE PLATE TO EXTERIOR WALLS.
3. REFER TO CIVIL SITE PLAN DRAWING C-01 FOR RESTORATION DETAILS AT GRADE.
4. ALL PIPE PENERATIONS ARE TO BE WATERTIGHT WITH APPROVED SEALANT.
5. WET WELL AND PRE-CAST CONCRETE VALVE CHAMBER TO BE STAMPED AND SEALED BY A P.ENG LICENSED IN THE PROVINCE OF ONTARIO.
6. VALVE CHAMBER AND WET WELL TO BE WATERPROOFED AT ALL JOINTS.

No.	REVISIONS	Date	By
A	ISSUED FOR 30% DESIGN SUBMISSION	DEC 2023	M.L.

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

P. Eng.
Approved By

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Centre Wellington
1 Macdoald Square, Elora, ON N0B 1S0

FERGUS GOLF COURSE REDEVELOPMENT
SEWAGE PUMP STATION

SECTION A

PROCESS MECHANICAL

Scale: 1 : 25	Contract No. #####
Drawn By: P.A.	
Designed By: S.G.	
Checked By: M.L.	Drawing No. SPS- PM-301
Date: 10/24/2023	
Project No.: 10402	

CADD FILE LOCATION: Autodesk Docs://3020.0010402.000_Fergus WTP and SPS Design (R2024)/10402 - FERGUS SPS.rvt
2023-12-15 14:58:34

SKETCH SHOWING ELEVATIONS FOR ENGINEER'S USE

SCALE 1:1000

10m 0 10m 20m 30m 40m 50m 60m 70m 80m 90m 100 metres

R-PE SURVEYING LTD., O.L.S.

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

BX	DENOTES BELL BOX
CB	DENOTES CATCH BASIN
CONC.	DENOTES CONCRETE
FH	DENOTES FIRE HYDRANT
GS	DENOTES GARAGE SILL ELEVATION
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
LS	DENOTES LAMP STANDARD
MH	DENOTES MANHOLE
MHSAN	DENOTES MANHOLE SANITARY
MHSTM	DENOTES MANHOLE STORM
MHW	DENOTES MANHOLE WATER
INV	DENOTES CULVERT INVERT ELEVATION
OBV	DENOTES CULVERT OBVERT ELEVATION
TS	DENOTES TRAFFIC SIGN
UP	DENOTES UTILITY POLE
WV	DENOTES WATER VALVE
-W-	DENOTES OVERHEAD WIRE
Ø	DENOTES DIAMETER
0.114	DENOTES DECIDUOUS TREE
0.504	DENOTES CONIFEROUS TREE
	DENOTES FENCE LINE
HYDRANT	DENOTES HYDRANT
	DENOTES ANCHOR

CAUTION

A) THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE IN THE TITLE BLOCK.
B) THIS SKETCH IS PROTECTED BY COPYRIGHT ©

NOTES

THIS IS NOT A PLAN OF SURVEY.
BOUNDARIES ARE NOT CERTIFIED BY THIS PLAN, AND ARE SUBJECT TO CLARIFICATION UPON THE INCORPORATION OF ADDITIONAL DOCUMENTARY AND FIELD SURVEY EVIDENCE.

ALL BOUNDARY INFORMATION HAS BEEN COMPILED USING VARIOUS PLANS AND HAS NOT BEEN CONFIRMED.

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION – GUELPH

FIELD OBSERVATIONS:

THE FIELD OBSERVATIONS REPRESENTED ON THIS PLAN WERE COMPLETED ON

THE ____ DAY OF _____, 2021

LOT 11, CONCESSION 3

PLAN 61R – 9081
PART 1
PART 2
PART 1 PLAN 60R-1961

PART 3
PART 1
PART 2
61R PLAN

LOT 10, CONCESSION 3

WELLINGTON COUNTY ROAD 7

LOT 10 CONCESSION 3

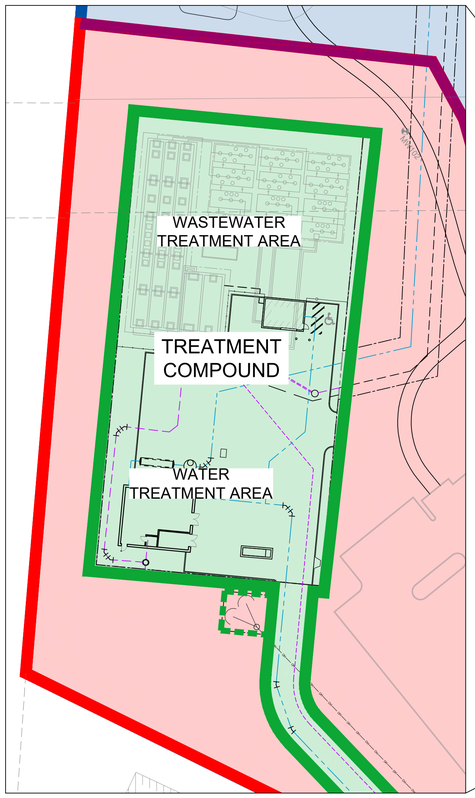
ROAD ALLOWANCE BETWEEN CONCESSIONS 2 AND 3

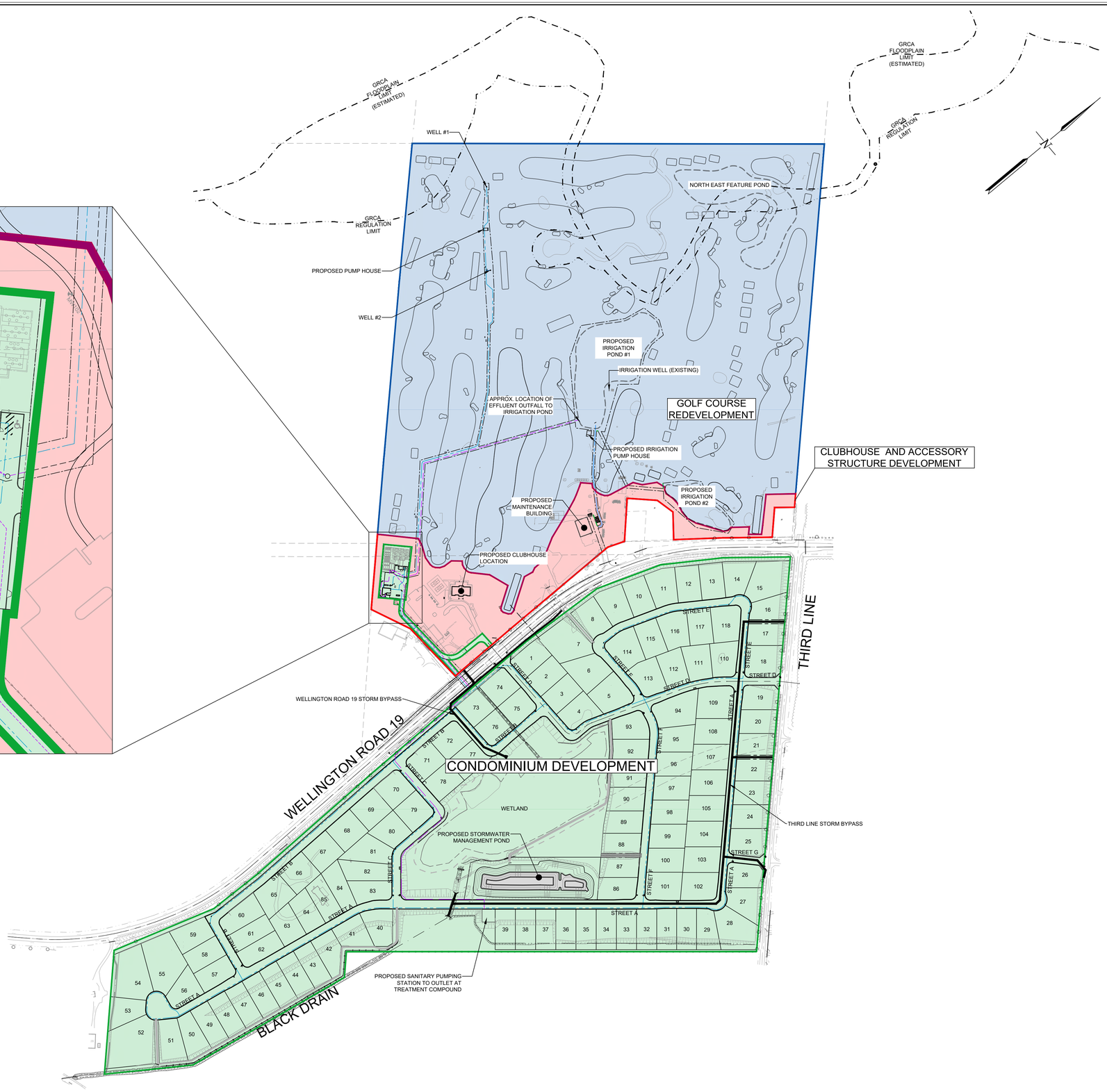
LOT 9 CONCESSION 3

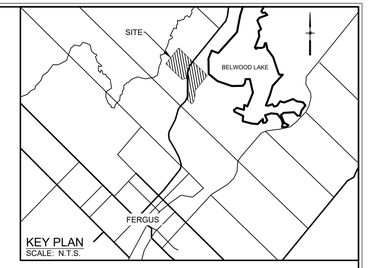
WOOD LOT

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Website: www.r-pe.co
DRAWN: S.L. CHECKED:
JOB No. 21-016 CAD FILE No.21016TP1c







ZONE 1
GOLF COURSE SITE ALTERATION
(SUBMISSION PENDING)

ZONE 2
CLUBHOUSE SITE PLAN APPLICATION
(CURRENT SUBMISSION)

ZONE 3
DRAFT PLAN OF CONDOMINIUM AND SUBDIVISION
(PREVIOUSLY SUBMITTED TO MUNICIPALITIES AND AGENCIES)

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes
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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	12/20/2023	SR
2	ISSUED FOR FIRST SUBMISSION OF CLUBHOUSE APPLICATION	2/14/2024	SR
3	REVISED FOR SECOND SUBMISSION OF SUBDIVISION	----	----
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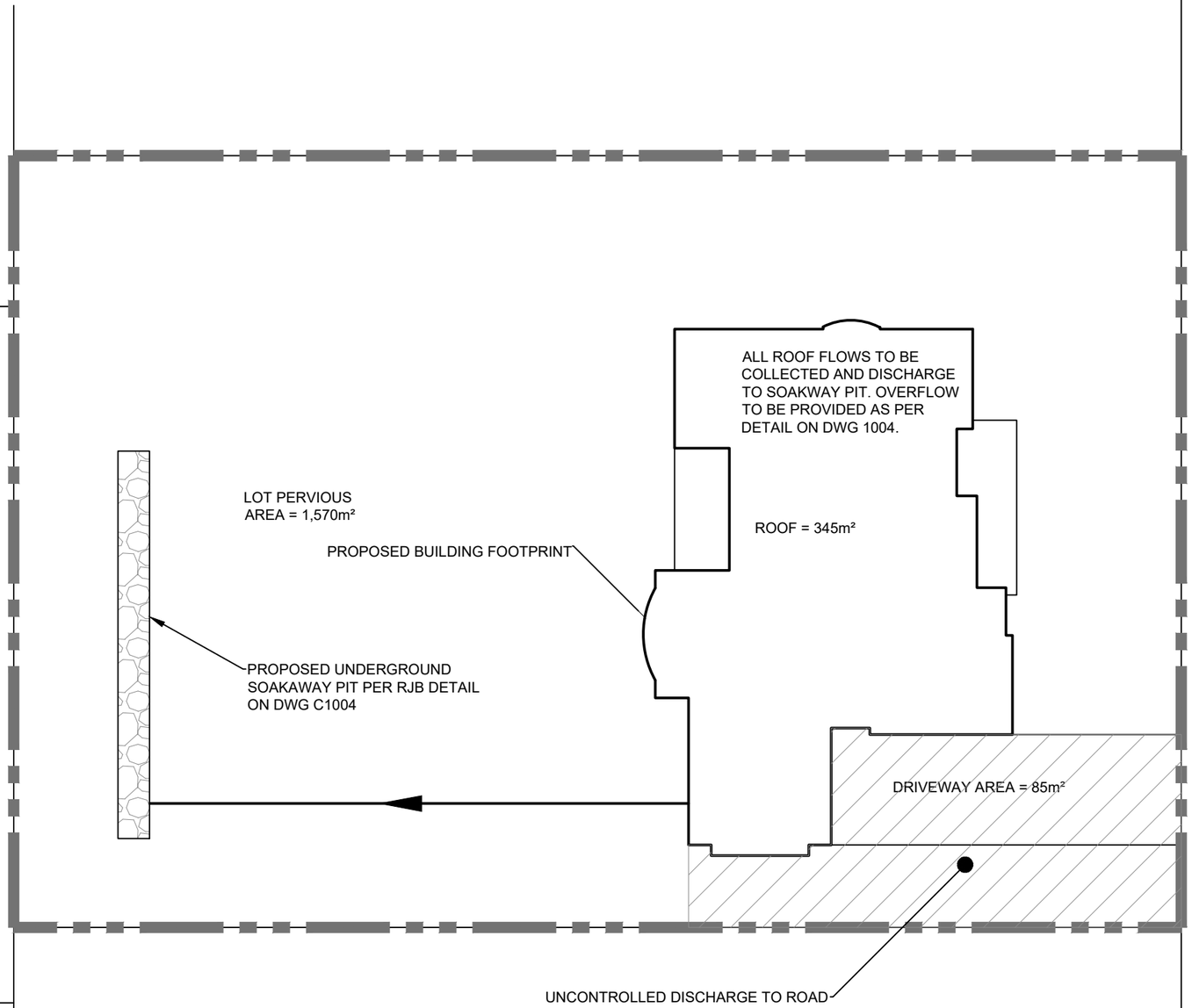
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

OVERALL DEVELOPMENT CONCEPT

Drawn	Checked	Designed	Checked	Date	Drawing No.
BF	MB	MB	SR	23/12/18	**0**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
1:3,000		0 60 120 180m			

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LOT AREA AVERAGE +/- 2023m²

IMPERVIOUS AREA = 430m²
PERVIOUS AREA = 1,570m²

LOT % IMPERVIOUS = 21.5%

% IMPERVIOUS USED IN SWM MODELLING = 25%

BURNSIDE

Client

FERGUS DEVELOPMENT INC.

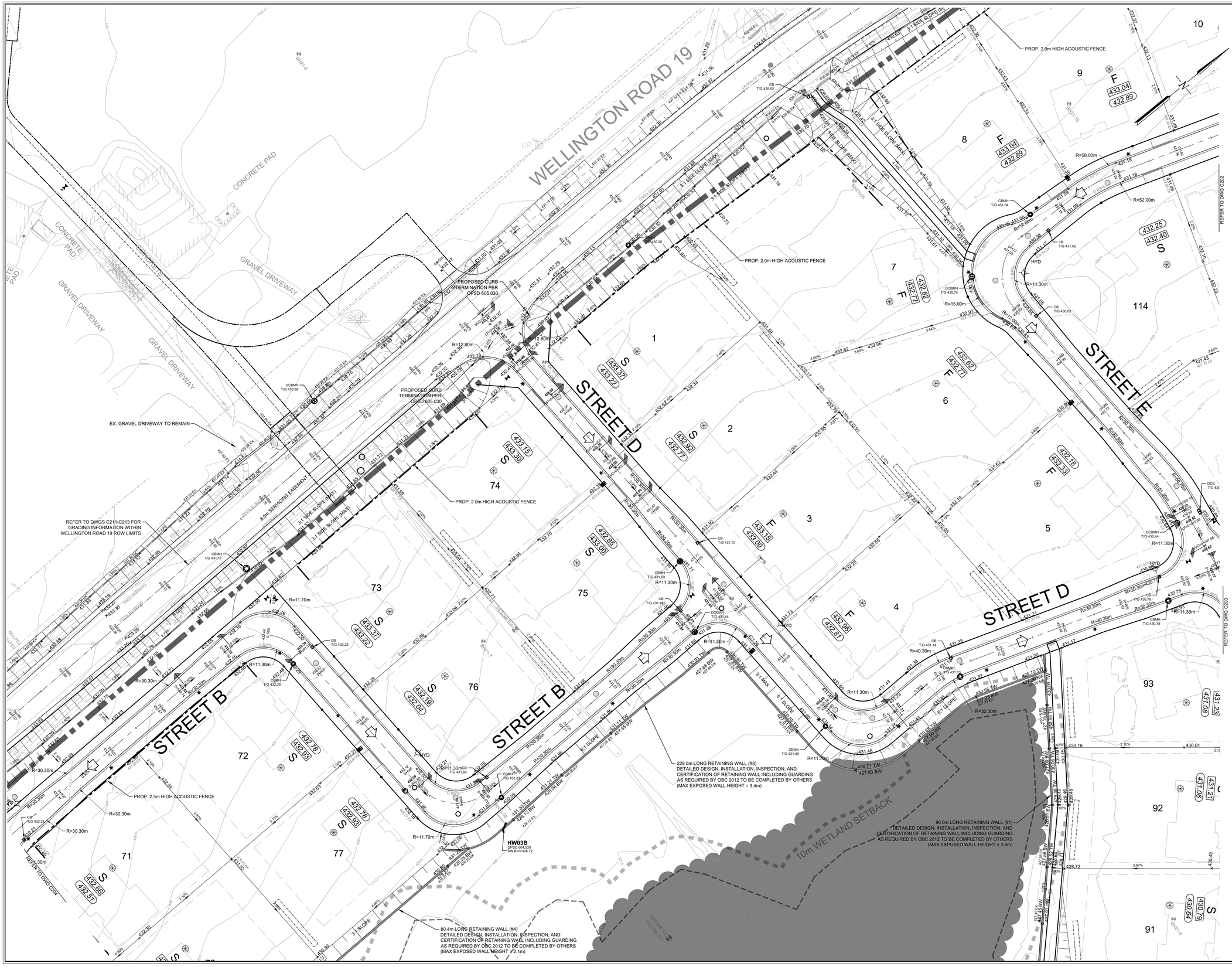
Figure Title

FERGUS GOLF COURSE

SAMPLE LOT IMPERVIOUS BREAKDOWN

Drawn	Checked	Date	Figure No.
BF	LG	23/12/20	6
Scale		Project No.	
1:250		052719	

File: \\guelph\Shared Work Areas\052719 Fergus Golf Course\052719.2000 - Fergus Golf Course Detailed Design\07_Figures\052719.2000 FIG6_SAMPLE LOT.dwg Date Plotted: July 11, 2024 - 2:37 PM



LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
CB DCB	SINGLE/DOUBLE CATCHBASIN
CBMH DCBMH	SINGLE/DOUBLE CATCHBASIN MANHOLE
426.21	PROPOSED GRADE
435.43 EX	EXISTING GRADE
DEPRESSED	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
TP	VALVE & BOX / TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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Client
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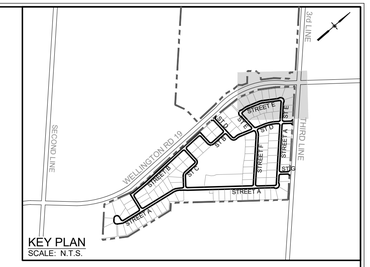
Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (1 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C201**
Project No.		Contract No.		Revision No.	
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1:500					

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LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
CB DCB	SINGLE/DOUBLE CATCHBASIN
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DEPRESSED	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
	VALVE & BOX
TP	TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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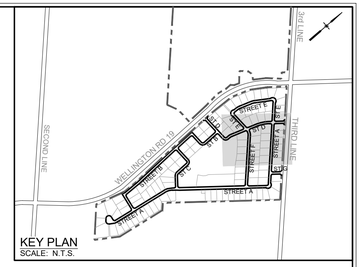
Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (2 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C202**
Project No. 052719.2000		Contract No. ----		Revision No. 0	
Scale 1:500	0 5.0 10.0 20.0 30.0m				

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LEGEND

- 118 — LOT NUMBER
- 432.13 — PROPOSED BUILDING GRADE
- 432.62 — PROPOSED TOP OF FOUNDATION WALL
- STORM MANHOLE
- SANITARY MANHOLE
- FOUNDATION DRAIN COLLECTOR MANHOLE
- CB / DCB — SINGLE/DOUBLE CATCHBASIN
- CBMH / DCBMH — SINGLE/DOUBLE CATCHBASIN MANHOLE
- 426.21 — PROPOSED GRADE
- 435.43 EX — EXISTING GRADE
- DEPRESSED CURB GRADE
- 0.50% — DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
- F — FRONT DRAINAGE LOT TYPE
- S — SPLIT DRAINAGE LOT TYPE
- TR — TRANSITIONAL DRAINAGE LOT TYPE
- WO — WALK OUT DRAINAGE LOT TYPE
- OVERLAND FLOW DIRECTION
- COMMUNITY MAILBOX
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- TRAFFIC SIGN
- HYDRO SWITCHGEAR
- HYD — HYDRANT
- VALVE & BOX
- TP — TRACER PORT
- BOREHOLE LOCATION
- PROPERTY LIMIT
- WETLAND BOUNDARY
- 10m WETLAND SETBACK
- ACOUSTIC FENCE
- CHAINLINK FENCE
- RETAINING WALL
- SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

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LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
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Client

FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title

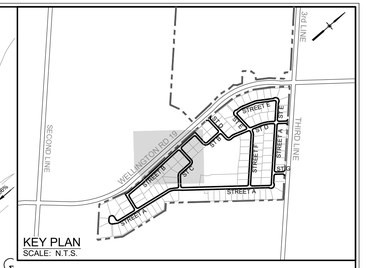
FERGUS GOLF COURSE

GRADING PLAN (3 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C203**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale		0 5.0 10.0 20.0 30.0m			
1:500					

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LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
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426.21	PROPOSED GRADE
435.43 EX	EXISTING GRADE
	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
	VALVE & BOX
TP	TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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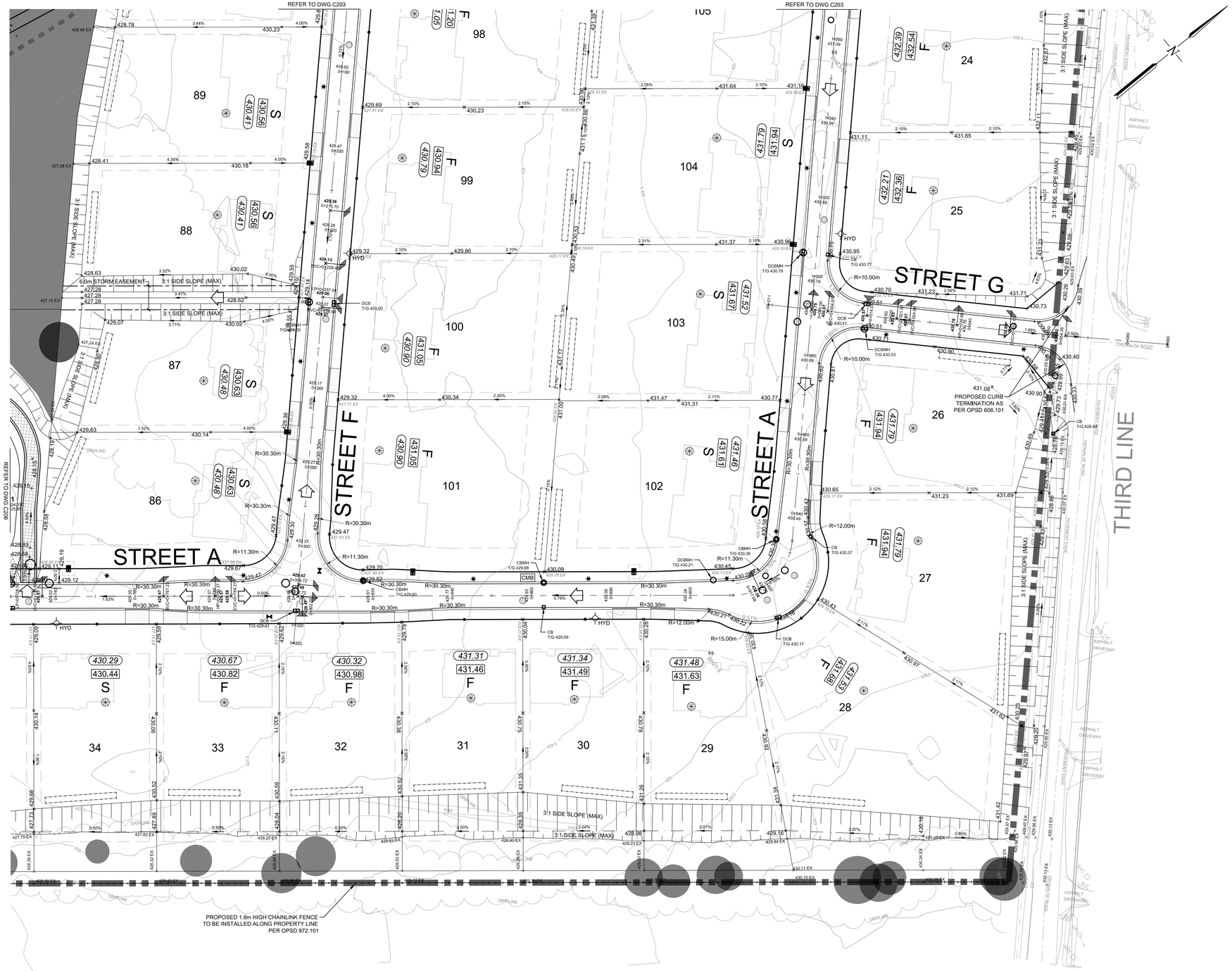
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

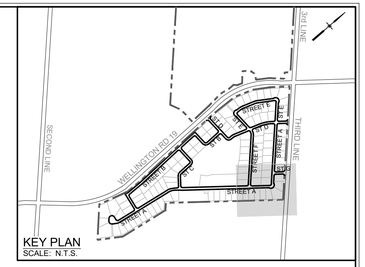
Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (4 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C204**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
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LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
CB DCB	SINGLE/DOUBLE CATCHBASIN
CBMH DCBMH	SINGLE/DOUBLE CATCHBASIN MANHOLE
426.21	PROPOSED GRADE
435.43 EX	EXISTING GRADE
	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
TP	VALVE & BOX / TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

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From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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telephone 1-800-265-9662
web www.rjburnside.com

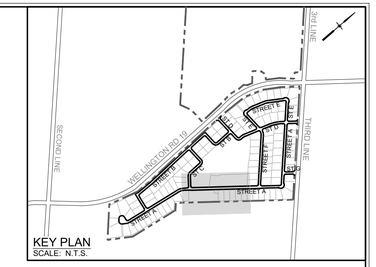
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (5 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	C205
Project No.		Contract No.		Revision No.	
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KEY PLAN
SCALE: N.T.S.

LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
CB DCB	SINGLE/DOUBLE CATCHBASIN
CBMH DCBMH	SINGLE/DOUBLE CATCHBASIN MANHOLE
426.21	PROPOSED GRADE
435.43 EX	EXISTING GRADE
DEPRESSED CURB	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
	VALVE & BOX
TP	TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015061 HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

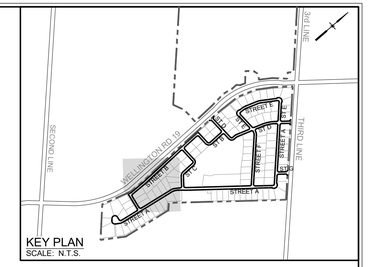
Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (6 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C206**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale	0 5.0 10.0 20.0 30.0m				
1:500					

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LEGEND

- 118 — LOT NUMBER
- 432.13 — PROPOSED BUILDING GRADE
- 432.62 — PROPOSED TOP OF FOUNDATION WALL
- STORM MANHOLE
- SANITARY MANHOLE
- FOUNDATION DRAIN COLLECTOR MANHOLE
- CB / DCB — SINGLE/DOUBLE CATCHBASIN
- CBMH / DCBMH — SINGLE/DOUBLE CATCHBASIN MANHOLE
- 426.21 — PROPOSED GRADE
- 435.43 EX — EXISTING GRADE
- DEPRESSED CURB GRADE
- 0.50% — DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
- F — FRONT DRAINAGE LOT TYPE
- S — SPLIT DRAINAGE LOT TYPE
- TR — TRANSITIONAL DRAINAGE LOT TYPE
- WO — WALK OUT DRAINAGE LOT TYPE
- OVERLAND FLOW DIRECTION
- COMMUNITY MAILBOX
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- TRAFFIC SIGN
- HYDRO SWITCHGEAR
- HYD — HYDRANT
- VALVE & BOX
- TP — TRACER PORT
- ENGINEERED FILL LOT
- BOREHOLE LOCATION
- PROPERTY LIMIT
- WETLAND BOUNDARY
- 10m WETLAND SETBACK
- ACOUSTIC FENCE
- CHAINLINK FENCE
- RETAINING WALL
- SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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Client

FERGUS DEVELOPMENT Inc.
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MARKHAM, ON
L3R 1G9

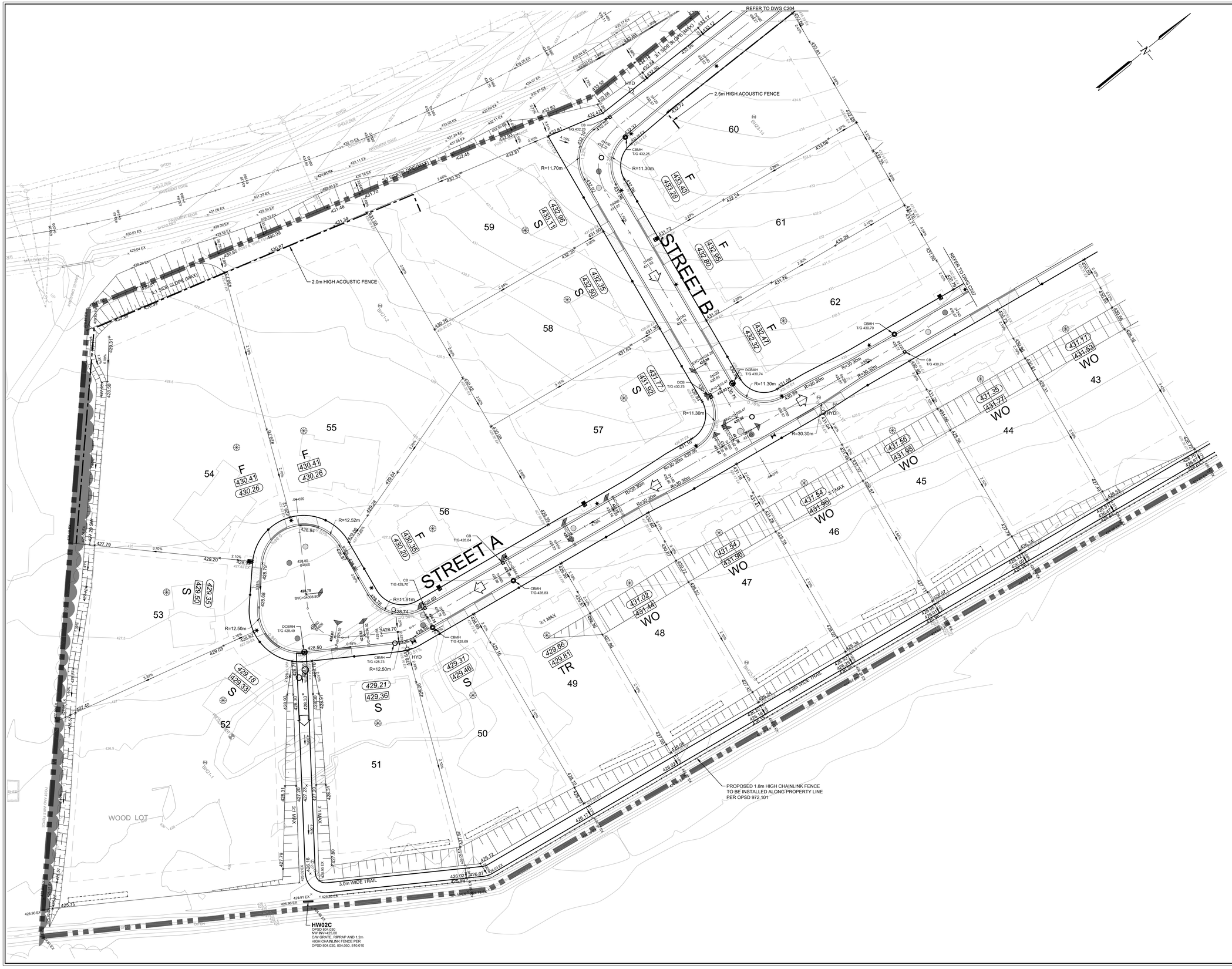
Drawing Title

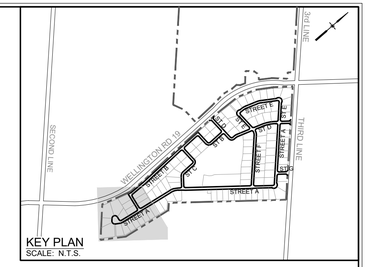
FERGUS GOLF COURSE

GRADING PLAN (7 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C207**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale	0 5.0 10.0 20.0 30.0m				
1:500					

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KEY PLAN
SCALE: N.T.S.

LEGEND

118	LOT NUMBER	HYD	HYDRANT
432.13	PROPOSED BUILDING GRADE		VALVE & BOX
432.62	PROPOSED TOP OF FOUNDATION WALL	TP	TRACER PORT
	STORM MANHOLE		ENGINEERED FILL LOT
	SANITARY MANHOLE	BH	BOREHOLE LOCATION
	FOUNDATION DRAIN COLLECTOR MANHOLE		PROPERTY LIMIT
CB DCB	SINGLE/DOUBLE CATCHBASIN		WETLAND BOUNDARY
CBMH DCBMH	SINGLE/DOUBLE CATCHBASIN MANHOLE		10m WETLAND SETBACK
426.21	PROPOSED GRADE		ACOUSTIC FENCE
435.43 EX	EXISTING GRADE		CHAINLINK FENCE
	DEPRESSED CURB GRADE		RETAINING WALL
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE		SOAKAWAY PIT
F	FRONT DRAINAGE LOT TYPE		
S	SPLIT DRAINAGE LOT TYPE		
TR	TRANSITIONAL DRAINAGE LOT TYPE		
WO	WALK OUT DRAINAGE LOT TYPE		
	OVERLAND FLOW DIRECTION		
	COMMUNITY MAILBOX		
	LIGHT STANDARD		
	TRANSFORMER & GROUNDING LOOP		
	TRAFFIC SIGN		
	HYDRO SWITCHGEAR		

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (8 OF 8)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	BF	MB	SR	23/10/27	**C208**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
1:500		0 5.0 10.0 20.0 30.0m			

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TABLE LEGEND	
SW	SWALE ELEVATION
SHG	SPECIFIED HOUSE GRADE
FFE	FINISHED FLOOR ELEVATION
TBS	TOP OF BASEMENT SLAB
UBS	UNDERSIDE OF BASEMENT SLAB
GW	APPROX. GROUNDWATER ELEVATION
<0.6m	INDICATES UNIT REQUIRING FDC SERVICING

*per GEMTEC, April 2024

Lot Number	Drainage Type	SW	SHG	TFW	FFE	TBS	UBS	GW	UBS-GW	FDC Inv	UBS-FDC	Soakaway Req'd
1	SD	433.07	**433.22**	**433.37**	433.73	430.71	430.48	429.89	0.59			Y
2	SD	432.62	**432.77**	**432.92**	433.28	430.26	430.03	429.18	0.85			Y
3	FD	432.44	**433.00**	**433.15**	433.51	430.49	430.26	428.06	2.20			Y
4	FD	432.25	**432.81**	**432.96**	433.32	430.30	430.07	427.79	2.28			Y
5	FD	431.62	**432.18**	**432.33**	432.69	429.67	429.44	427.94	1.50			Y
6	FD	432.06	**432.62**	**432.77**	433.13	430.11	429.88	428.83	1.05			Y
7	FD	432.30	**432.86**	**433.01**	433.37	430.35	430.12	429.50	0.62			Y
8	FD	432.33	**432.89**	**433.04**	433.40	430.38	430.15	429.55	0.60			Y
9	FD	432.33	**432.89**	**433.04**	433.40	430.38	430.15	429.46	0.69			Y
10	FD	432.26	**432.82**	**432.97**	433.33	430.31	430.08	429.30	0.78			Y
11	FD	432.26	**432.82**	**432.97**	433.33	430.31	430.08	429.18	0.90			Y
12	FD	432.09	**432.65**	**432.80**	433.16	430.14	429.91	428.90	1.01			Y
13	FD	431.75	**432.31**	**432.46**	432.82	429.80	429.57	428.64	0.93			Y
14	FD	431.75	**432.31**	**432.46**	432.82	429.80	429.57	428.50	1.07			Y
15	FD	431.49	**432.05**	**432.20**	432.56	429.54	429.31	428.30	1.01			Y
16	FD	431.49	**432.05**	**432.20**	432.56	429.54	429.31	428.10	1.21			Y
17	FD	431.39	**431.95**	**432.10**	432.46	429.44	429.21	428.00	1.21			Y
18	FD	431.21	**431.77**	**431.92**	432.28	429.26	429.03	428.00	1.03			Y
19	FD	431.25	**431.81**	**431.96**	432.32	429.30	429.07	428.04	1.03			Y
20	FD	431.43	**431.99**	**432.14**	432.50	429.48	429.25	428.07	1.18			Y
21	FD	431.62	**432.18**	**432.33**	432.69	429.67	429.44	428.03	1.41			Y
22	FD	431.80	**432.36**	**432.51**	432.87	429.85	429.62	427.86	1.76			Y
23	FD	431.83	**432.39**	**432.54**	432.90	429.88	429.65	428.00	1.65			Y
24	FD	431.83	**432.39**	**432.54**	432.90	429.88	429.65	428.00	1.65			Y
25	FD	431.65	**432.21**	**432.36**	432.72	429.70	429.47	428.00	1.47			Y
26	FD	431.23	**431.79**	**431.94**	432.30	429.28	429.05	428.20	0.85			Y
27	FD	431.23	**431.79**	**431.94**	432.30	429.28	429.05	428.20	0.85			Y
28	FD	430.97	**431.53**	**431.68**	432.04	429.02	428.79	428.20	0.59			Y
29	FD	430.92	**431.48**	**431.63**	431.99	428.97	428.74	428.13	0.61			Y
30	FD	430.78	**431.34**	**431.49**	431.85	428.83	428.60	428.00	0.60			Y
31	FD	430.75	**431.31**	**431.46**	431.82	428.80	428.57	427.78	0.79			Y
32	FD	430.39	**430.95**	**431.10**	431.46	428.44	428.21	427.58	0.63			Y
33	FD	430.11	**430.67**	**430.82**	431.18	428.16	427.93	427.23	0.70			Y
34	SD	430.14	**430.29**	**430.44**	430.80	427.78	427.55	426.95	0.60			Y
35	SD	430.12	**430.27**	**430.42**	430.78	427.76	427.53	426.87	0.66			Y
36	SD	429.98	**430.13**	**430.28**	430.64	427.62	427.39	426.78	0.61			Y
37	WO	429.98	**430.13**	**430.55**	430.79	427.77	427.54	426.71	0.83			Y
38	WO	429.85	**430.00**	**430.42**	430.66	427.64	427.41	426.62	0.79			Y
39	WO	429.85	**430.00**	**430.42**	430.66	427.64	427.41	426.55	0.86			Y
40	WO	430.37	**430.52**	**430.94**	431.18	428.16	427.93	429.08	-1.15	426.57	1.36	
41	WO	430.62	**430.77**	**431.19**	431.43	428.41	428.18	429.20	-1.02	426.91	1.27	
42	WO	430.80	**430.95**	**431.37**	431.61	428.59	428.36	429.20	-0.84	427.12	1.24	
43	WO	430.96	**431.11**	**431.53**	431.77	428.75	428.52	429.21	-0.69	427.57	0.95	
44	WO	431.20	**431.35**	**431.77**	432.01	428.99	428.76	428.96	-0.20	428.01	0.75	
45	WO	431.60	**431.75**	**432.17**	432.41	429.39	429.16	428.56	0.60			Y
46	WO	431.41	**431.56**	**431.98**	432.22	429.20	428.97	428.07	0.90			Y
47	WO	431.41	**431.56**	**431.98**	432.22	429.20	428.97	427.67	1.30			Y
48	WO	430.87	**431.02**	**431.44**	431.68	428.66	428.43	427.28	1.15			Y
49	SD	429.51	**429.66**	**429.81**	430.17	427.15	426.92	426.98	-0.06	425.95	0.97	Y
50	SD	429.16	**429.31**	**429.46**	429.82	426.80	426.57	426.61	-0.04	425.72	0.85	Y
51	SD	429.06	**429.21**	**429.36**	429.72	426.70	426.47	426.12	0.35	425.53	0.94	Y
52	SD	429.03	**429.18**	**429.33**	429.69	426.67	426.44	426.26	0.18	425.41	1.03	Y
53	SD	429.20	**429.35**	**429.50**	429.86	426.84	426.61	427.29	-0.68	425.51	1.10	
54	FD	429.70	**430.26**	**430.41**	430.77	427.75	427.52	428.49	-0.97	425.67	1.85	
55	FD	429.70	**430.26**	**430.41**	430.77	427.75	427.52	428.82	-1.30	425.67	1.85	
56	FD	429.64	**430.20**	**430.35**	430.71	427.69	427.46	428.06	-0.60	425.45	2.01	
57	SD	431.63	**431.78**	**431.93**	432.29	429.27	429.04	429.76	-0.72	428.27	0.77	
58	SD	432.20	**432.35**	**432.50**	432.86	429.84	429.61	431.18	-1.57	428.77	0.84	
59	SD	432.81	**432.96**	**433.11**	433.47	430.45	430.22	431.77	-1.55	429.35	0.87	
60	FD	432.72	**433.28**	**433.43**	433.79	430.77	430.54	432.70	-2.16	429.18	1.36	
61	FD	432.24	**432.80**	**432.95**	433.31	430.29	430.06	431.97	-1.91	428.66	1.40	
62	FD	431.76	**432.32**	**432.47**	432.83	429.81	429.58	430.64	-1.06	428.19	1.39	
63	FD	431.71	**432.27**	**432.42**	432.78	429.76	429.53	431.37	-1.84	427.66	1.87	
64	FD	431.67	**432.23**	**432.38**	432.74	429.72	429.49	431.33	-1.84	427.11	2.38	
65	SD	434.62	**434.77**	**434.92**	435.28	432.26	432.03	434.00	-1.97	429.79	2.24	
66	SD	434.78	**434.93**	**435.08**	435.44	432.42	432.19	434.00	-1.81	429.34	2.85	
67	SD	434.78	**434.93**	**435.08**	435.44	432.42	432.19	434.00	-1.81	428.81	3.38	
68	SD	434.24	**434.39**	**434.54**	434.90	431.88	431.65	434.00	-2.35	428.56	3.09	
69	SD	433.70	**433.85**	**434.00**	434.36	431.34	431.11	433.77	-2.66	428.28	2.83	
70	SD	432.24	**432.39**	**432.54**	432.90	429.88	429.65	432.00	-2.35	427.66	1.99	
71	SD	432.36	**432.51**	**432.66**	433.02	430.00	429.77	430.85	-1.08	427.67	2.10	
72	SD	432.63	**432.78**	**432.93**	433.29	430.27	430.04	430.18	-0.14	427.02	3.02	
73	SD	433.09	**433.24**	**433.39**	433.75	430.73	430.50	430.04	0.46	427.06	3.44	Y
74	SD	433.00	**433.15**	**433.30**	433.66	430.64	430.41	429.80	0.61			Y
75	SD	432.70	**432.85**	**433.00**	433.36	430.34	430.11	428.92	1.19			Y
76	SD	432.89	**433.04**	**433.19**	433.55	430.53	430.30	429.12	1.18			Y
77	SD	432.63	**432.78**	**432.93**	433.29	430.27	430.04	429.15	0.89			Y
78	SD	432.32	**432.47**	**432.62**	432.98	429.96	429.73	429.97	-0.24	427.48	2.25	
79	SD	432.24	**432.39**	**432.54**	432.90	429.88	429.65	430.55	-0.90	427.48	2.17	
80	FD	431.17	**431.73**	**431.88**	432.24	429.22	428.99	430.84	-1.85	426.88	2.11	
81	FD	431.26	**431.82**	**431.97**	432.33	429.31	429.08	431.26	-2.18	426.68	2.40	
82	FD	430.86	**431.42**	**431.57**	431.93	428.91	428.68	430.33	-1.65	426.57	2.11	
83	FD	430.45	**431.01**	**431.16**	431.52	428.50	428.27	429.73	-1.46	426.45	1.82	
84	FD	431.34	**431.90**	**432.05**	432.41	429.39	429.16	430.84	-1.68	426.78	2.38	
85	FD	431.33	**431.89**	**432.04**	432.40	429.38	429.15	431.13	-1.98	426.97	2.18	
86	SD	430.33	**430.48**	**430.63**	430.99	427.97	427.74	427.10	0.64			Y
87	SD	430.33	**430.48**	**430.63**	430.99	427.97	427.74	427.10	0.64			Y
88	SD	430.26	**430.41**	**430.56**	430.92	427.90	427.67	427.07	0.60			Y
89	SD	430.26	**430.41**	**430.56**	430.92	427.90	427.67	427.06	0.61			Y
90	SD	430.28	**430.43**	**430.58**	430.94	427.92	427.69	427.06	0.63			Y
91	SD	430.49	**430.64**	**430.79**	431.15	428.13	427.90	427.20	0.70			Y
92	SD	430.91	**431.06**	**431.21**	431.57	428.55	428.32	427.44	0.88			Y
93	SD	430.93	**431.08**	**431.23**	431.59	428.57	428.34	427.70	0.64			Y
94	FD	431.15	**431.71**	**431.86**	432.22	429.20	428.97	428.00	0.97			Y
95	FD	431.15	**431.71**	**431.86**	432.22	429.20	428.97	427.85	1.12			Y
96	FD	430.96	**431.52**	**431.67**	432.03	429.01	428.78	427.60	1.18			Y
97	FD	430.73	**431.29**	**431.44**	431.80	428.78	428.55	427.48	1.07			Y
98	FD	430.49	**431.05**	**431.20**	431.56	428.54	428.31	427.37	0.94			Y
99	FD	430.23	**430.79**	**430.94**	431.30	428.28	428.05	427.40	0.65			Y
100	FD	430.34	**430.90**	**431.05**	431.41	428.39	428.16	427.44	0.72			Y
101	FD	430.34	**430.90**	**431.05**	431.41	428.39	428.16	427.47	0.69			Y
102	SD	431.31	**431.46**	**431.61**	431.97	428.95	428.72	427.94	0.78			Y
103	SD	431.37	**431.52**	**431.67**	432.03	429.01	428.78	427.90	0.88			Y
104	SD	431.64	**431.79**	**431.94**	432.30	429.28	429.05	427.83	1.22			Y
105	SD	431.88	**432.03**	**432.18**	432.54	429.52	429.29	427.82	1.47			Y
106	SD	431.77	**431.92**	**432.07**	432.43	429.41	429.18	427.94	1.24			Y
107	SD	431.53	**431.68**	**431.83**	432.19	429.17	428.94	427.99	0.95			Y
108	SD	431.53	**431.68**	**431.83**	432.19	429.17	428.94	428.10	0.84			Y
109	SD	431.45	**431.60**	**431.75**	432.11	429.09	428.86	428.15	0.71			Y
110	FD	431.17	**431.73**	**431.88**	432.24	429.22	428.99	428.03	0.96			Y
111	FD	431.47	**432.03**	**432.18**	432.54	429.52	429.29	428.00	1.29			Y
112	FD	431.70	**432.26**	**432.41**	432.77	429.75	429.52	427.76	1.76			Y
113	FD	431.70	**432.26**	**432.41**	432.77	429.75	429.52	427.97	1.55			Y
114	SD	432.10	**432.25**	**432.40**	432.76	429.74	429.51	428.70	0.81			Y
115	SD	432.29	**432.44**	**432.59**	432.95	429.93	429.70	428.55	1.15			Y
116	FD	432.27	**432.83**	**432.98**	433.34	430.32	430.09	428.45	1.64			Y
117	FD	432.02	**432.58**	**432.73**	433.09	430.07	429.84	428.20	1.64			Y
118	FD	431.84	**432.40**	**432.55**	432.91	429.89	429.66	428.14	1.52			Y
												85

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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web www.rjburnside.com

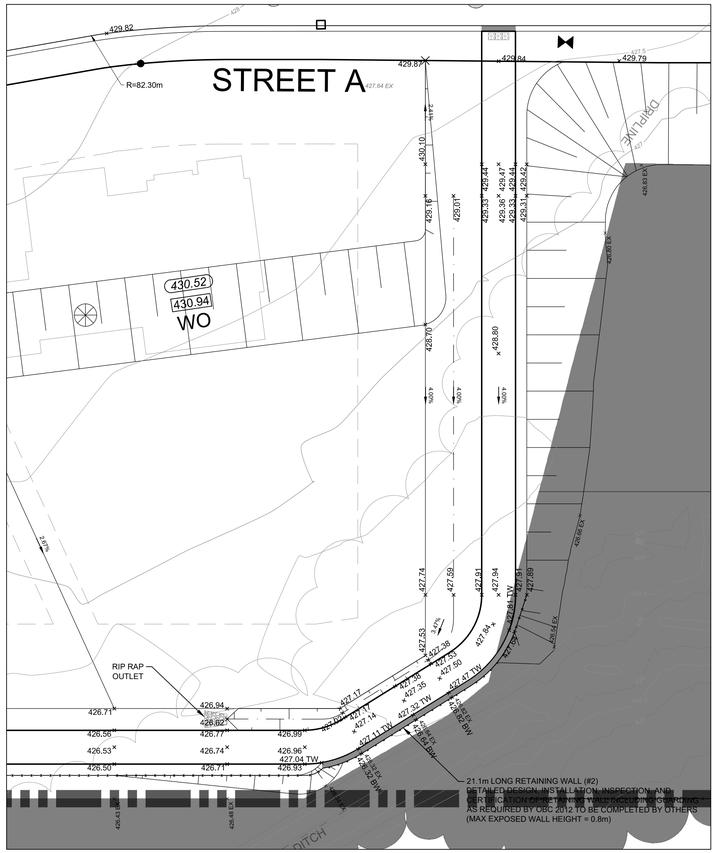
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

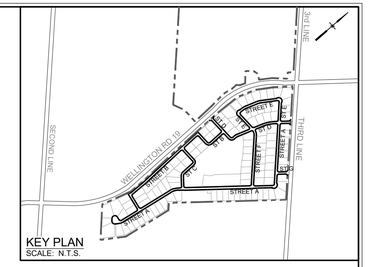
HOUSE GRADES TABLE

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Project No.		Contract No.		Revision No.	
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DETAIL A
1:250



KEY PLAN
SCALE: N.T.S.

LEGEND

118	LOT NUMBER
432.13	PROPOSED BUILDING GRADE
432.62	PROPOSED TOP OF FOUNDATION WALL
	STORM MANHOLE
	SANITARY MANHOLE
	FOUNDATION DRAIN COLLECTOR MANHOLE
CB DCB	SINGLE/DOUBLE CATCHBASIN
SMH DCBMH	SINGLE/DOUBLE CATCHBASIN MANHOLE
426.21	PROPOSED GRADE
435.43 EX	EXISTING GRADE
	DEPRESSED CURB GRADE
0.50%	DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE
F	FRONT DRAINAGE LOT TYPE
S	SPLIT DRAINAGE LOT TYPE
TR	TRANSITIONAL DRAINAGE LOT TYPE
WO	WALK OUT DRAINAGE LOT TYPE
	OVERLAND FLOW DIRECTION
	COMMUNITY MAILBOX
	LIGHT STANDARD
	TRANSFORMER & GROUNDING LOOP
	TRAFFIC SIGN
	HYDRO SWITCHGEAR
HYD	HYDRANT
TP	VALVE & BOX TRACER PORT
	ENGINEERED FILL LOT
	BOREHOLE LOCATION
	PROPERTY LIMIT
	WETLAND BOUNDARY
	10m WETLAND SETBACK
	ACOUSTIC FENCE
	CHAINLINK FENCE
	RETAINING WALL
	SOAKAWAY PIT

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 20120150061 HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

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NOT FOR CONSTRUCTION

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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web www.rjburnside.com

Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

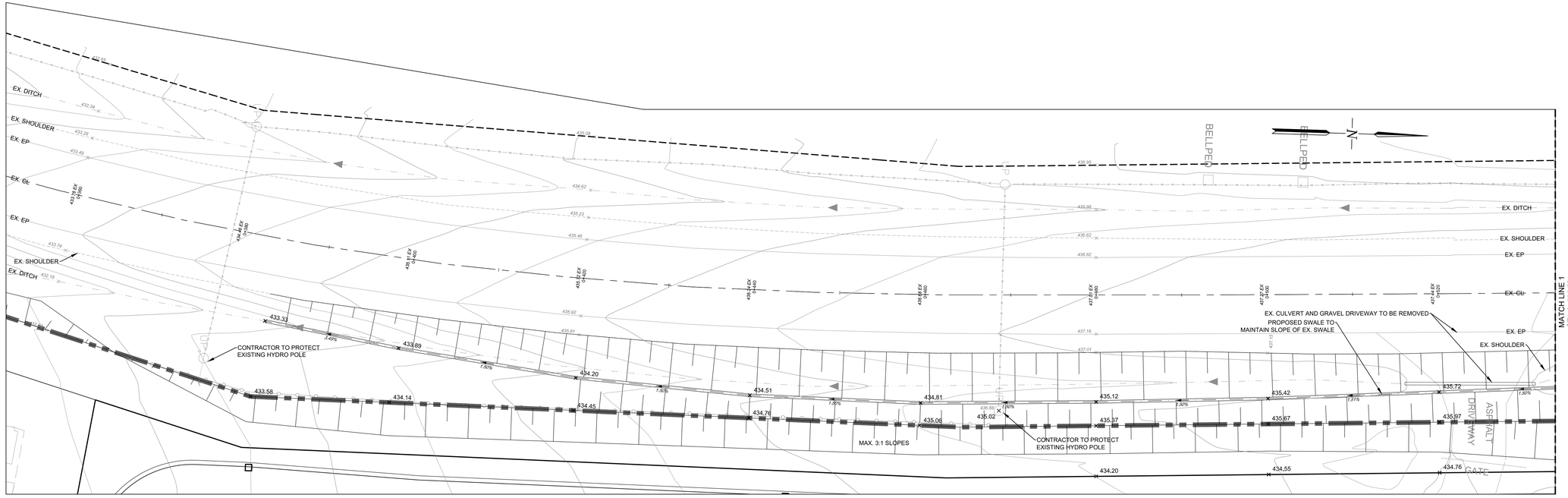
Drawing Title
FERGUS GOLF COURSE

GRADING PLAN DETAILS

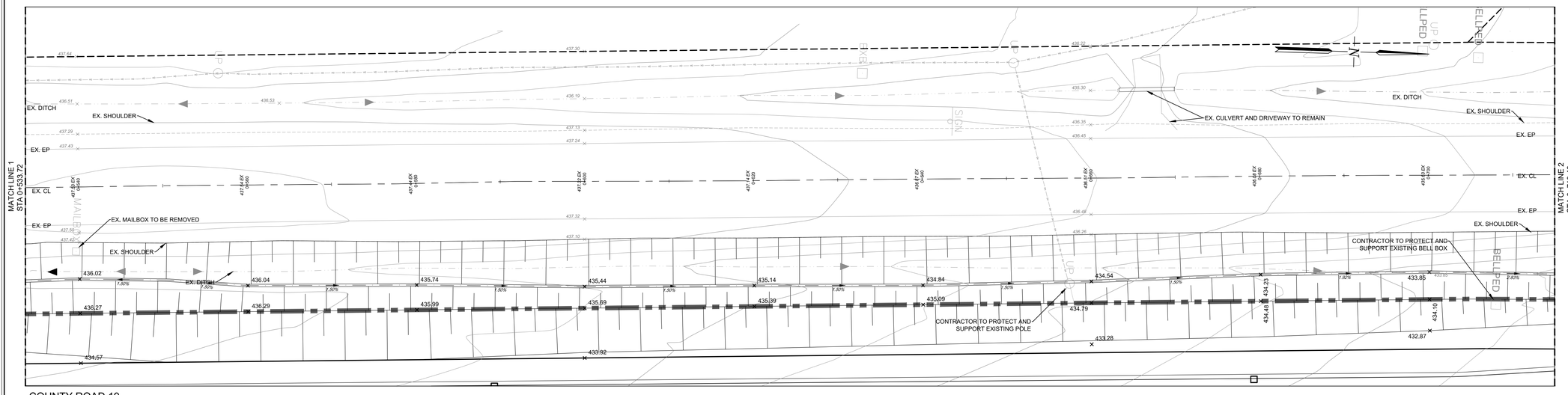
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Project No.		Contract No.		Revision No.	
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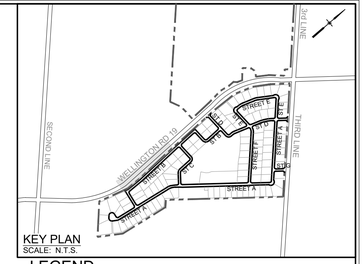
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COUNTY ROAD 19
STA 0+351.19 TO STA 0+533.72



COUNTY ROAD 19
STA 0+533.72 TO STA 0+714.98



KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPOSED BUILDING GRADE (223.66)
- PROPOSED TOP OF FOUNDATION WALL (223.81)
- STORM MANHOLE
- SANITARY MANHOLE
- FDC MANHOLE
- CATCHBASIN WITH OPSD 705.010, OPSD 705.020 COVER (CB, DCB)
- PROPOSED CURB GRADE (*221.21)
- PROPOSED LOT GRADE (x426.21)
- EXISTING GRADE (+ 426.531)
- PROPOSED SWALE AND GRADE
- DEPRESSED CURB GRADE
- DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE (4.0m @ 1.8%)
- OVERLAND FLOW DIRECTION
- SWM POND BLOCK BOUNDARY
- 15m SETBACK FROM TOP OF BANK
- LIMIT OF CURRENT APPLICATION
- TREE PROTECTION HOARDING (TPH)
- 1.5m TO 1.8m HIGH CHAINLINK FENCE
- 1.5m TO 1.8m WOODEN PRIVACY FENCE
- 2.4m WOODEN NOISE FENCE
- COMMUNITY MAILBOX
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- STREETLIGHT PEDESTAL
- EXISTING DITCH
- EXISTING EDGE OF GRAVEL SHOULDER
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF GRAVEL SHOULDER
- PROPOSED EDGE OF PAVEMENT
- EXISTING POST AND WIRE FENCE
- EXISTING STEEL BEAM GUIDE RAIL
- HYDRANT (HYD.)
- VALVE & BOX (VB)
- TRACER PORT (TP)
- ENGINEERED FILL LOT
- BOREHOLE LOCATION (BH)
- EXISTING TREE TO BE PRESERVED
- EXISTING TREE TO BE REMOVED

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION
CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK
ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015006! HAVING AN ORTHOMETIRC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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telephone 1-800-265-9662
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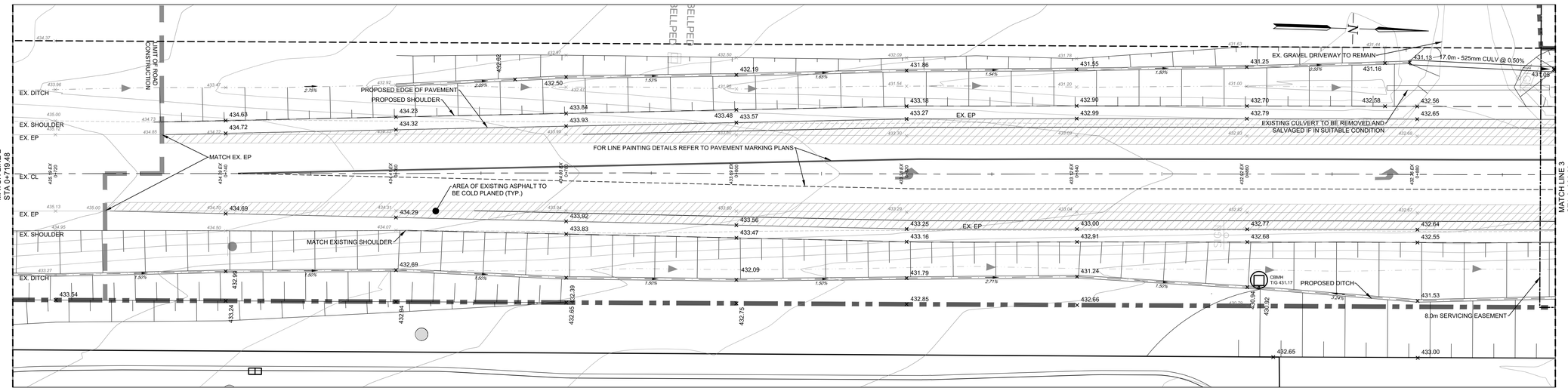
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

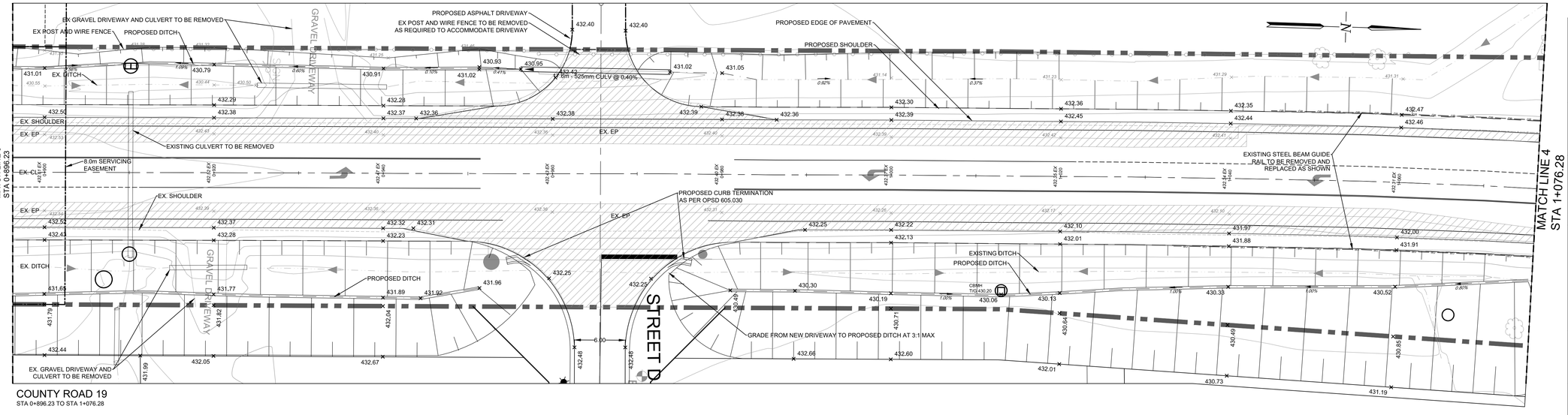
GRADING PLAN (COUNTY ROAD 19) (1 OF 3)

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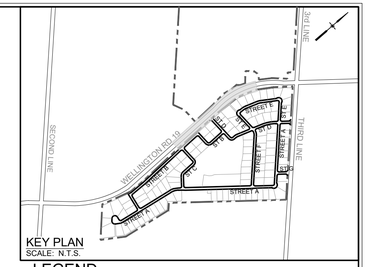
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COUNTY ROAD 19
STA 0+714.98 TO STA 0+896.23



COUNTY ROAD 19
STA 0+896.23 TO STA 1+076.28



LEGEND

- PROPOSED BUILDING GRADE (223.68)
- PROPOSED TOP OF FOUNDATION WALL (223.81)
- STORM MANHOLE
- SANITARY MANHOLE
- FDC MANHOLE
- CATCHBASIN WITH OPSD 705.010, OPSD 705.020 COVER
- PROPOSED CURB GRADE (*221.21)
- PROPOSED LOT GRADE (x426.21)
- EXISTING GRADE (426.531)
- PROPOSED SWALE AND GRADE
- DEPRESSED CURB GRADE
- DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE / OVERLAND FLOW DIRECTION (4.0m @ 1.8%)
- SWM POND BLOCK BOUNDARY
- 15m SETBACK FROM TOP OF BANK
- LIMIT OF CURRENT APPLICATION
- TREE PROTECTION HOARDING
- 1.5m TO 1.8m HIGH CHAINLINK FENCE
- 1.5m TO 1.8m WOODEN PRIVACY FENCE
- 2.4m WOODEN NOISE FENCE
- COMMUNITY MAILBOX
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- STREETLIGHT PEDESTAL
- EXISTING DITCH
- EXISTING EDGE OF GRAVEL SHOULDER
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF GRAVEL SHOULDER
- PROPOSED EDGE OF PAVEMENT
- EXISTING POST AND WIRE FENCE
- EXISTING STEEL BEAM GUIDE RAIL
- HYDRANT
- VALVE & BOX
- TRACER PORT
- ENGINEERED FILL LOT
- BOREHOLE LOCATION
- EXISTING TREE TO BE PRESERVED
- EXISTING TREE TO BE REMOVED
- LIMIT OF PROPOSED ASPHALT WITHIN COUNTY ROAD

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

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LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

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No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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Guelph, Ontario, N1H 1C4
telephone 1-800-265-9662
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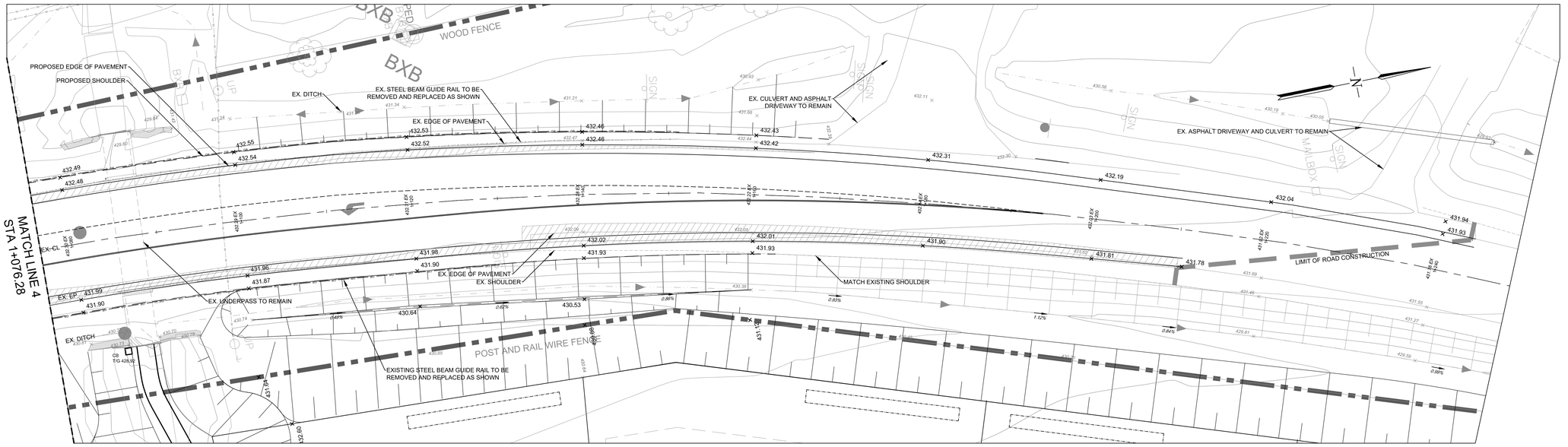
Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

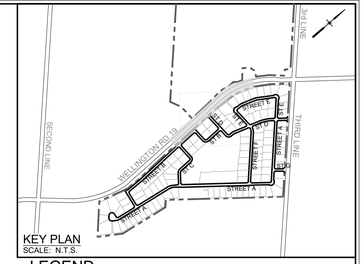
GRADING PLAN (COUNTY ROAD 19) (2 OF 3)

Drawn	Checked	Designed	Checked	Date	Drawing No.
BF	MB	BF	SR	23/11/20	**C212**
Project No.		Contract No.		Revision No.	
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COUNTY ROAD 19
STA 1+076.28 TO STA 1+248.94



LEGEND

- PROPOSED BUILDING GRADE (223.66)
- PROPOSED TOP OF FOUNDATION WALL (223.81)
- STORM MANHOLE
- SANITARY MANHOLE
- FDC MANHOLE
- CATCHBASIN WITH OPSD 705.010, OPSD 705.020 COVER (CB, DCB)
- PROPOSED CURB GRADE (*221.21)
- PROPOSED LOT GRADE (x426.21)
- EXISTING GRADE (+ 426.531)
- PROPOSED SWALE AND GRADE
- DEPRESSED CURB GRADE
- DIRECTION OF FLOW / DIRECTION OF PROPOSED SLOPE / OVERLAND FLOW DIRECTION (44.0m @ 1.8%)
- SWM POND BLOCK BOUNDARY
- 15m SETBACK FROM TOP OF BANK
- LIMIT OF CURRENT APPLICATION
- TREE PROTECTION HOARDING
- 1.5m TO 1.8m HIGH CHAINLINK FENCE
- 1.5m TO 1.8m WOODEN PRIVACY FENCE
- 2.4m WOODEN NOISE FENCE
- COMMUNITY MAILBOX
- LIGHT STANDARD
- TRANSFORMER & GROUNDING LOOP
- STREETLIGHT PEDESTAL
- EXISTING DITCH
- EXISTING EDGE OF GRAVEL SHOULDER
- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF GRAVEL SHOULDER
- PROPOSED EDGE OF PAVEMENT
- EXISTING POST AND WIRE FENCE
- EXISTING STEEL BEAM GUIDE RAIL
- HYDRANT (HYD.)
- VALVE & BOX (VB)
- TRACER PORT (TP)
- ENGINEERED FILL LOT
- BOREHOLE LOCATION (BH)
- EXISTING TREE TO BE PRESERVED
- EXISTING TREE TO BE REMOVED
- LIMIT OF PROPOSED ASPHALT WITHIN COUNTY ROAD

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY R-PE LIMITED, APRIL 2021

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY R-PE LIMITED.

BENCHMARK

ELEVATIONS SURVEYED BY R-PE LIMITED DURING APRIL 2021

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO CAN-NET REAL TIME NETWORK BASE STATION NUMBER 2012015061 HAVING AN ORTHOMETRIC ELEVATION OF 350.952 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928: 1978).

LOCATION DESCRIPTION: CANSEL CANNET RTK BASE STATION - GUELPH

Notes

1. This drawing is the exclusive property of R. J. Burnside & Associates Limited. The reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

GERANIUM
From the ground up™

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR FIRST SUBMISSION	23/12/20	SR
2	ISSUED FOR SECOND SUBMISSION	24/06/14	SR
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BURNSIDE

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Client
FERGUS DEVELOPMENT Inc.
3190 STEELES AVENUE EAST, SUITE 300
MARKHAM, ON
L3R 1G9

Drawing Title
FERGUS GOLF COURSE

GRADING PLAN (COUNTY ROAD 19) (3 OF 3)

Drawn	Checked	Designed	Checked	Date	Drawing No.
KT	ET	ET	SR	23/11/20	**C213**
Project No.		Contract No.		Revision No.	
052719.2000		----		0	
Scale					
1:250		0 5.0 10.0 15.0m			

File: C:\projects\Current Work Areas\052719 Fergus Golf Course\052719 Fergus Golf Course Designs\3_Production\Dwg\052719 Sheet - GRADING PLAN - CR19.dwg, Date Plotted: June 14, 2024 - 11:43:19

APPENDIX D

MECP Water Well Record

MECP Online Well Database Summary (500-m Radius)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
7166124	WEST GARAFRAXA TOWNS CON 04 011								
6702896	WEST GARAFRAXA TOWNS CON 02 009	3/10/1959	DO	53.9	23.5	25.9	10.7	FR 0177	CLAY MSND 0015 CLAY STNS 0040 BLUE CLAY 0077 GREY LMSN 0177
6702928	WEST GARAFRAXA TOWNS CON 04 010	11/20/1965	DO	10.7		10.7	7.6	FR 0025	LOAM 0002 LOAM MSND 0010 CLAY STNS 0033 CLAY GRVL 0035
6702935	WEST GARAFRAXA TOWNS CON 04 010	11/23/1966	DO	9.1		9.1	1.5	FR 0017	LOAM 0001 BRWN CLAY 0003 MSND 0005 BLUE HPAN 0017 MSND 0020 HPAN STNS 0030
6702937	WEST GARAFRAXA TOWNS CON 04 010	7/20/1967	DO	29.9	26.5	26.5	5.5	FR 0088	LOAM 0001 GREY CLAY STNS 0087 SHLE 0098
6705285	WEST GARAFRAXA TOWNS CON 04 009	9/20/1974	DO	51.8	21.3	27.4	8.8	FR 0170	LOAM 0001 BRWN CLAY STNS 0023 GREY CLAY 0070 BRWN ROCK FCRD 0082 GREY ROCK 0155 BRWN ROCK 0170
6705605	WEST GARAFRAXA TOWNS CON 04 010	7/28/1975	DO	79.2	73.4	74.7	11.9	FR 0260	LOAM 0001 BRWN CLAY SAND 0015 GREY CLAY STNS 0145 GREY SAND 0152 GREY CLAY 0208 BRWN SAND 0241 BRWN ROCK 0260
6705693	WEST GARAFRAXA TOWNS CON 04 010	8/9/1975	DO	7.6		4.9	1.8	FR 0006	BRWN SAND 0006 GREY SAND 0010 GREY CLAY 0025
6705695	WEST GARAFRAXA TOWNS CON 04 010	9/4/1975	DO	7.6		7.6	1.8	FR 0006	BRWN SAND 0006 GREY SAND 0010 GREY CLAY 0025
6705694	WEST GARAFRAXA TOWNS CON 04 010	9/4/1975	DO	7.6		7.6	1.8	FR 0006	BRWN SAND 0006 GREY SAND 0010 GREY CLAY 0025
6705698	WEST GARAFRAXA TOWNS CON 04 010	9/8/1975	DO	7.6		4.9	3.0	FR 0013	BRWN SAND 0015 GREY CLAY 0025
6705700	WEST GARAFRAXA TOWNS CON 03 008	9/10/1975	DO	63.1	21.9	33.5	10.4	FR 0207	BRWN CLAY BLDR 0036 GREY CLAY BLDR 0072 LMSN CLAY 0104 GREY LMSN HARD 0155 BRWN DLMT 0207
6706075	WEST GARAFRAXA TOWNS CON 04 010	6/22/1976	DO	61.3	29.6	32.3	10.7	FR 0190	BRWN SAND 0012 GREY CLAY GRVL 0097 GREY ROCK 0127 BRWN ROCK 0201

AC = Cooling and A/C
CO = Commercial
DE = Dewatering
DO = Domestic
IN = Industrial
IR = Irrigation
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MO = Monitoring
MT = Monitoring and Test Hole
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TH = Test Hole

MECP Online Well Database Summary (500-m Radius)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
6706242	WEST GARAFRAXA TOWNS CON 04 010	10/14/1976	DO	7.3		4.9	1.8	FR 0006	BRWN SAND 0014 GREY CLAY 0024
6706243	WEST GARAFRAXA TOWNS CON 04 010	10/15/1976	DO	6.4		4.6	1.2	FR 0004	BRWN SAND 0014 GREY CLAY 0021
6706396	WEST GARAFRAXA TOWNS CON 04 010	5/28/1977	DO	6.7		5.5	3.4	FR 0012	BLCK LOAM 0001 BRWN CLAY BLDR 0012 BRWN SAND 0013 BRWN CLAY BLDR 0022
6706640	WEST GARAFRAXA TOWNS CON 03 009	6/9/1977	DO	65.5	22.6	24.7	10.1	FR 0195	BRWN CSND 0015 GREY CLAY STNS 0074 GREY ROCK 0215
6706452	WEST GARAFRAXA TOWNS CON 04 009	7/14/1977	DO	36.6	26.5	27.7	15.8	FR 0100	BRWN LOAM 0001 GREY CLAY SAND STNS 0087 BRWN ROCK 0120
6706753	WEST GARAFRAXA TOWNS CON 04 010	8/1/1978	DO	9.1		9.1	3.0	FR 0007	BRWN SAND 0010 GREY CLAY 0030
6706784	WEST GARAFRAXA TOWNS CON 04 010	8/29/1978	DO	12.2		12.2	2.7	FR 0009 FR 0026	LOAM 0001 BRWN CLAY SNDY 0009 GREY CLAY STNS 0026 BRWN SAND 0028 GREY CLAY STNS 0040
6707006	WEST GARAFRAXA TOWNS CON 04 009	6/20/1979	DO	36.0			9.8	FR 0117	BRWN LOAM 0001 BRWN CLAY STNS 0015 GREY CLAY STNS GRVL 0080 GREY STNS CLAY FCRD 0083 GREY STNS 0115 BRWN STNS 0118
6707096	WEST GARAFRAXA TOWNS CON 04 010	9/13/1979	DO	12.2	3.0	12.2	1.2	FR 0004 FR 0010 FR 0016 FR 0033	BRWN SAND GRVL 0004 GREY CLAY 0010 GREY MARL SAND 0012 GREY CLAY 0016 GRVL 0017 GREY CLAY 0030 GREY MARL SAND 0033 GREY CLAY 0040
6707227	WEST GARAFRAXA TOWNS CON 02 010	1/23/1980	DO	9.1		9.1	1.8	FR 0006	BRWN LOAM 0001 BRWN CLAY 0010 BRWN SAND 0012 BRWN CLAY 0030
1702651	EAST GARAFRAXA TOWNS CON 03 009	4/5/1980	DO	43.3	21.9	9.8	11.9	FR 0140	BRWN CLAY 0016 GRVL 0028 STNS GRVL 0041 BRWN CLAY STNS 0072 BLUE LMSN HARD 0117 WHIT SNDS 0126 WHIT LMSN 0134 GREY LMSN 0142
6707302	WEST GARAFRAXA TOWNS CON 04 010	7/9/1980	DO	36.0	27.1	28.0	13.1	FR 0114	BRWN FSND 0012 GREY CLAY GRVL 0089 GREY ROCK 0118
6707789	WEST GARAFRAXA TOWNS CON 04 010	6/25/1982	DO	53.9		53.9	4.9	FR 0176	CLAY GRVL 0006 CLAY STNS 0055 GREY CLAY 0070 CLAY STNS 0105 CLAY SOFT SNDY 0172 STNS 0176 UNKN 0177

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MECP Online Well Database Summary (500-m Radius)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
6708187	WEST GARAFRAXA TOWNS CON 04 010	6/6/1984	DO	42.7	28.6	29.9	7.0	FR 0125	CLAY STNS 0094 LMSN 0140
6708208	WEST GARAFRAXA TOWNS CON 04 009	5/8/1985	DO	64.9	27.4	27.7	7.9	SA 0195 SA 0213	BLCK LOAM 0001 BRWN CLAY 0008 GREY CLAY STNS 0090 GREY LMSN 0152 BRWN LMSN 0213
6708405	WEST GARAFRAXA TOWNS CON 04 012	3/19/1986	DO	51.5	29.0	30.5	12.8	FR 0157 FR 0165	BLCK LOAM 0001 BRWN CLAY SAND 0012 GREY CLAY STNS 0095 GREY LMSN SHLE 0169
6708706	WEST GARAFRAXA TOWNS CON 03 012	5/15/1986	DO	50.3	33.5	34.1	2.1	FR 0150 FR 0165	GRVL 0010 CLAY 0100 SAND 0110 LMSN 0165
6708435	WEST GARAFRAXA TOWNS CON 04 010	6/17/1986	DO	61.0	27.4	29.3	7.3	FR 0185	BRWN CLAY SAND 0011 GREY CLAY STNS 0090 GREY LMSN 0200
6708770	WEST GARAFRAXA TOWNS CON 04 011	2/5/1987	DO	38.7	34.4	34.4	15.2	FR 0125	BLCK LOAM 0001 BRWN SAND 0011 BLUE CLAY 0113 GREY LMSN 0127
6708835	WEST GARAFRAXA TOWNS CON 04 010	6/23/1987	DO	53.0	29.9	31.7	11.6	FR 0140 FR 0160	BRWN CLAY STNS 0005 SAND 0008 GREY CLAY STNS 0073 GREY CLAY STKY 0078 GREY CLAY STNS 0096 GREY CLAY STKY 0098 ROCK 0100 GREY LMSN 0128 BRWN LMSN 0174
6708836	WEST GARAFRAXA TOWNS CON 04 010	6/24/1987	DO	44.2	40.2	41.1	9.1	FR 0138	BRWN CLAY STNS 0010 GREY CLAY STNS 0062 GREY CLAY STKY 0085 GREY CLAY STNS 0132 GREY LMSN 0145
6708893	WEST GARAFRAXA TOWNS CON 04 010	8/6/1987	DO	79.2	61.3	63.1	12.8	FR 0260	BRWN FILL 0003 BRWN CLAY 0012 GREY CLAY STNS 0165 GREY SAND 0195 GREY CLAY STNS 0201 BRWN SNDS SHLE 0207 BRWN LMSN 0260
6708933	WEST GARAFRAXA TOWNS CON 04 012	9/1/1987	DO	41.1	36.9	40.2	4.6	FR 0135	BRWN CLAY GRVL STNS 0018 GREY CLAY 0121 GREY ROCK 0135
6709528	WEST GARAFRAXA TOWNS CON 03 009	6/8/1988	DO	51.8	23.2	23.2	13.7	FR 0170	BLCK LOAM SOFT 0002 GREY CLAY STNS HARD 0076 BRWN ROCK LMSN HARD 0170
6709396	WEST GARAFRAXA TOWNS CON 03 012	7/7/1988	DO	56.4	36.0	6.4	5.2	FR 0184	BRWN CLAY STNS 0118 BLUE ROCK 0123 GREY ROCK 0140 LMSN 0185
6709484	WEST GARAFRAXA TOWNS CON 04 010	9/27/1988	DO	39.3	30.5	31.7	15.8	FR 0129	BLCK LOAM 0001 BRWN SAND CLAY 0012 BRWN CLAY STNS 0034 GREY CLAY STNS 0100 GREY LMSN 0129

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MECP Online Well Database Summary (500-m Radius)

ID	Township	Completion Date (yyyy-mm-dd)	Water Use	Well Depth (m)	Bedrock Depth (m)	Minimum Casing Depth (m)	Static Water Levels (m)	Water Types and Bearing Zone Depths (ft)	Stratigraphic Layers (ft)
6709642	WEST GARAFRAXA TOWNS CON 04 009	1/23/1989	DO	36.6	25.6	25.9	13.7	FR 0119	BRWN CLAY STNS 0015 BRWN CLAY GRVL 0084 GREY ROCK 0110 BRWN ROCK 0120
6710559	WEST GARAFRAXA TOWNS CON 04 010	6/11/1990	DO	43.9	29.0	30.5	4.9	FR 0135	BRWN CLAY STNS 0010 GREY CLAY STNS 0095 GREY LMSN 0144
6711036	WEST GARAFRAXA TOWNS CON 04 010	9/17/1992	DO	50.9	29.6	30.2	12.2	FR 0167	BRWN SAND FILL 0002 BRWN CLAY SAND 0011 GREY CLAY STNS 0097 GREY LMSN 0167
6711152	WEST GARAFRAXA TOWNS CON 04 011	4/12/1993	DO	50.3	33.2	34.1	23.8	FR 0115 FR 0120 FR 0145 FR 0165	LOAM 0001 BRWN SAND CLAY 0018 BRWN CLAY SAND HPAN 0026 BRWN CLAY SAND GRVL 0109 GREY LMSN 0165
6711170	WEST GARAFRAXA TOWNS CON 04 009	5/18/1993	DO	42.1	25.9	26.8	7.6	FR 0138	BLCK LOAM 0001 BRWN CLAY STNS 0027 GREY CLAY STNS 0085 GREY LMSN 0138
6711924	WEST GARAFRAXA TOWNS CON 04 009	1/26/1996	DO	33.5	23.2	23.5	13.7	FR 0086 FR 0094	BRWN CLAY 0018 GREY CLAY SAND 0025 GREY CLAY SOFT 0055 GREY CLAY HARD 0076 GREY ROCK 0079 GREY ROCK LOOS 0085 GREY ROCK 0110
6711958	WEST GARAFRAXA TOWNS CON 04 010	4/9/1996	DO	70.1	51.2	51.8	12.5	FR 0215	LOAM 0001 BRWN SAND 0011 BRWN GRVL SAND 0016 GREY CLAY STNS 0083 GREY CLAY GRVL 0117 GREY CLAY SILT STNS 0168 GREY LMSN 0230
6712869	WEST GARAFRAXA TOWNS CON 04 010	7/13/1998	DO	56.1	29.3	30.5	11.3	FR 0175	LOAM 0001 BRWN CLAY STNS 0016 GREY CLAY STNS 0090 SAND CLAY 0096 BRWN LMSN 0184
6712754	WEST GARAFRAXA TOWNS CON 02 010	11/24/1998	DO	36.6	23.8	24.4	18.3	FR 0115	BRWN CLAY SAND 0025 GREY CLAY STNS 0078 BRWN ROCK 0110 GREY ROCK 0120
6713066	WEST GARAFRAXA TOWNS CON 04 010	5/12/1999	DO	76.2	70.1	71.0	9.1	FR 0246 FR 0250	LOAM 0001 BRWN SAND GRVL CLAY 0004 BRWN CLAY STNS 0009 GREY CLAY GRVL 0027 GREY CLAY STNS 0157 GREY CLAY GRVL 0171 GREY GRVL SAND SILT 0230 GREY LMSN 0250
6713242	WEST GARAFRAXA TOWNS CON 04 010	8/17/1999	DO	61.6	30.2	31.4	13.7	FR 0172 FR 0198	BRWN LOAM 0001 BRWN CLAY STNS SNDY 0012 GREN CLAY STNS 0099 GREN LMSN 0202
6714970	WEST GARAFRAXA TOWNS CON 04 006	12/6/2003	DO	37.4	28.3		8.5	0123	BRWN LOAM 0002 BRWN CLAY SAND GRVL 0093 GREY LMSN 0123
6715076	WEST GARAFRAXA TOWNS CON 04 010	8/25/2004	DO AC	62.8	29.3	30.8	12.7	0203	BRWN SAND CLAY 0012 GREY CLAY STNS 0069 GREY CLAY 0096 BRWN LMSN 0105 GREY LMSN 0145 BRWN LMSN 0206

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6715584	WEST GARAFRAXA TOWNS 011	11/15/2005	AB						
7170379	WEST GARAFRAXA TOWNS CON 04 010	10/13/2011	DO	63.4	59.7	60.4	12.8	FR 0205	BRWN CLAY 0037 GREY CLAY 0112 GREY CLAY STNS 0143 GREY CLAY SLTY 0196 GREY LMSN 0208
7172623	WEST GARAFRAXA TOWNS CON 03 009	10/26/2011	DO ST	41.2	28.3	29.9	16.3	FR 0135	BRWN CLAY SLTY 0005 BRWN CLAY SAND 0012 GREY CLAY STNS 0093 GREY LMSN 0135
7179341	WEST GARAFRAXA TOWNS CON 03 009	3/1/2012	DO			35.1			
7185591	WEST GARAFRAXA TOWNS CON 04 009	7/16/2012	DO	75.6	74.7	75.0	15.2	FR 0248	BRWN SAND 0016 BRWN CLAY STNS 0102 GREY CLAY 0189 GREY CLAY STNS 0245 GREY LMSN 0248
7249014	WEST GARAFRAXA TOWNS CON 04 009	9/24/2015	DO	61.6	28.6	29.9	13.7	FR 0192	BRWN CLAY STNS 0039 GREY CLAY STNS 0094 GREY LMSN 0202
7273582	WEST GARAFRAXA TOWNS CON 04 009	5/20/2016	DO	42.7	26.2	26.2	5.5	FR 0102 FR 0137	BRWN LOAM SOFT 0002 BRWN CLAY STNS HARD 0037 GREY CLAY GRVL SOFT 0086 BRWN LMSN SHLE HARD 0140
7281023	WEST GARAFRAXA TOWNS	1/15/2017	DO	84.7	73.3	74.7	16.6	UT 0262	BRWN LOAM 0001 BRWN CLAY SNDY 0004 BRWN SAND 0011 BRWN CLAY SAND GRVL 0240 BRWN LMSN 0261 GREY LMSN 0278
7281021	WEST GARAFRAXA TOWNS CON 03 011	1/21/2017	DO	57.3	31.3	33.8	11.9	UT 0187	BRWN LOAM 0002 BRWN CLAY HARD 0010 BRWN CLAY SNDY 0015 BRWN SAND GRVL 0042 GREY TILL CLAY SILT 0103 GREY LMSN 0188
7281022	WEST GARAFRAXA TOWNS CON 03 011	1/21/2017	AB						
7294234	WEST GARAFRAXA TOWNS	8/30/2017	PS	25.6		25.6	9.6	UT 0084	BRWN CLAY GRVL 0030 GREY CLAY GRVL 0080 GREY GRVL 0084
7310362	WEST GARAFRAXA TOWNS	3/16/2018	AB						
7317288	WEST GARAFRAXA TOWNS CON 04 010	7/25/2018	AB				2.1		

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MECP Online Well Database Summary (500-m Radius)

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7319355	WEST GARAFRAXA TOWNS CON 04 009	8/7/2018	DO	54.3	27.1	28.7	13.7	FR 0174	BRWN CLAY STNS 0035 GREY CLAY STNS 0089 GREY LMSN 0178
7377087	WEST GARAFRAXA TOWNS CON 02 010	6/15/2020	DO	61.0	23.8	24.7	18.3		
7377090	WEST GARAFRAXA TOWNS CON 02 010	9/20/2020	AB				2.4		
7377089	WEST GARAFRAXA TOWNS CON 02 010	9/20/2020	AB				3.0		
7379634	WEST GARAFRAXA TOWNS CON 04 010	12/4/2020	DO	43.2	28.3	29.7	10.9		
7395149	WEST GARAFRAXA TOWNS CON 02 009	7/1/2021	DO	92.0	22.6	23.8	18.3		
7406108	WEST GARAFRAXA TOWNS CON 04 010	9/10/2021							

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APPENDIX E

Tables

Table E.1: Well construction information
Table E.2: Groundwater Depths and Elevations
Table E.3: Summary of Hydraulic Conductivity Values - Single Well Response Tests

Table E.1: Well construction information - 8243 and 8282 Wellington Road 19, Fergus, Ontario

Well Name	UTM Coordinates		Installation Date	Ground Surface Elevation	Top of Casing Elevation	Measured Stick up	Top of Screen	Bottom of Screen	Top of Screen	Bottom of Screen	Screened Lithology
	Easting	Northing		(masl)	(masl)	(m)	(m bgs)	(m bgs)	(m asl)	(m asl)	
BH23-02	551750	4844266	2023/11/15	427.99	428.90	0.91	2.90	4.42	425.09	423.57	(CL) SILTY CLAY
BH23-09	551496	4843863	2023/11/16	428.80	429.90	1.10	1.37	2.90	427.43	425.90	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)
BH23-20S	551668	4843940	2023/11/07	426.56	427.55	1.00	2.90	4.42	423.66	422.14	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)
BH23-20D	551667	4843940	2023/11/07	426.65	427.55	0.90	7.47	8.99	419.18	417.66	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)
BH23-24S	551671	4843827	2023/11/07	426.71	427.51	0.79	2.90	4.42	423.81	422.29	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)
BH23-24D	551672	4843826	2023/11/07	426.66	427.60	0.94	7.47	8.99	419.19	417.67	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)
BH23-27	551160	4844064	2023/11/16	434.20	434.92	0.72	5.79	7.32	428.41	426.88	(CL-ML) sandy SILTY CLAY (TILL)
BH23-29	551327	4844098	2023/11/10	432.72	433.67	0.95	7.62	9.14	425.10	423.58	(ML) gravelly, sandy SILT (TILL)
BH23-33[1]	550844	4844483	2023/11/13	429.90	430.60	0.70	1.52	3.05	428.40	426.90	(CL) sandy SILTY CLAY (TILL)
BH23-36[1]	551232	4844531	2023/11/13	430.50	431.30	0.80	3.05	4.57	427.50	425.90	(ML) clayey SILT
BH23-38	551187	4843993	2023/11/16	434.67	435.59	0.92	7.62	9.14	427.05	425.53	(CL-ML/ML) sandy CLAYEY SILT to SILT (TILL)
BH23-41	551205	4844016	2023/11/15	434.64	435.56	0.92	6.10	7.62	428.54	427.02	(ML) sandy SILT (TILL)
BH23-43	551178	4844020	2023/11/20	434.63	435.57	0.94	6.10	7.62	428.53	427.01	(CL-ML) sandy SILTY CLAY (TILL)
BH23-44	551190	4844020	2023/11/20	434.50	435.25	0.75	4.57	6.10	429.93	428.40	(CL-ML) sandy SILTY CLAY (TILL)
BH23-45	551131	4844047	2023/11/15	433.73	434.63	0.90	6.10	7.62	427.63	426.11	(CL-ML) sandy SILTY CLAY (TILL)
BH23-46	551189	4844150	2023/11/17	433.75	434.50	0.75	2.90	4.42	430.85	429.33	(CL-ML) sandy SILTY CLAY (TILL)
BH23-N1	551219	4844347	2023/12/20	432.56	433.35	0.79	3.05	6.10	429.51	426.46	(CL) SILTY CLAY
BH23-N2	551291	4844369	2023/12/20	432.00	432.82	0.82	3.05	6.10	428.95	425.90	(SM) SILTY SAND; (ML) SANDY SILT; (ML) CLAYEY SILT
BH24-01	550975	4844725	2024/01/03	425.91	426.73	0.82	13.72	15.20	412.19	410.71	(ML) CLAYEY SILT
BH24-02	551093	4844670	2024/01/03	427.51	428.33	0.82	13.72	15.20	413.79	412.31	(CL) SILTY CLAY
BH24-03	551164	4844790	2024/01/04	428.68	429.50	0.82	13.72	15.20	414.96	413.48	(CL) SILTY CLAY
BH21-01	551476	4843276	2021/03/25	426.33	427.42	1.09	4.57	6.10	421.76	420.23	(CL) SILTY CLAY
BH21-03	551427	4843696	2021/03/29	434.96	434.91	-0.05	1.83	4.88	433.13	430.08	(ML-CL) SILTY CLAY to clayey SILT (TILL)
BH21-05	551876	4844077	2021/03/30	428.71	429.99	1.28	1.22	4.27	427.49	424.44	(SM/ML) SILT and Sand; (CL) CLAYEY SILT
BH21-06	551637	4844125	2021/03/30	427.33	428.35	1.02	2.70	4.60	424.63	422.73	(SM) SILTY SAND; (CL) Sandy SILTY CLAY
BH21-07S	551439	4844018	2021/03/30	428.99	428.90	-0.09	1.52	2.74	427.47	426.25	(ML-CL) SILTY CLAY to clayey SILT (TILL)
BH21-07D	551439	4844018	2021/03/30	428.99	428.91	-0.08	7.32	8.84	421.67	420.15	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT
BH21-08	551553	4844380	2021/03/30	427.75	428.86	1.11	1.50	4.60	426.25	423.15	(CL) CLAYEY SILT; (SM) SILTY SAND
BH21-09	551266	4844085	2021/03/22	432.43	433.60	1.17	6.71	8.23	425.72	424.20	(CL) Sandy SILTY CLAY
BH21-10	551239	4844290	2021/03/24	433.20	433.03	-0.17	3.05	6.10	430.15	427.10	(CL) Sandy SILTY CLAY
BH21-11	551602	4844265	2021/03/31	428.46	429.54	1.08	5.20	6.10	423.26	422.36	(CL) SILTY CLAY
BH21-12	551093	4844087	2021/03/23	431.95	433.11	1.16	3.23	4.40	428.72	427.55	(CL-ML) Gravelly SILTY CLAY-CLAYEY SILT
BH21-13	551049	4844452	2021/03/23	429.07	429.00	-0.07	5.79	7.32	423.28	421.75	(CL) SILTY CLAY; (SM-GM) SILTY SAND and GRAVEL
BH21-14	550895	4844279	2021/03/23	431.06	430.96	-0.10	1.52	3.05	429.54	428.01	(CL) Sandy SILTY CLAY
BH21-15	551086	4844267	2021/03/24	432.46	432.30	-0.16	3.00	4.60	429.46	427.86	(CL) Sandy SILTY CLAY
BH21-16	551425	4844256	2021/03/31	429.43	429.35	-0.08	3.33	4.93	426.10	424.50	(CL-ML) SILTY CLAY-CLAYEY SILT
BH21-17	551512	4843492	2021/03/26	428.92	430.09	1.17	3.30	4.90	425.62	424.02	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT
BH21-18	551588	4843776	2021/03/29	427.24	428.41	1.17	0.90	4.00	426.34	423.24	(CL) CLAYEY SILT; (ML) Sandy SILT; (SM-GM) SILTY SAND and GRAVEL; (CL) SILTY CLAY
MW22-01 (NW Site)	551292	4844042	2022/11/21	432.09	433.17	1.08	1.52	4.57	430.57	427.52	(CL) SILTY CLAY
MW22-27 (SE Site)	551483	4843649	2022/11/24	432.11	432.96	0.85	3.35	6.40	428.76	425.71	(CL) SILTY CLAY; (SM) SILTY SAND
MW22-28 (SE Site)	551497	4843637	2022/11/30	432.25	433.27	1.02	3.05	6.10	429.20	426.15	(CL) SILTY CLAY
MW101	551430	4844602	2021/05/18	430.33	431.16	0.83	33.80	61.00	396.53	369.33	Dolostone
MW102	551156	4844083	2021/05/26	433.59	434.40	0.81	30.60	61.00	402.99	372.59	Dolostone
MW103	551035	4844853	2021/05/15	426.42	427.49	1.07	30.80	61.00	395.62	365.42	Dolostone
PW21-1	550796	4844515	2021/05/12	430.04	430.62	0.58	32.90	84.10	397.14	345.94	Dolostone
MP-1	550939	4844521	-	427.16	428.14	0.98	-	-	-	-	-
SG1 (NW Site)	550939	4844521	-	426.59	428.02	1.43	-	-	-	-	-
MP2	551110	4844459	-	429.33	430.23	0.90	-	-	-	-	-
SG2 (NW Site)	-	-	-	428.78	430.23	1.45	-	-	-	-	-
PZ1	551443	4844025	-	428.70	429.69	0.99	-	-	-	-	-
SG1	551441	4844024	-	428.29	429.30	1.01	-	-	-	-	-
PZ2	551572	4844261	-	427.34	428.43	1.09	-	-	-	-	-
SG2	551574	4844262	-	427.24	428.27	1.03	-	-	-	-	-
PZ3	551474	4843287	-	425.54	426.96	1.42	-	-	-	-	-
SG3	551476	4843289	-	425.18	426.17	0.99	-	-	-	-	-
PZ4	551629	4844157	-	427.14	428.38	1.24	-	-	-	-	-
SG4	551629	4844156	-	427.10	428.13	1.03	-	-	-	-	-
PZ5	551545	4844002	-	427.21	428.32	1.11	-	-	-	-	-
SG5	551544	4844003	-	427.23	428.23	1.00	-	-	-	-	-
North Irrigation Well (MOE#6712549)	551157	4844464	-	429.91	430.20	0.29	-	-	-	-	Limestone
South Irrigation Well (MOE#6713016)	551546	4844183	-	427.51	428.15	0.64	-	-	-	-	Limestone
Clubhouse Well (MOE#6714026)	551256	4844358	-	432.18	432.68	0.50	-	-	-	-	Limestone
Old Clubhouse Well (MOE#6706408)	551466	4843649	-	433.04	433.71	0.67	-	-	-	-	Rock

Notes:

m - metre
m asl - metres above sea level
m bgs - metres below ground surface

Survey data provided by R-PE Surveying Ltd. of Woodbridge Ontario based on UTM coordinate and Canadian Geodetic Vertical Elevation Datum 2013 (CGVD2013). The top of casing elevation is estimate using the surveyed ground surface elevation plus the stick of the well casing above the ground surface measured in the field.

[1] Wells were not found by surveyors, coordinates were approximated using cell phone coordinates and ground surface elevations were estimated from the existing site grading drawings. The top of casing elevation is estimate using the ground surface elevation plus the stick of the well casing above the ground surface measured in the field.

Table E.2: Groundwater Depths and Elevations - 8243 and 8282 Wellington Road 19, Fergus, Ontario

Well Name	UTM Zone		Ground Surface Elevation	Top of Casing Elevation[1]	Top of Screen[1]	Bottom of Screen[1]	Screened Lithology	Date of completion	March 22-31, 2021 (WSP, 2023a)		April 5, 2021 (WSP, 2023a)		April 8, 9, 12, 2021 (WSP, 2023a)		April 14, 2021 (WSP, 2023a)		October 7, 2022 (WSP, 2023a)		December 13, 2022 (WSP, 2023b)		December 21, 2022 (WSP, 2023b)	
									WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]
	Easting	Northing	(masl)	(masl)	(m asl)	(m asl)			(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)
BH23-02	551750	4844266	427.99	428.9	425.09	423.57	(CL) SILTY CLAY	11/15/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-09	551496	4843863	428.80	429.9	427.43	425.90	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/16/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-20S	551668	4843940	426.56	427.6	423.66	422.14	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-20D	551667	4843940	426.65	427.5	419.18	417.66	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-24S	551671	4843827	426.71	427.5	423.81	422.29	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-24D	551672	4843826	426.66	427.6	419.19	417.67	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-27	551160	4844064	434.20	434.9	428.41	426.88	(CL-ML) sandy SILTY CLAY (TILL)	11/16/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-29	551327	4844098	432.72	433.7	425.10	423.58	(ML) gravelly, sandy SILT (TILL)	11/10/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-33[1]	550844	4844483	429.90	430.6	428.40	426.90	(CL) sandy SILTY CLAY (TILL)	11/13/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-36[1]	551232	4844531	430.50	431.3	427.50	425.90	(ML) clayey SILT	11/13/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-38	551187	4843993	434.67	435.6	427.05	425.53	(CL-ML/ML) sandy CLAYEY SILT to SILT (TILL)	11/16/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-41	551205	4844016	434.64	435.6	428.54	427.02	(ML) sandy SILT (TILL)	11/15/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-43	551178	4844020	434.63	435.6	428.53	427.01	(CL-ML) sandy SILTY CLAY (TILL)	11/20/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-44	551190	4844020	434.50	435.3	429.93	428.40	(CL-ML) sandy SILTY CLAY (TILL)	11/20/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-45	551131	4844047	433.73	434.6	427.63	426.11	(CL-ML) sandy SILTY CLAY (TILL)	11/15/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-46	551189	4844150	433.75	434.5	430.85	429.33	(CL-ML) sandy SILTY CLAY (TILL)	11/17/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-N1	551219	4844347	432.56	433.4	429.51	426.46	(CL) SILTY CLAY	12/20/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH23-N2	551291	4844369	432.00	432.8	428.95	425.90	(SM) SILTY SAND; (ML) SANDY SILT; (ML) CLAYEY SILT	12/20/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24-01	550975	4844725	425.91	426.7	412.19	410.71	(ML) CLAYEY SILT	1/3/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24-02	551093	4844670	427.51	428.3	413.79	412.31	(CL) SILTY CLAY	1/3/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH24-03	551164	4844790	428.68	429.5	414.96	413.48	(CL) SILTY CLAY	1/4/2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH21-01	551476	4843276	426.33	427.4	421.76	420.23	(CL) SILTY CLAY	3/25/2021	1.5	425.92	0.81	425.52	2.36	423.97	1.56	424.77	1.82	424.51	-	-	-	-
BH21-03	551427	4843696	434.96	434.9	433.13	430.08	(ML-CL) SILTY CLAY to clayey SILT (TILL)	3/29/2021	2.1	432.78	0.59	434.37	0.73	434.23	0.40	434.56	2.99	431.97	-	-	-	-
BH21-05	551876	4844077	428.71	430.0	427.49	424.44	(SM/ML) SILT and Sand; (CL) CLAYEY SILT	3/30/2021	0.6	429.39	0.91	427.80	1.01	427.70	0.76	427.95	2.25	426.46	-	-	-	-
BH21-06	551637	4844125	427.33	428.4	424.63	422.73	(SM) SILTY SAND; (CL) Sandy SILTY CLAY	3/30/2021	0.9	427.45	0.45	426.88	0.57	426.76	0.41	426.92	1.3	426.03	-	-	-	-
BH21-07S	551439	4844018	428.99	428.9	427.47	426.25	(ML-CL) SILTY CLAY to clayey SILT (TILL)	3/30/2021	3	425.9	-	-	0.43	428.56	0.74	428.25	2.32	426.67	-	-	-	-
BH21-07D	551439	4844018	428.99	428.9	421.67	420.15	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT	3/30/2021	3	425.91	-	-	1.30	427.69	0.53	428.46	0.69	428.3	-	-	-	-
BH21-08	551553	4844380	427.75	428.9	426.25	423.15	(CL) CLAYEY SILT; (SM) SILTY SAND	3/30/2021	0.2	428.66	0.06	427.69	0.14	427.61	-0.02	427.77	1.91	425.84	-	-	-	-
BH21-09	551266	4844085	432.43	433.6	425.72	424.20	(CL) Sandy SILTY CLAY	3/22/2021	7.3	426.3	1.71	430.72	1.85	430.58	1.57	430.86	3.37	429.06	-	-	-	-
BH21-10	551239	4844290	433.20	433.0	430.15	427.10	(CL) Sandy SILTY CLAY	3/24/2021	3	430.03	1.41	431.79	1.05	432.15	0.62	432.58	1.97	431.23	-	-	-	-
BH21-11	551602	4844265	428.46	429.5	423.26	422.36	(CL) SILTY CLAY	3/31/2021	1.5	428.04	1.25	427.21	1.30	427.16	1.07	427.39	2.48	425.98	-	-	-	-
BH21-12	551093	4844087	431.95	433.1	428.72	427.55	(CL-ML) Gravelly SILTY CLAY-CLAYEY SILT	3/23/2021	3.7	429.41	0.42	431.53	0.11	431.84	0.52	431.43	1.79	430.16	-	-	-	-
BH21-13	551049	4844452	429.07	429.0	423.28	421.75	(CL) SILTY CLAY; (SM-GM) SILTY SAND and GRAVEL	3/23/2021	7.4	421.6	1.38	427.69	1.30	427.77	1.31	427.76	2.9	426.17	-	-	-	-
BH21-14	550895	4844279	431.06	431.0	429.54	428.01	(CL) Sandy SILTY CLAY	3/23/2021	1.7	429.26	0.31	430.75	0.29	430.77	0.20	430.86	2.35	428.71	-	-	-	-
BH21-15	551086	4844267	432.46	432.3	429.46	427.86	(CL) Sandy SILTY CLAY	3/24/2021	3.8	428.5	1.35	431.11	0.34	432.12	-	-	1.53	430.93	-	-	-	-
BH21-16	551425	4844256	429.43	429.4	426.10	424.50	(CL-ML) SILTY CLAY-CLAYEY SILT	3/31/2021	0.6	428.75	1.35	428.08	0.65	428.78	0.13	429.30	1.65	427.78	-	-	-	-
BH21-17	551512	4843492	428.92	430.1	425.62	424.02	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT	3/26/2021	2.1	427.96	-0.09	429.01	0.74	428.18	0.46	428.46	2.4	426.52	-	-	-	-
BH21-18	551588	4843776	427.24	428.4	426.34	423.24	(CL) CLAYEY SILT; (ML) Sandy SILT; (SM-GM) SILTY SAND and GRAVEL; (CL) SILTY CLAY	3/29/2021	1.2	427.21	1.29	425.95	1.29	425.95	1.05	426.19	1.93	425.31	-	-	-	-
MW22-01 (NW Site)	551292	4844042	432.09	433.2	430.57	427.52	(CL) SILTY CLAY	11/21/2022	-	-	-	-	-	-	-	-	-	-	2.34	429.75	2.34	429.75
MW22-27 (SE Site)	551483	4843649	432.11	433.0	428.76	425.71	(CL) SILTY CLAY; (SM) SILTY SAND	11/24/2022	-	-	-	-	-	-	-	-	-	-	5.48	427.48	-	-
MW22-28 (SE Site)	551497	4843637	432.25	433.3	429.20	426.15	(CL) SILTY CLAY	11/30/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW101	551430	4844602	430.33	431.2	396.53	369.33	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW102	551156	4844083	433.59	434.4	402.99	372.59	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW103	551035	4844853	426.42	427.5	395.62	365.42	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW21-1	550796	4844515	430.04	430.6	397.14	345.94	Dolostone	5/12/2021	-	-	-	-	-	-					-	-		
MP-1	550939	4844521	427.16	428.1	-	-	-	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SG1 (NW Site)	550939	4844521	426.59	428.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MP2	551110	4844459	429.33	430.2	-	-	-	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SG2 (NW Site)	-	-	428.78	430.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PZ1	551443	4844025	428.70	429.7	-	-	-	-	-	-	0.46	428.24	0.43	428.27	0.34	428.36	DRY	DRY	-	-	-	-
SG1	551441	4844024	428.29	429.3	-	-	-	-	-	-	DRY	DRY	DRY	DRY	0.05	428.35	DRY	DRY	-	-	-	-
PZ2	551572	4844261	427.34	428.4	-	-	-	-	-	-	0	427.34	0.07	427.27	0.04	427.30	DRY	DRY	-	-	-	-
SG2	551574	4844262	427.24	428.3	-	-	-	-	-	-	0.04	427.31	0.02	427.29	0.10	427.37	DRY	DRY	-	-	-	-
PZ3	551474	4843287	425.54	427.0	-	-	-	-	-	-	0.21	425.34	0.32	425.22	0.23	425.31	DRY	DRY	-	-	-	-
SG3	551476	4843289	425.18	426.2	-	-	-	-	-	-	0.09	425.26	DRY	DRY	0.07	425.24	DRY	DRY	-	-	-	-
PZ4	551629	4844157	427.14	428.4	-	-	-	-	-	-	-0.12	427.26	0.05	427.09	-0.19	427.33	DRY	DRY	-	-	-	-
SG4	551629	4844156	427.10	428.1	-	-	-	-	-	-	DRY	DRY	DRY	DRY	0.07	427.20	DRY	DRY	-	-	-	-
PZ5	551545	4844002	427.21	428.3	-	-	-	-	-	-	0.35	426.86	0.43	426.78	0.13	427.09	DRY	DRY	-	-	-	-
SG5	551544	4844003	427.23	428.2	-	-	-	-	-	-	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	-	-	-	-
Clubhouse Well (MOE#6714026)	551256	4844358	432.18	432.7			Limestone	3/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Old Clubhouse Well (MOE#6706408)	551466	4843649	433.04	433.7			Rock	5/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Elev. - Elevation
m - metre
m asl - metres above sea level
m bgs - metres below ground surface
m toc - metres below top of casing
WL - Water Level

Survey data provided by R-PE Surveying Ltd. of Woodbridge Ontario based on UTM coordinate and Canadian Geodetic Vertical Elevation Datum 2013 (CGVD2013). The top of casing elevation is estimate using the surveyed ground surface elevation plus the stick of the well casing above the ground surface measured in the field.

[1] Wells were not found by surveyors, coordinates were approximated using cell phone coordinates and ground surface elevations were estimated from the existing site grading drawings. The top of casing elevation is estimate using the ground surface elevation plus the stick of the well casing above the ground surface [1] Wells were not found by surveyors, coordinates were approximated using cell phone coordinates and groundsurfac measured in the field.

Table E.2: Groundwater Depths and Elevations - 8243 and 8282 Wellington Road 19, Fergus, Ontario

Well Name	UTM Zone		Ground Surface Elevation	Top of Casing Elevation[1]	Top of Screen[1]	Bottom of Screen[1]	Screened Lithology	Date of completion	November 30 & December 1, 2023 (GEMTEC)		December 18-19, 2023 (GEMTEC)		January 11, 2023 (GEMTEC)		January 3-5, 8, 2024 (GEMTEC)		February 5, 2024 (GEMTEC)		March 11-12, 2024 (GEMTEC)	
									WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.[1]	WL Below Ground	Approximate WL Elev.
	Easting	Northing	(masl)	(masl)	(m asl)	(m asl)			(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)	(m bgs)	(m asl)
BH23-02	551750	4844266	427.99	428.9	425.09	423.57	(CL) SILTY CLAY	11/15/2023	-0.09	428.08	0.71	427.28	-	-	0.61	427.38	0.39	427.60	0.26	427.73
BH23-09	551496	4843863	428.80	429.9	427.43	425.90	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/16/2023	0.91	427.89	0.23	428.57	-	-	0.21	428.59	0.20	428.60	0.17	428.62
BH23-20S	551668	4843940	426.56	427.6	423.66	422.14	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	0.45	426.10	0.33	426.23	-	-	0.31	426.24	0.25	426.30	0.14	426.41
BH23-20D	551667	4843940	426.65	427.5	419.18	417.66	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	0.62	426.03	0.88	425.77	-	-	0.51	426.14	0.44	426.21	0.34	426.31
BH23-24S	551671	4843827	426.71	427.5	423.81	422.29	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	0.62	426.10	0.36	426.36	-	-	0.35	426.37	0.42	426.30	0.23	426.49
BH23-24D	551672	4843826	426.66	427.6	419.19	417.67	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	11/7/2023	0.58	426.08	0.48	426.18	-	-	0.40	426.26	0.34	426.32	0.24	426.42
BH23-27	551160	4844064	434.20	434.9	428.41	426.88	(CL-ML) sandy SILTY CLAY (TILL)	11/16/2023	1.42	432.78	0.29	433.91	-	-	0.93	433.27	0.87	433.33	0.88	433.32
BH23-29	551327	4844098	432.72	433.7	425.10	423.58	(ML) gravelly, sandy SILT (TILL)	11/10/2023	1.71	431.01	1.40	431.32	-	-	1.43	431.30	1.38	431.34	1.46	431.26
BH23-33[1]	550844	4844483	429.90	430.6	428.40	426.90	(CL) sandy SILTY CLAY (TILL)	11/13/2023	1.10	428.80	0.56	429.30	-	-	0.75	429.20	0.62	429.28	0.56	429.34
BH23-36[1]	551232	4844531	430.50	431.3	427.50	425.90	(ML) clayey SILT	11/13/2023	1.12	429.40	1.02	429.50	-	-	0.98	429.50	0.95	429.55	0.86	429.64
BH23-38	551187	4843993	434.67	435.6	427.05	425.53	(CL-ML/ML) sandy CLAYEY SILT to SILT (TILL)	11/16/2023	1.42	433.25	0.92	433.75	-	-	0.90	433.77	0.81	433.86	0.73	433.94
BH23-41	551205	4844016	434.64	435.6	428.54	427.02	(ML) sandy SILT (TILL)	11/15/2023	1.08	433.56	0.24	434.40	-	-	0.69	433.95	0.60	434.04	0.41	434.23
BH23-43	551178	4844020	434.63	435.6	428.53	427.01	(CL-ML) sandy SILTY CLAY (TILL)	11/20/2023	1.19	433.44	0.77	433.86	-	-	0.68	433.96	0.53	434.11	0.63	434.00
BH23-44	551190	4844020	434.50	435.3	429.93	428.40	(CL-ML) sandy SILTY CLAY (TILL)	11/20/2023	1.03	433.47	0.71	433.79	-	-	0.67	433.83	0.54	433.96	0.81	433.69
BH23-45	551131	4844047	433.73	434.6	427.63	426.11	(CL-ML) sandy SILTY CLAY (TILL)	11/15/2023	1.35	432.38	0.78	432.95	-	-	0.58	433.15	0.45	433.28	0.46	433.27
BH23-46	551189	4844150	433.75	434.5	430.85	429.33	(CL-ML) sandy SILTY CLAY (TILL)	11/17/2023	1.35	432.40	0.14	433.62	-	-	0.16	433.59	0.12	433.63	0.13	433.62
BH23-N1	551219	4844347	432.56	433.4	429.51	426.46	(CL) SILTY CLAY	12/20/2023	-	-	-	-	-	-	-	-	0.31	432.25	0.30	432.26
BH23-N2	551291	4844369	432.00	432.8	428.95	425.90	(SM) SILTY SAND; (ML) SANDY SILT; (ML) CLAYEY SILT	12/20/2023	-	-	-	-	-	-	-	-	0.92	431.08	0.81	431.19
BH24-01	550975	4844725	425.91	426.7	412.19	410.71	(ML) CLAYEY SILT	1/3/2024	-	-	-	-	-	-	-	-	1.67	424.24	1.56	424.35
BH24-02	551093	4844670	427.51	428.3	413.79	412.31	(CL) SILTY CLAY	1/3/2024	-	-	-	-	-	-	-	-	3.60	423.91	3.38	424.13
BH24-03	551164	4844790	428.68	429.5	414.96	413.48	(CL) SILTY CLAY	1/4/2024	-	-	-	-	-	-	-	-	4.19	424.49	3.90	424.78
BH21-01	551476	4843276	426.33	427.4	421.76	420.23	(CL) SILTY CLAY	3/25/2021	1.36	424.97	-	-	-	-	1.13	425.20	0.95	425.38	0.94	425.39
BH21-03	551427	4843696	434.96	434.9	433.13	430.08	(ML-CL) SILTY CLAY to clayey SILT (TILL)	3/29/2021	-	-	-	-	-	-	0.82	434.14	0.29	434.67	0.45	434.51
BH21-05	551876	4844077	428.71	430.0	427.49	424.44	(SM/ML) SILT and Sand; (CL) CLAYEY SILT	3/30/2021	1.63	427.08	-	-	-	-	1.21	427.50	0.81	427.90	0.58	428.13
BH21-06	551637	4844125	427.33	428.4	424.63	422.73	(SM) SILTY SAND; (CL) Sandy SILTY CLAY	3/30/2021	0.99	426.34	-	-	-	-	0.49	426.84	0.41	426.92	0.33	427.00
BH21-07S	551439	4844018	428.99	428.9	427.47	426.25	(ML-CL) SILTY CLAY to clayey SILT (TILL)	3/30/2021	-	-	-	-	-	-	0.54	428.45	0.21	428.78	0.19	428.80
BH21-07D	551439	4844018	428.99	428.9	421.67	420.15	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT	3/30/2021	-	-	-	-	-	-	-	-	0.60	428.39	0.48	428.51
BH21-08	551553	4844380	427.75	428.9	426.25	423.15	(CL) CLAYEY SILT; (SM) SILTY SAND	3/30/2021	0.11	427.64	-	-	-	-	0.22	427.53	0.01	427.74	-0.05	427.80
BH21-09	551266	4844085	432.43	433.6	425.72	424.20	(CL) Sandy SILTY CLAY	3/22/2021	1.74	430.69	-	-	-	-	1.39	431.04	1.46	430.97	1.43	431.00
BH21-10	551239	4844290	433.20	433.0	430.15	427.10	(CL) Sandy SILTY CLAY	3/24/2021	-	-	-	-	-	-	0.67	432.53	0.62	432.58	0.60	432.60
BH21-11	551602	4844265	428.46	429.5	423.26	422.36	(CL) SILTY CLAY	3/31/2021	-	-	-	-	-	-	1.64	426.82	1.11	427.35	0.02	428.44
BH21-12	551093	4844087	431.95	433.1	428.72	427.55	(CL-ML) Gravelly SILTY CLAY-CLAYEY SILT	3/23/2021	0.54	431.41	-	-	-	-	0.23	431.72	0.06	431.89	0.13	431.82
BH21-13	551049	4844452	429.07	429.0	423.28	421.75	(CL) SILTY CLAY; (SM-GM) SILTY SAND and GRAVEL	3/23/2021	-	-	-	-	-	-	1.33	427.74	1.23	427.84	1.38	427.69
BH21-14	550895	4844279	431.06	431.0	429.54	428.01	(CL) Sandy SILTY CLAY	3/23/2021	-	-	-	-	-	-	0.44	430.62	0.39	430.67	0.18	430.88
BH21-15	551086	4844267	432.46	432.3	429.46	427.86	(CL) Sandy SILTY CLAY	3/24/2021	-	-	-	-	-	-	0.83	431.63	0.16	432.30	0.18	432.28
BH21-16	551425	4844256	429.43	429.4	426.10	424.50	(CL-ML) SILTY CLAY-CLAYEY SILT	3/31/2021	-	-	-	-	-	-	0.28	429.15	0.08	429.35	0.08	429.35
BH21-17	551512	4843492	428.92	430.1	425.62	424.02	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT	3/26/2021	1.36	427.56	-	-	-	-	0.51	428.41	0.29	428.63	0.37	428.55
BH21-18	551588	4843776	427.24	428.4	426.34	423.24	(CL) CLAYEY SILT; (ML) Sandy SILT; (SM-GM) SILTY SAND and GRAVEL; (CL) SILTY CLAY	3/29/2021	0.92	426.32	-	-	-	-	1.24	426.00	1.11	426.13	0.98	426.26
MW22-01 (NW Site)	551292	4844042	432.09	433.2	430.57	427.52	(CL) SILTY CLAY	11/21/2022	-	-	-	-	-	-	0.64	431.45	0.59	431.50	0.55	431.54
MW22-27 (SE Site)	551483	4843649	432.11	433.0	428.76	425.71	(CL) SILTY CLAY; (SM) SILTY SAND	11/24/2022	-	-	-	-	-	-	0.38	431.73	-	-	0.28	431.83
MW22-28 (SE Site)	551497	4843637	432.25	433.3	429.20	426.15	(CL) SILTY CLAY	11/30/2022	-	-	-	-	3.14	430.13	-	-	-	-	1.45	430.81
MW101	551430	4844602	430.33	431.2	396.53	369.33	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	8.58	421.75
MW102	551156	4844083	433.59	434.4	402.99	372.59	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	11.84	421.75
MW103	551035	4844853	426.42	427.5	395.62	365.42	Dolostone	3/29/2021	-	-	-	-	-	-	-	-	-	-	3.81	422.61
PW21-1	550796	4844515	430.04	430.6	397.14	345.94	Dolostone	5/12/2021				-	-	-					6.73	423.31
MP-1	550939	4844521	427.16	428.1	-	-	-	3/29/2021	-	-	-	-	-	-	-	-	-	-	-0.08	427.24
SG1 (NW Site)	550939	4844521	426.59	428.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-0.92	427.51
MP2	551110	4844459	429.33	430.2	-	-	-	3/29/2021	-	-	-	-	-	-	-	-	-	-	0.03	429.30
SG2 (NW Site)	-	-	428.78	430.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PZ1	551443	4844025	428.70	429.7	-	-	-	-	0.42	428.28	-	-	-	-	0.29	428.41	0.32	428.38	0.32	428.38
SG1	551441	4844024	428.29	429.3	-	-	-	-	DRY	DRY	-	-	-	-	DRY	DRY	0.20	428.49	0.02	428.31
PZ2	551572	4844261	427.34	428.4	-	-	-	-	-0.04	427.38	-	-	-	-	0	427.34	-0.08	427.42	-0.03	427.37
SG2	551574	4844262	427.24	428.3	-	-	-	-	-0.95	428.19	-	-	-	-	DRY	DRY	0.09	427.33	0.01	427.25
PZ3	551474	4843287	425.54	427.0	-	-	-	-	0.60	424.94	-	-	-	-	0.34	425.20	0.13	425.41	0.16	425.38
SG3	551476	4843289	425.18	426.2	-	-	-	-	DRY	DRY	-	-	-	-	DRY	DRY	0.25	425.43	0.12	425.30
PZ4	551629	4844157	427.14	428.4	-	-	-	-	-	-	-	-	-	-	-	-	-0.08	427.22	-0.12	427.26
SG4	551629	4844156	427.10	428.1	-	-	-	-	-	-	-	-	-	-	-	-	0.10	427.20	0.10	427.20
PZ5	551545	4844002	427.21	428.3	-	-	-	-	-	-	-	-	-	-	-	-	-0.77	427.98	0.10	427.11
SG5	551544	4844003	427.23	428.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	DRY	DRY
Clubhouse Well (MOE#6714026)	551256	4844358	432.18	432.7			Limestone	3/29/2021	-	-	-	-	-	-	-	-	-	-	9.59	422.59
Old Clubhouse Well (MOE#6706408)	551466	4843649	433.04	433.7			Rock	5/15/2021	-	-	-	-	-	-	-	-	-	-	19.27	413.77

Notes:

Elev. - Elevation
m - metre
m asl - metres above sea level
m bgs - metres below ground surface
m toc - metres below top of casing
WL - Water Level

Survey data provided by R-PE Surveying Ltd. of Woodbridge Ontario based on UTM coordinate and Canadian Geodetic Vertical Elevation Datum 2013 (CGVD2013). The top of c

[1] Wells were not found by surveyors, coordinates were approximated using cell phone coordinates and ground surface elevations were estimated from the existing site grading dra elevations were estimated from the existing site grading drawings. The top of casing elevation is estimate using the estimated groundsurface elevation plus the stick of the well casing above the ground surface measured in the field. measured in the field.

Table E.3: Summary of Hydraulic Conductivity Values - Single Well Response Tests - 8243 and 8282 Wellington Road 19, Fergus, Ontario

Well Name	Date of Test	Ground Surface Elevation (masl)	Top of Screen (m bgs)	Bottom of Screen (m bgs)	Screened Lithology	Type of Test	Hydraulic Conductivity Estimate (m/s)	Notes
South East Site								
BH23-02	12/18/2023	427.991	2.90	4.42	(CL) SILTY CLAY	Rising Head	4.E-07	Completed by GEMTEC
BH23-09	12/18/2023	428.798	1.37	2.90	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	Rising Head	6.E-09	Completed by GEMTEC
BH23-20D	12/18/2023	426.645	7.47	8.99	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	Rising Head	2.E-08	Completed by GEMTEC
BH23-20S	12/18/2023	426.555	2.90	4.42	(CL-ML) SILTY CLAY to CLAYEY SILT (TILL)	Rising Head	6.E-07	Completed by GEMTEC
BH21-01	4/9/2021	426.33	4.57	6.10	(CL) SILTY CLAY	Rising Head	8.E-09	Completed by WSP
BH21-03	4/8/2021	434.96	1.83	4.88	(ML-CL) SILTY CLAY; clayey SILT (TILL)	Rising Head	6.E-06	Completed by WSP
BH21-05	4/8/2021	428.71	1.22	4.27	(SM/ML) SILT and Sand; (CL) CLAYEY SILT	Rising Head	2.E-06	Completed by WSP
BH21-06	4/8/2021	427.33	2.70	4.60	(SM) SILTY SAND; (CL) Sandy SILTY CLAY	Rising Head	2.E-07	Completed by WSP
BH21-07S	4/8/2021	428.99	1.52	2.74	(ML-CL) SILTY CLAY clayey SILT (TILL)	Rising Head	6.E-07	Completed by WSP
North West Site								
BH23-27	12/18/2023	434.2	5.79	7.32	(CL-ML) sandy SILTY CLAY (TILL)	Rising Head	4.E-08	Completed by GEMTEC
BH23-29	12/19/2023	432.72	7.62	9.14	(ML) gravelly, sandy SILT (TILL)	Rising Head	7.E-09	Completed by GEMTEC
BH23-33[1]	12/18/2023	429.9	1.52	3.05	(CL) sandy SILTY CLAY (TILL)	Rising Head	2.E-08	Completed by GEMTEC
BH23-36[1]	12/18/2023	430.5	3.05	4.57	(ML) clayey SILT	Rising Head	1.E-08	Completed by GEMTEC
BH23-41	12/18/2023	434.64	6.10	7.62	(ML) sandy SILT (TILL)	Rising Head	7.E-08	Completed by GEMTEC
BH23-46	12/18/2023	433.75	2.90	4.42	(CL-ML) sandy SILTY CLAY (TILL)	Rising Head	2.E-08	Completed by GEMTEC
BH21-08	4/8/2021	427.75	1.50	4.60	(CL) CLAYEY SILT; (SM) SILTY SAND	Rising Head	4.E-06	Completed by WSP
BH21-10	4/9/2021	433.2	3.05	6.10	(CL) Sandy SILTY CLAY	Rising Head	2.E-08	Completed by WSP
BH21-16	4/9/2021	429.43	3.33	4.93	(CL-ML) SILTY CLAY-CLAYEY SILT	Rising Head	6.E-08	Completed by WSP
BH21-17	4/14/2021	428.92	3.30	4.90	(CL-ML) Sandy SILTY CLAY-CLAYEY SILT	Rising Head	1.E-08	Completed by WSP
BH21-18	4/8/2021	427.24	0.90	4.00	(CL) CLAYEY SILT; (ML) Sandy SILT; (SM-GM) SILTY SAND and GRAVEL; (CL) SILTY CLAY	Rising Head	2.E-07	Completed by WSP

Notes:

All test were analysed using Bouwer and Rice, 1976

m asl - meters above sea level
m bgs - meters below groundsurface
m/s - meters per second

Survey data provided by R-PE Surveying Ltd. of Woodbridge Ontario based on UTM coordinate and Canadian Geodetic Vertical Elevation Datum 2013 (CGVD2013). The top of casing elevation is estimate using the surveyed ground surface elevation plus the stick of the well casing above the ground surface measured in the field.

[1] Wells were not found by surveyors, coordinates were approximated using cell phone coordinates and ground surface elevations were estimated from the existing site grading drawings. The top of casing elevation is estimate using the ground surface elevation plus the stick of the well casing above the ground surface measured in the field.

Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

APPENDIX F

Record of Boreholes
Abbreviations and Terminology Used on Records of Boreholes
Record of Borehole Sheets from 2023 (GEMTEC)
Record of Borehole Sheets from January 2024 (GEMTEC)

ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

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

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

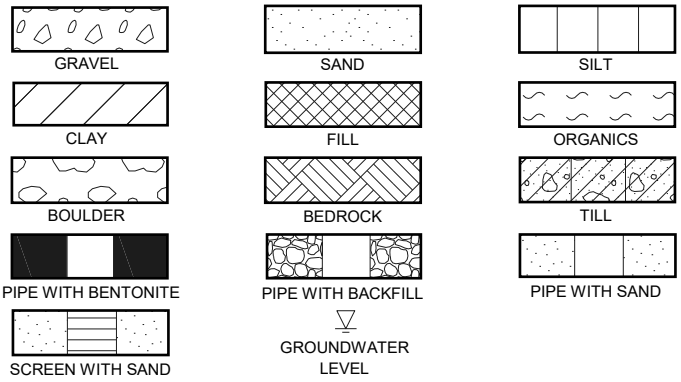
PENETRATION RESISTANCE

Standard Penetration Resistance, N
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

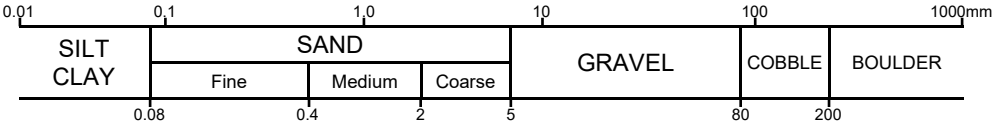
Dynamic Penetration Resistance
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).

WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

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

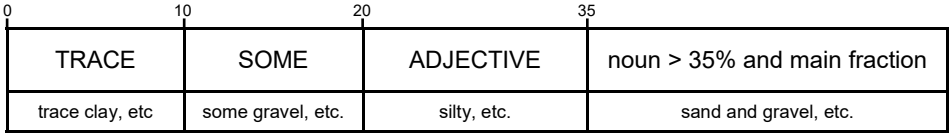


GRAIN SIZE



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)



RECORD OF BOREHOLE BH23-01

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 8 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (152 mm)	Ground Surface									
		TOPSOIL		0.00							
		(ML) SILT, some silt, some sand, trace organics; dark brown; cohesive, w<PL		0.18	1	SS	356	7			
1		(SM) SILTY SAND, trace to some gravel; brown; non-cohesive, moist to wet, compact		0.76	2	SS	254	16			
					3	SS	254	28			
2					4	SS	356	24			
3					5	SS	330	12			▽
4											
		(CL) SILTY CLAY, some sand; grey; cohesive, w~PL, stiff		4.57	6	SS	279	15			
5		End of Borehole		5.03							
6		Notes: 1. Groundwater measured at approximately 3.1 m depth in open borehole upon completion of drilling.									
7											
8											
9											
10											
11											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/08	3.0 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-02

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

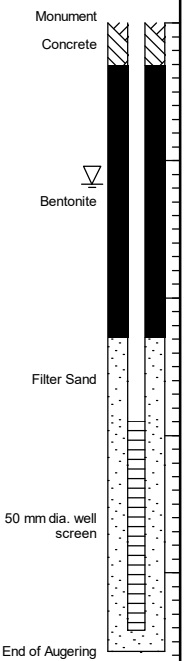
SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		428.00				
0	Power Auger Hollow Stem Auger (203 mm)	TOPSOIL		0.00 / 427.75	1	SS	330	4
		(ML) SILT, some sand, trace organics; dark brown; cohesive, w<PL		0.25 / 427.24				
1		(SM) SILTY SAND, trace gravel; brown; non-cohesive, moist to wet, loose to compact		0.76	2	SS	305	7
					3	SS	356	13
2				425.71				
		(CL) SILTY CLAY, trace gravel; grey (TILL); cohesive, w~PL, stiff to very stiff		2.29	4	SS	305	12
3					5	SS	457	13
4								
					6	SS	457	22
5				422.97				
		End of Borehole		5.03				
6		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.						
7								
8								
9								
10								
11								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.2 ▽	426.8

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-03

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (152 mm)	Ground Surface								
		TOPSOIL		0.00	1	SS	356	3		
		(ML) SILT, some sand, trace gravel; dark brown; cohesive, w<PL, stiff		0.25						
1					2	SS	356	14		
		(CL) SILTY CLAY, trace sand, trace gravel; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		1.52	3	SS	305	19		
2					4	SS	457	19	MH	
3					5	SS	254	45		
4										
5					6	SS	457	73		
		End of Borehole		5.03						
6		Notes: 1. Groundwater measured at approximately 1.5 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.								
7										
8										
9										
10										
11										

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-04

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0		Ground Surface						
		TOPSOIL		0.00				
		(ML) SILT, some sand, trace gravel, trace organics; dark brown; cohesive, w<PL, firm		0.18	1	SS	203	6
1	Power Auger Solid Stem Auger (152 mm)	(CL-ML) SILTY CLAY to CLAYEY SILT, some sand, some gravel; brown to grey (TILL), cohesive, w<PL, very stiff to hard		0.76	2	SS	457	19
2					3	SS	457	44
					4	SS	330	55
3		- auger grinding between approximately 2.9 m and 4.4 m depths			5	SS	381	50 / 0.15
4								
5					6	SS		56
		End of Borehole		5.03				
6		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.						
7								
8								
9								
10								
11								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-05

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 9 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface								
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00	1	SS	330	2		
		(ML) SILT, some sand, trace gravel, trace organics; brown; cohesive, w<PL		0.25						
1		(SP/ML) SAND and SILT, trace gravel; brown; non-cohesive, moist to wet, loose to dense		0.76	2	SS	381	4		
					3	SS	178	35	MH	
2		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some sand, trace to some gravel; brown to grey (TILL); cohesive, w<PL to w~PL, hard		2.13	4	SS	432	79		
3					5	SS	432	87		
4					6	SS	102	50 / 0.03		
		End of Borehole:		4.27						
5		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with soil cuttings upon completion of drilling.								
6										
7										
8										
9										
10										
11										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-06

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 9 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0		Ground Surface						
		TOPSOIL		0.00	1	SS	229	6
		(ML) SILT, some sand, trace organics; dark brown; cohesive, w~PL		0.20				
1		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some sand, trace gravel; brown to grey (TILL); w<PL to w>PL, stiff to hard		0.76	2	SS	432	13
					3	SS	457	13
2					4	SS	406	73 / 0.10
3	Power Auger Solid Stem Auger (152 mm)				5	SS	330	50 / 0.10
4					6	SS	457	77
5								
6					7	SS	432	50 / 0.08
7								
8					8	SS	381	50 / 0.13
9		(SM) gravelly SILTY SAND; grey; non-cohesive, moist to wet, very dense		9.14	9	SS	102	50 / 0.15
10		End of Borehole		9.60				
11		Notes: 1. Groundwater measured at approximately 1.0 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.						

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/09	0.9 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-07

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 3 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0		Ground Surface						
		TOPSOIL		0.00				
		(SM) SILTY SAND, trace clay; light brown; non-cohesive; moist, loose		0.18	1	SS	356	4
1	Power Auger Solid Stem Auger (152 mm)	(CL) SILTY CLAY, trace to some sand, trace gravel; light brown to grey (mottled); cohesive, w<PL to w~PL, stiff to very stiff		0.76	2	SS	203	10
					3	SS	203	18
2		- auger grinding between approximately 2.0 m to 3.0 m depths						
		(CL) gravelly SILTY CLAY, some gravel, trace sand; grey (TILL); cohesive, w<PL to w~PL, hard		2.29	4	SS	152	90 / 0.25
3					5	SS	152	80 / 0.25
		End of Borehole		3.51				
4		Notes:						
		1. Groundwater measured at approximately 2.4 m depth in open borehole upon completion of drilling.						
5		2. Borehole backfilled with bentonite upon completion of drilling.						
6								
7								
8								
9								
10								
11								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/03	2.4 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-08

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 3 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface								
0	Power Auger Solid Stem Auger (127 mm)	TOPSOIL		0.00						
		(SM) SILTY SAND, trace to some clay; light brown to brown; non-cohesive, moist to wet, compact		0.15	1	SS	356	4		
1					2	SS	254	20		
2					3	SS	406	23		
		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some gravel, trace to some sand; brown to grey (TILL); cohesive, w<PL to w~PL, hard		2.29	4	SS	152	64	MH	
3					5	SS	203	100 / 0.25		
		End of Borehole		3.51						
4		Notes: 1. Groundwater measured at approximately 1.5 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.								
5										
6										
7										
8										
9										
10										
11										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/03	1.5 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-09

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 16 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (152 mm)	Ground Surface		428.80							Monument
		TOPSOIL		0.00 / 428.60							Concrete
		(CL-ML) CLAYEY SILT to SILTY CLAY, some sand, trace gravel; brown to grey (TILL); cohesive, w<PL, stiff to hard		0.20	1	SS	406	7			Bentonite
1					2	SS	457	17			Filter Sand
2					3	SS	457	14			50 mm dia. well screen
					4	SS	254	68			
3					5	SS	305	70			
				425.29							End of Augering
4		End of Borehole		3.51							
		Notes:									
		1. Borehole dry upon completion of drilling.									
		2. Monitoring well installed as shown upon completion of drilling.									
5											
6											
7											
8											
9											
10											
11											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.3 ▽	427.5

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-10

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 1 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0		Ground Surface						
		TOPSOIL		0.00				
		(SM) SILTY SAND, trace clay; brown; non-cohesive, moist		0.15	1	SS	152	4
1	Power Auger Solid Stem Auger (127 mm)	(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some sand, trace gravel; brown (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	305	12
					3	SS	406	14
2					4	SS	356	59
3					5	SS	406	61
		End of Borehole		3.51				
4		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.						
5								
6								
7								
8								
9								
10								
11								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-11

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 2 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface								
0	Power Auger Solid Stem Auger (127 mm)	TOPSOIL		0.00	1	SS	356	5		
		(SM) SILTY SAND, trace gravel; light brown; non-cohesive, moist to wet, compact		0.36						
1					2	SS	152	13		
		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some gravel, trace to some sand; light brown to grey (TILL); cohesive, w<PL to w~PL, hard		1.52	3	SS	406	10	MH	
2										
					4	SS	457	6		
3										
					5	SS	254	47		
4		End of Borehole 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.		3.51						
5										
6										
7										
8										
9										
10										
11										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-12

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 1 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface									
		TOPSOIL		0.00							
		(SC) CLAYEY SAND, trace gravel; brown: non-cohesive, moist, loose		0.20	1	SS	203	7			
1					2	SS	305	8			
		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some gravel, trace to some sand, light brown to grey (TILL), cohesive, w<PL to w~PL, very stiff to hard		1.52	3	SS	406	22			
2					4	SS	406	32			
3	Power Auger Solid Stem Auger (127 mm)				5	SS	457	43			
4					6	SS	102	50 / 0	13		
5											
6					7	SS	76	50 / 0	13		
7											
					8	SS	76	50 / 0	13		
8		End of Borehole		7.75							
		Notes:									
		1. Groundwater measured at approximately 4.9 m depth in open borehole upon completion of drilling.									
9		2. Borehole backfilled with bentonite upon completion of drilling.									
10											
11											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/01	4.9 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-13

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 1 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m ● / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m ▲	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED / WATER CONTENT, % W_P W W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface										
0		TOPSOIL		0.00								
		(SM) SILTY SAND, trace gravel; dark brown to brown, non-cohesive, moist, loose		0.20	1	SS	305	10	●			
1					2	SS	305	4	● ○			
		(CL) SILTY CLAY, some sand, trace gravel; brown; cohesive, w~PL, soft		1.52	3	SS	457	4	●			▽
2	Power Auger Solid Stem Auger (127 mm)											
		(CL-ML) CLAYEY SILT to SILTY CLAY, trace to some sand, some gravel; brown to grey (TILL), cohesive, w<PL to w~PL, hard		2.29	4	SS	406	33	○ ●			
3					5	SS	457	58	●			
		- auger grinding between approximately 3.6 m to 4.4 m depths										
4					6	SS	51	50/0.08	○			
		End of Borehole		4.65								
5		Notes:										
		1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling.										
6		2. Borehole backfilled with bentonite upon completion of drilling.										
7												
8												
9												
10												
11												

10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/01	1.8 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-14

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Oct 31 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (127 mm)	Ground Surface									
		TOPSOIL		0.00	1	SS	356	7			
		(CL-ML) CLAYEY SILT to SILTY CLAY, some sand, some gravel; brown (TILL); cohesive, w~PL, stiff to hard		0.25	2	SS	406	12			
1											
					3	SS	356	11			
2											
		- auger grinding between approximately 2.5 m to 3.1 m depths			4	SS	457	57			
3											
					5	SS	457	70			
		End of Borehole		3.51							
4		Notes:									
		1. Borehole open and dry upon completion of drilling.									
		2. Borehole backfilled with bentonite upon completion of drilling.									
5											
6											
7											
8											
9											
10											
11											

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-15

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 1 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (127 mm)	Ground Surface									
		TOPSOIL		0.00							
		(SM) SILTY SAND, some gravel; brown; non-cohesive, moist, loose		0.15	1	SS	152	8			
1					2	SS	102	6			
		- auger grinding between approximately 1.5 m to 7.6 m depths		1.52							
		(CL-ML) CLAYEY SILT to SILTY CLAY, some sand, trace to some gravel; brown to grey (TILL); cohesive, w<PL, very stiff to hard			3	SS	457	18			
2					4	SS	406	33			
3					5	SS	406	57			
4					6	SS	406	50 / 0.10			
5											
6					7	SS	152	50 / 0.13			
7											
8					8	SS	203	50 / 0.13			
		End of Borehole		7.90							
9		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.									
10											
11											

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

RECORD OF BOREHOLE BH23-16

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Oct 31 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Solid Stem Auger (127 mm)	Ground Surface									
		TOPSOIL		0.00	1	SS	305	7			
		(SM) SILTY SAND, trace to some silt, trace gravel; brown to grey; moist to wet, compact		0.30							
1					2	SS	305	20			
2					3	SS	254	18		MH	▽
					4	SS	406	17			
3					5	SS	356	28			
		(CL-ML) CLAYEY SILT to SILTY CLAY, trace gravel, trace sand; grey (TILL); cohesive, w<PL to w~PL, hard - auger grinding between approximately 3.8 m to 4.6 m dpeths		3.51							
4											
5					6	SS	406	110	>>		
		End of Borehole		5.03							
6		Notes: 1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.									
7											
8											
9											
10											
11											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/10/31	1.8 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-17

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Oct 31 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Solid Stem Auger (127 mm)	Ground Surface									
		TOPSOIL		0.00	1	SS	381	5			
		(SM) SILTY SAND, trace clay; brown; non-cohesive, moist to wet		0.28							
1		(SP) SAND, some silt, trace to some gravel, trace clay; brown to light brown; non-coheisve, moist to wet, compact		0.76	2	SS	305	15			
					3	SS	356	18			
2					4	SS	406	10			
3					5	SS	381	18			
4		- auger grinding between approximately 3.8 m to 4.6 m depths			6A	SS	457	89			
5		(CL-ML) CLAYEY SILT to SILTY CLAY, some sand, some gravel; brown to grey (TILL); cohesive, w<PL, hard		4.80	6B						
		End of Borehole		5.03							
6		Notes: 1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.									
7											
8											
9											
10											
11											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/10/31	1.8 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-18

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 3 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface								
0	Power Auger Solid Stem Auger (127 mm)	TOPSOIL		0.00	1	SS	229	8		
		(SM) SILTY SAND, some silt; light brown; non-cohesive, wet, compact		0.23						
1					2	SS	254	22		
2					3	SS	406	12	MH	
					4	SS	457	12		
3		(CL) SILTY CLAY, trace gravel, trace sand; grey (TILL); cohesive, w<PL to w~PL, very stiff		3.05	5	SS	254	17		
		End of Borehole		3.51						
4		Notes: 1. Groundwater measured at approximately 0.9 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.								
5										
6										
7										
8										
9										
10										
11										

SAMPLES

● PENETRATION RESISTANCE (N), BLOWS/0.3m
▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/03	0.9 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-19

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 3 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface								
0	Power Auger Solid Stem Auger (127 mm)	TOPSOIL		0.00						
		(SM) SILTY SAND, trace gravel, trace clay; light brown; non-coheisve, moist to wet, compact		0.15	1	SS	381	9		
1					2	SS	203	13		
		(SP) SAND, trace to some silt; light brown; non-cohesive, wet, compact		1.52	3	SS	457	13		
2		(CL-ML) SILTY CLAY to CLAYEY SILT, trace gravel, trace sand; light brown to grey (TILL); cohesive, w<PL to w~PL, stiff		2.29	4	SS	254	8		
3					5	SS	152	15	MH	
		End of Borehole		3.51						
4		Notes: 1. Groundwater measured at approximately 0.9 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.								
5										
6										
7										
8										
9										
10										
11										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: NATURAL, REMOULDED
WATER CONTENT, %: W_P, W, W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/03	0.9 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-20D

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 2
DATUM: CGVD28
BORING DATE: Nov 7 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		426.60						Monument
0		TOPSOIL		426.45 / 0.00						Concrete
		(SM) SILTY SAND; light brown to grey; non-cohesive, moist		0.15	1	SS	305	6		
				425.84						
1		(SP) SAND, some silt; light brown to grey; non-cohesive, wet, loose		0.76	2	SS	152	8		
				425.08						
		(CL-ML) SILTY CLAY to CLAYEY SILT, trace to some gravel, trace to some sand; light brown to grey (TILL), cohesive, w<PL to w~PL, stiff to hard		1.52	3	SS	203	14		
2					4	SS	356	14		
3					5	SS	203	14		Bentonite
4	Power Auger / Hollow Stem Auger (203 mm)	- auger grinding between approximately 3.7 m to 9.1 m depths			6	SS	406	22		
5										
6					7	SS	406	51	MH	
7										Filter Sand
8					8	SS	457	57		50 mm dia. well screen
9					9	SS	457	90		
				417.00						End of Augering
		End of Borehole		9.60						
10		Notes:								
		1. Borehole dry upon completion of drilling.								
		2. Refusal encountered at approximately 6.7 m depth. Borehole moved approximately 1 m east.								
11										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L

10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-20D

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 2 OF 2
DATUM: CGVD28
BORING DATE: Nov 7 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L); 10 20 30 40 50 60 70 80 90	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
11		3. Monitoring well installed as shown upon completion of drilling.									
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.2 ▽	425.4

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-20S

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 7 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger, Hollow Stem Auger (203 mm)	Ground Surface		426.60							Monument, Concrete
		- Refer to BH23-20D for coresponding lithology information.		0.00							
1											Bentonite
2											
3											Filter Sand
4											50 mm dia. well screen
5											
6											
				419.89							
7		End of Borehole 1. Monitoring well installed as shown upon completion of drilling.		6.71							End of Augering
8											
9											
10											
11											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.1 ▽	425.5

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-21

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 3 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0	Power Auger Solid Stem Auger (127 mm)	Ground Surface						
		TOPSOIL		0.00	1	SS	254	9
		(SM) SILTY SAND; brown; non-coheisve, moist		0.25				
1		(SP) SAND, some silt, trace gravel; brown; non-cohesive, wet, compact		0.76	2	SS	406	16
2		(CL) SILTY CLAY, trace to some sand, trace gravel; grey (TILL); w~PL to w>PL, stiff to very stiff		1.52	3	SS	254	9
					4	SS	203	15
3		(ML) SILT, some sand; grey; non-cohesive, wet, compact		3.05	5	SS	76	15
		End of Borehole		3.51				
4		Notes:						
		1. Groundwater measured at approximately 0.6 m depth in open borehole upon completion of drilling.						
5		2. Borehole backfilled with bentonite upon completion of drilling.						
6								
7								
8								
9								
10								
11								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/03	0.6 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-22

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 2 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (203 mm)	Ground Surface		426.30						
		TOPSOIL		426.30 0.00 426.05	1	SS	254	7		
		(SM) SILTY SAND; brown; non-cohesive, moist		0.25 425.54						
1		(SP) gravelly SAND to SAND, some gravel, some silt, trace clay; non-cohesive, moist to wet, compact		0.76	2	SS	152	11		
					3	SS	152	20		
2				424.01						
		(ML) gravelly CLAYEY SILT, some sand; cohesive, grey (TILL); w<PL, very stiff to hard		2.29	4	SS	203	28	MH	
3					5	SS	152	90		
				422.49						
4		End of Borehole (auger refusal)		3.81						
5		Notes: 1. Groundwater measured at approximately 0.6 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.								
6										
7										
8										
9										
10										
11										

SOIL PROFILE | SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/02	0.6 ▽	425.7

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-23

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 2 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m ● / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m ▲	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED / WATER CONTENT, % W_P W W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Solid Stem Auger (127 mm) / Hollow Stem Auger (203 mm)	Ground Surface										
		TOPSOIL		0.00	1	SS	356	6				
		(SM) SILTY SAND; light brown to brown; non-coheisve, moist, compact,		0.36								
1					2	SS	254	12				
		(SP) SAND, trace to some silt, trace gravel; light brown; non-cohesive, moist to wet, loose to compact		1.52	3	SS	203	14				▽
2												
					4	SS	305	18			MH	
3												
					5	SS	152	9				
4												
		(ML) SILT, trace gravel to gravelly; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		4.57	6	SS	152	26				
5												
6					7	SS	51	50 / 0	13			
7												
					8	SS	102	50 / 0	15			
8		End of Borehole (auger refusal)		7.92								
		Notes: 1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling.										
9												
10												
11												

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/02	1.8 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-24D

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 6 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
		Ground Surface	426.70					
0	Power Auger Hollow Stem Auger (203 mm)	TOPSOIL	426.55 0.00					
		(SP/SM) SAND, some silt to silty; brown; non-cohesive, moist, compact	0.15	1	SS	305	11	
1				2	SS	254	18	
			425.18					
		(ML) SILT, some sand, trace gravel; grey (TILL); non-cohesive, compact to dense, moist	1.52	3	SS	305	14	
2				4	SS	305	41	NP
		- auger grinding between approximately 2.7 m and 8.9 m depths						
3			423.60					
		(CL-ML) SILTY CLAY to CLAYEY SILT, some sand to sandy, some gravel; grey (TILL); cohesive, w<PL, hard	3.10	5	SS	254	40	
4								
				6	SS	356	52	
5								
6				7	SS	254	65	
7								
				8	SS	254	76	
8								
9				9	SS	254	61	
			417.10					
		End of Borehole	9.60					
10		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.						
11								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION

Monument
Concrete
Bentonite
Filter Sand
50 mm dia. well screen
End of Augering

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.2 ▽	425.5

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-24S

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 7 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (+ NATURAL, ⊕ REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (203 mm)	Ground Surface		426.70							Monument Concrete
		- Refer to BH23-24D for coresponding lithology information.		0.00							
1											Bentonite
2											Filter Sand
3											50 mm dia. well screen
4				422.13							End of Augering
		End of Borehole 1. Monitoring well installed as shown upon completion of drilling.		4.57							
5											
6											
7											
8											
9											
10											
11											

10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/03/12	1.0 ▽	425.7

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-25

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 2 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m ● / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m ▲	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED / WATER CONTENT, % W_P W W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface										
0	Power Auger Solid Stem Auger (127 mm)	TOPSOIL		0.00	1	SS	279	7				
		(SP) SAND, some silt, trace gravel; grey; non-cohesive, wet, loose		0.28								
1					2	SS	356	8				
					3A	SS	457	17				
2		(CL-ML) SILTY CLAY to CLAYEY SILT, trace to some gravel, trace sand; grey (TILL); cohesive, w<PL to w~PL, stiff to hard		1.83	3B							
					4	SS	457	26				
3					5	SS	76	50 / 0	10			
		End of Borehole		3.15								
4												
5												
6												
7												
8												
9												
10												
11												

10 20 30 40 50 60 70 80 90

Notes:

1. Groundwater measured at approximately 0.9 m depth in open borehole upon completion of drilling.

2. Borehole backfilled with bentonite upon completion of drilling.

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
23/11/02	0.9 ▽	

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-26

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 9 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		432.20							
		TOPSOIL		0.00 / 431.97	1	SS	279	6			
		(ML) SILT, some sand, trace gravel; dark brown; coheisve, w<PL, firm		0.23 / 431.44							
1	Power Auger / Solid Stem Auger (152 mm)	(CL-ML) sandy SILTY CLAY, trace gravel; grey (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	330	22			
2					3	SS	356	14			
					4	SS	432	65			
3		- auger grinding between approximately 2.7 m and 3.1 m depths			5	SS	457	50 / 0.08			
4											
5				427.17	6	SS	279	50 / 0.14			
		End of Borehole		5.03							
6		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole was backfilled with soil cuttings upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.									
7											
8											
9											
10											
11											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUSSOUTH_GEOTECH_R0_2023_11_14.GPJ GEMTEC 2018.GDT 4/18/24

RECORD OF BOREHOLE BH23-27

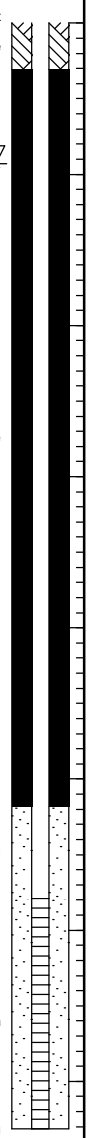
CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 16 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
		Ground Surface		434.20					
0	Power Auger, Hollow Stem Auger (203 mm)	TOPSOIL		0.00 / 434.00	1	SS	203	3	
		(SM) SILTY SAND, trace rootlets; brown; non-cohesive, moist		0.20 / 433.44					
1		(CL-ML) sandy SILTY CLAY, some gravel; brown to grey (TILL); cohesive, w<PL, very stiff to hard		0.76	2	SS	254	15	
					3	SS	178	19	
2					4	SS	406	23	
3					5	SS	254	19	MH
4					6	SS	330	25	
5					7	SS	305	56	
6					8	SS	0	50 / 0.01	
7				426.43					
8		End of Borehole		7.77					
9		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.							
10									

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL, ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.9 ▽	433.3

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-28

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0	Power Auger; Solid Stem Auger (152 mm)	Ground Surface		433.27				
		TOPSOIL		0.00 / 433.07	1	SS	254	7
		(SM) SILTY SAND; brown; non-cohesive, moist		0.20 / 432.51				
1		(CL) sandy SILTY CLAY, trace gravel; bown-grey (mottled) (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	457	19
					3	SS	305	8
2					4	SS	457	33
3					5	SS	457	38
4		- auger grinding on probable cobbles/boulders between approximately 3.6 m and 4.3 m depths			6	SS	457	69
5		End of Borehole		428.24 / 5.03				
6		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.						
7								
8								
9								
10								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-29

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 2
DATUM: CGVD28
BORING DATE: Nov 10 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger, Hollow Stem Auger (203 mm)	Ground Surface		432.72						Monument
		TOPSOIL		0.00 / 432.52	1	SS	432	6		
		(ML) SILT, some sand, trace gravel; brown; cohesive, w~PL		0.20 / 431.96						
1		(CL) SILTY CLAY, trace sand, trace gravel; brown to brown-grey (mottled); cohesive, w~PL, stiff		0.76	2	SS	457	12		
					3	SS	305	9		
2										
		(ML) gravelly, sandy SILT; brown (TILL); cohesive, w<PL, very stiff to hard - auger grinding on probable cobbles/boulders between approximately 2.3 m and 6.1 m depths		430.43 / 2.29	4	SS	356	24		
3					5	SS	330	66	MH	Bentonite
4										
					6	SS	229	50 / 0.15		
5		- becoming grey at approximately 5.5 m depth								
6					7	SS	254	50 / 0.13		
7										Filter Sand
					8	SS	356	50 / 0.08	MH	
8										50 mm dia. well screen
9					9	SS	203	50 / 0.15		
				423.12						End of Augering
		End of Borehole		9.60						
10		Notes:								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: NATURAL, REMOULDED
WATER CONTENT, %: W_P, W, W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-29

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 2 OF 2
DATUM: CGVD28
BORING DATE: Nov 10 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.							10 20 30 40 50 60 70 80 90		
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	1.4 ▽	431.3

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-30

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 10 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		432.78				
0		TOPSOIL		432.65 0.13	1	SS	305	10
		(ML) SILT, trace sand, trace gravel; dark brown; cohesive, w<PL		432.02 0.76				
1	Power Auger Solid Stem Auger (152 mm)	(CL) sandy SILTY CLAY, trace to some gravel; brown to grey (TILL); coheisve, w<PL to w>PL, stiff to hard			2	SS	279	8
					3	SS	457	26
2					4	SS	406	53
3					5	SS	279	21
		End of Borehole		429.27 3.51				
4		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.						
5								
6								
7								
8								
9								
10								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % — W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-31

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 9 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		431.24				
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 / 431.04	1	SS	330	5
		(ML) SILT, some sand; dark brown; cohesive, w<PL		0.20 / 430.48				
1		(CL) sandy SILTY CLAY, trace gravel; brown-grey (mottled) to grey (TILL), coheisve w~PL to w>PL, firm to hard		0.76	2	SS	457	5
2					3	SS	457	15
					4	SS	127	67
3					5	SS	457	26
		End of Borehole		427.73 / 3.51				
4		Notes: 1. Groundwater measured at approximately 0.9 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.						
5								
6								
7								
8								
9								
10								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-32

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE:

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		429.48						
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 / 429.28						
		(SM) SILTY SAND; dark brown; non-cohesive, moist		0.20 / 428.72	1	SS	305	7		
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown to grey (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	457	12		
2					3	SS	457	34	MH	
					4	SS	457	38		
3					5	SS	457	72		
		End of Borehole		425.97 / 3.51						

Notes:

1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling.

2. Borehole backfilled with bentonite upon completion of drilling.

3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.

SAMPLES: ● PENETRATION RESISTANCE (N), BLOWS/0.3m; ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED

WATER CONTENT, %: W_P — W — W_L

10 20 30 40 50 60 70 80 90

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-33

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 13 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		429.94						
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 / 429.74	1	SS	356	7	MH	Monument; Bentonite; Filter Sand; 50 mm dia. well screen; End of Augering
		(SM) SILTY SAND; dark brown; non-cohesive, moist		0.20 / 429.18						
1		(CL) sandy SILTY CLAY, trace gravel, brown-grey (mottled) to grey (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	457	13		
					3	SS	457	25		
2					4	SS	203	28		
3					5	SS	457	65		
		End of Borehole		426.43 / 3.51						
4		Notes:								
		1. Borehole dry upon completion of drilling.								
		2. Monitoring well installed as shown upon completion of drilling.								
5		3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.								
6										
7										
8										
9										
10										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/04	0.7 ▽	429.2

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LOGGED: CC
CHECKED:

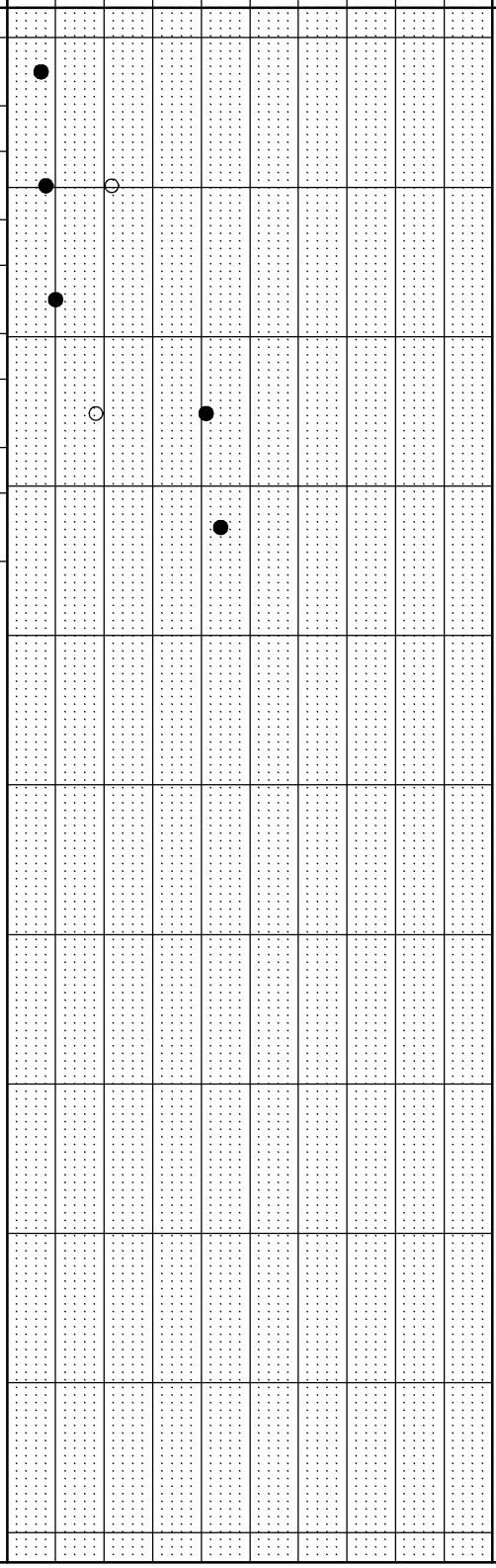
GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-34

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE:

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0		Ground Surface		426.42				
	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 / 426.12	1	SS	330	7
		(SM) SILTY SAND; black, trace organics; non-cohesive, moist		0.30 / 425.66				
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown-grey (mottled) to grey (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	457	8
					3	SS	457	10
2					4	SS	457	41
3					5	SS	381	44
				422.91				
		End of Borehole		3.51				
4		Notes: 1. Groundwater measured at approximately 1.2 m depth in open borehole upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.						
5								
6								
7								
8								
9								
10								



ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-35

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 10 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		429.95						
0	Power Auger	TOPSOIL		0.00 / 429.77						
		(ML) SILT, trace gravel; dark brown; cohesive, w<PL		0.18 / 429.19	1	SS	330	11		
1	Solid Stem Auger (152 mm)	(CL) sandy SILTY CLAY, trace gravel, trace rock fragments; brown to grey (TILL), cohesive, w<PL to w~PL, firm to hard		0.76	2	SS	432	5		
					3	SS	457	12		
2					4	SS	406	71		
3					5	SS	406	40		
4					6	SS	406	40		
5				424.92						
		End of Borehole		5.03						
6										
7										
8										
9										
10										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

Notes:

1. Groundwater measured at approximately 0.9 m depth in open borehole upon completion of drilling.

2. Borehole backfilled with bentonite upon completion of drilling.

3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.

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CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-36

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 10 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		394.56						
0	Power Auger Hollow Stem Auger (203 mm)	TOPSOIL		0.00 / 394.31	1	SS	254	9		Monument, Concrete
		(SM) SILTY SAND; dark brown; non-cohesive, moist		0.25 / 393.80						
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown to brown-grey (TILL), cohesive, w<PL, stiff to very stiff		0.76	2	SS	178	16		Bentonite
					3	SS	457	14		
2		(SM) SILTY SAND; brown; non-cohesive, wet, compact		2.29 / 392.27	4	SS	356	11	MH	Filter Sand
3		(CL-ML) sandy SILTY CLAY, trace gravel, trace rock fragments; grey (TILL); cohesive, w<PL, hard		3.05 / 391.51	5	SS	406	52		50 mm dia. well screen
4										
5				389.53	6	SS	76	50 / 0.08		End of Augering
		End of borehole		5.03						

Notes:

1. Borehole dry upon completion of drilling.

2. Monitoring well installed as shown upon completion of drilling.

3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/04	1.0 ▽	393.6
24/01/08	1.0 ▼	393.5

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CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-37

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE:

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		428.67						
0	Power Auger / Solid Stem Auger (152 mm)	TOPSOIL		0.00 / 428.39	1	SS	406	4		
		(ML) SILT, trace gravel; brown-black; cohesive, w~PL		0.28 / 427.91						
1		(SM) SILTY SAND; brown; non-cohesive, moist, loose		0.76 / 427.15	2	SS	25	9		
		(CL) sandy SILTY CLAY, trace gravel; brown to grey (TILL); cohesive, w~PL to w>PL, stiff to very stiff		1.52	3	SS	457	10		
2										
					4	SS	457	26		
3										
					5	SS	457	28	MH	
4										
					6	SS	457	22		
5				423.64						
		End of Borehole		5.03						
6										
7										
8										
9										
10										

SOIL PROFILE / SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

Notes:

1. Groundwater measured at approximately 1.8 m depth in open borehole upon completion of drilling.

2. Borehole backfilled with bentonite upon completion of drilling.

3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-38

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 2
DATUM: CGVD28
BORING DATE: Nov 16 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger, Hollow Stem Auger (203 mm)	Ground Surface		434.67							Monument
		TOPSOIL		0.00 / 434.49							Concrete
		(SM) SILTY SAND, trace rootlets; brown; non-cohesive, moist		0.18 / 433.91	1	SS	229	6			
1		(CL-ML / ML) sandy CLAYEY SILT to SILT, trace to some gravel; brown to grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		0.76	2	SS	178	34			
2					3	SS	279	20			
					4	SS	254	43			
3					5	SS	279	47			
4					6	SS	229	39			Bentonite
5											
6					7	SS	127	50 / 0.08		MH	
7											Filter Sand
8					8	SS	279	50 / 0.15			50 mm dia. well screen
9					9	SS	152	50 / 0.15			End of Augering
		End of Borehole		425.07 / 9.60							
10		Notes:									

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL, ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-38

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 2 OF 2
DATUM: CGVD28
BORING DATE: Nov 16 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.							10 20 30 40 50 60 70 80 90		
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.9 ▽	433.8

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-39

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 2
DATUM: CGVD28
BORING DATE: Nov 17 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m ● / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m ▲	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED / WATER CONTENT, % W_P W W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		433.55								
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 433.32	1	SS	254	5	●			
		(SM) SILTY SAND; brown; non-cohesive, moist		0.23 432.79								
1		(CL-ML) sandy SILTY CLAY, some gravel; brown to grey (TILL); w<PL, stiff to hard		0.76	2	SS	432	20	○ ●			
					3	SS	305	13	●			
2					4	SS	457	29	○ ⊢ ●		MH	
3					5	SS	279	41	●			
4					6	SS	305	35	○ ●			
5												
6					7	SS	254	50 / 0.15				
7												
8					8	SS	279	50 / 0.15	○			
9					9	SS	254	50 / 0.10				
		End of Borehole		423.95 9.60								
10		Notes:										

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-39

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 2 OF 2
DATUM: CGVD28
BORING DATE: Nov 17 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, mm	SAMPLES: BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED); WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

10 20 30 40 50 60 70 80 90

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-40

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 17 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		433.71						
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 433.46	1	SS	279	6		
		(SM) SILTY SAND; brown; non-cohesive, moist		0.25 432.95						
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown to grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		0.76	2	SS	254	78		
					3	SS	457	20		
2					4	SS	457	34		
3					5	SS	457	27	MH	
4					6	SS	457	50		
5										
6					7	SS	457	50 / 0.15		
7										
8				425.63	8	SS	457	50 / 0.14		
		End of Borehole		8.08						
9		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.								
10										

SOIL PROFILE / SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

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LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-41

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 14 2023

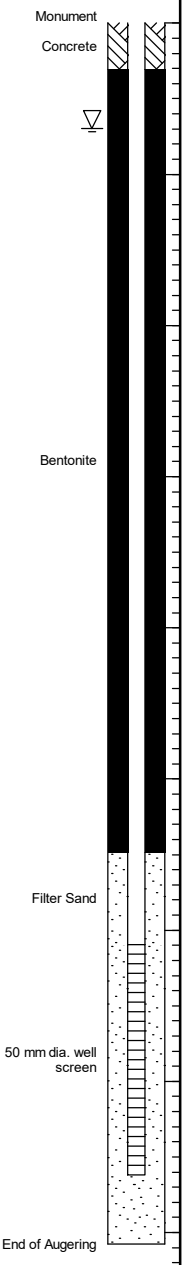
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		434.64				
0	Power Auger / Hollow Stem Auger (203 mm)	TOPSOIL		0.00 / 434.41	1	SS	229	5
		(SM) SILTY SAND; dark brown; non-cohesive, moist		0.23 / 433.88				
1		(ML) sandy SILT, trace gravel; brown-grey (mottled) to grey (TILL), cohesive, w<PL, very stiff to hard		0.76	2	SS	254	30
		- auger grinding on probable cobbles/boulders between approximately 1.5 m and 2.8 m depths			3	SS	330	26
2					4	SS	25	62
3					5	SS	432	30
4					6	SS	178	60
5								
6					7	SS	254	50 / 0.13
7								
8				426.56	8	SS	305	50 / 0.13
		End of Borehole		8.08				
9		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling. 3. Auger refusal encountered at approximately 3.8 m depth. Borehole moved 1 m north.						
10								

SOIL PROFILE | SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.7 ▽	433.9

GEMTEC Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-42

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		433.55				
0	Power Auger Solid Stem Auger (152 mm)	TOPSOIL		0.00 433.30	1	SS	279	5
		(SM) SILTY SAND, trace organics; brown; non-cohesive, moist		0.25 432.79				
1		(CL) sandy SILTY CLAY, trace gravel; brown to grey (TILL), cohesive, w<PL, very stiff to hard - auger grinding on probable cobbles/boulders between approximately 1.3 m and 4.6 m depths		0.76	2	SS	305	21
					3	SS	406	18
2					4	SS	457	29
3					5	SS	381	27
4					6	SS	457	39
5								
6					7	SS	457	87 / 0.13
7								
8				425.47	8	SS	356	50 / 0.14
		End of Borehole		8.08				
9		Notes: 1. Borehole open and dry upon completion of drilling. 2. Borehole backfilled with bentonite upon completion of drilling. 3. Ground surface interpolation derived from '21016tp07a.dwg' (RP-E Surveying, December 7, 2023). Location not yet surveyed.						
10								

SOIL PROFILE | SAMPLES | PENETRATION RESISTANCE (N), BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m | SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) | WATER CONTENT, % (W_P, W, W_L) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION

10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-43

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 20 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m ● / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m ▲	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED / WATER CONTENT, % W_P W W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger / Hollow Stem Auger (203 mm)	Ground Surface		434.63								Monument
		TOPSOIL		0.00 / 434.40	1	SS	229	14	●			Concrete
		(SM) SILTY SAND, trace gravel; brown; non-cohesive, moist		0.23 / 433.87								
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown to grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		0.76	2	SS	279	25	●			
					3	SS	279	16	○ ●			
2					4	SS	305	28	●			
3					5	SS	25	50 / 0.10	○			Bentonite
4					6	SS	254	50 / 0.15				
5												
6					7	SS	25	50 / 0.03	○			Filter Sand
7												50 mm dia. well screen
8				426.55	8	SS	203	50 / 0.15	○			
		End of Borehole		8.08								End of Augering
9												
10												

Notes:

1. Borehole dry upon completion of drilling.

2. Monitoring well installed as shown upon completion of drilling.

3. Auger refusal encountered at approximately 0.6 m depth. Borehole moved 2 m east.

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.7 ▽	434.0

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-44

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

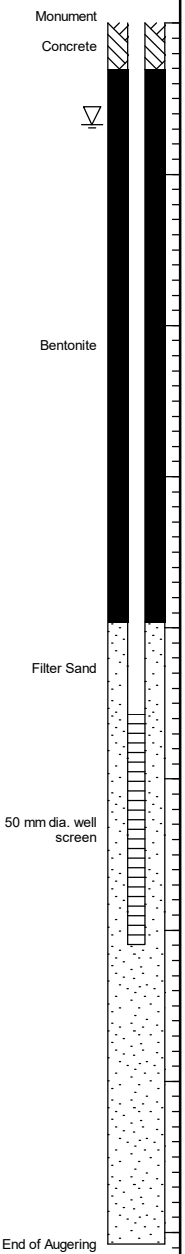
SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 20 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
		Ground Surface		434.50				
0	Power Auger / Hollow Stem Auger (203 mm)	TOPSOIL		0.00 / 434.32				
		(SM) SILTY SAND, trace gravel; brown; moist		0.18	1	SS	457	13
				433.74				
1		(CL-ML) sandy SILTY CLAY, trace to some sand, trace to some gravel; brown to grey (TILL); w<PL, very stiff to hard		0.76	2	SS	305	15
					3	SS	76	15
2								
		- auger grinding on probable cobbles/boulders between approximately 2.2 m and 2.4 m depths			4	SS	330	40
3								
					5	SS	51	45
4								
					6	SS	229	30
5								
6					7	SS	203	50 / 0.15
7								
					8	SS	305	90 / 0.15
8				426.42				
		End of Borehole		8.08				
9		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.						
10								

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.7 ▽	433.8

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-45

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 15 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		433.73						Monument
0		TOPSOIL		433.53 0.20	1	SS	203	5		Concrete
	Power Auger Hollow Stem Auger (203 mm)	(SM) SILTY SAND; dark brown; non-cohesive, moist		432.97 0.76						
1		(CL-ML) sandy SILTY CLAY, trace to some gravel; brown to grey (TILL); cohesive, w<PL, stiff to hard			2	SS	356	12		
					3	SS	305	10	MH	
2					4	SS	279	17		
3					5	SS	457	22		Bentonite
4					6	SS	457	61		
5										
6					7	SS	305	50 / 0.08		Filter Sand
7										50 mm dia. well screen
8				425.65	8	SS	229	50 / 0.10		End of Augering
		End of Borehole		8.08						
9		Notes: 1. Borehole dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.								
10										

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.6 ▽	433.2

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-46

CLIENT: Geranium
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Nov 16 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		433.75						Monument
0	Power Auger	TOPSOIL		0.00 / 433.55						Concrete
		(SM) SILTY SAND; brown; non-cohesive, moist		0.20	1	SS	254	7		
				432.99						
1		(CL-ML) sandy SILTY CLAY, trace gravel; brown to grey (TILL); cohesive, w<PL, stiff to hard		0.76	2	SS	76	14		Bentonite
					3	SS	279	11		
2										Filter Sand
					4	SS	76	50 / 0.15		
		- auger grinding on probable cobbles/boulders between approximately 2.8 m and 3.1 m depths								
3	Hollow Stem Auger (203 mm)				5	SS	152	80		50 mm dia. well screen
4										
					6	SS	457	86		
				428.72						End of Augering
5		End of Borehole		5.03						
		Notes:								
		1. Borehole dry upon completion of drilling.								
6		2. Monitoring well installed as shown upon completion of drilling.								
		3. Auger refusal encountered at approximately 2.4 m depth. Borehole moved 1 m north.								
7										
8										
9										
10										

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA
NATURAL
REMOULDED
WATER CONTENT, %
W_P W W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/01/03	0.2	433.6

GEMTEC
Consulting Engineers and Scientists

LOGGED: CC
CHECKED:

GEO - BOREHOLE LOG 101987.017_FERGUSNORTH_GEOTECH_R0_2023_12_11.GPJ GEMTEC 2018.GDT 3/21/24

RECORD OF BOREHOLE BH23-N1

CLIENT: FERGUS DEVELOPMENT INC.
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Local
BORING DATE: Dec 20 2023

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		396.97									Monument
0	Direct Push Dual Tube Lines (50mm)	TOPSOIL		0.00 0.20									Gravel
		(ML) SANDY SILT, trace gravel, trace clay; brown; non-cohesive, moist		396.21	1	DP	762		SA1: M&I, OCPs	HEX: 0 IBL: 0			
1		(SM) SILTY SAND, trace gravel, trace clay; brown; non-cohesive, moist		0.76 395.45	2	DP	356			HEX: 5 IBL: 0			Bentonite
		(CL) SILTY CLAY, trace sand, trace gravel; brown to grey; non-cohesive, moist		1.52	3	DP	533			HEX: 15 IBL: 0			
2					4	DP	0			HEX: 0 IBL: 0			
					5	DP	762		SA5: PHC, BTEX	HEX: 15 IBL: 0			Filter Sand
3		- wet at approximately 3.7 m depth			6	DP	533			HEX: 10 IBL: 0			
					7	DP	762			HEX: 15 IBL: 0			50mm dia. Well Screen
4					8	DP	254			HEX: 0 IBL: 0			
					9	DP				HEX: 0 IBL: 0			
5					10	DP				HEX: 0 IBL: 0			
				389.96									
6		End of Borehole		7.01									End of Augering
		Notes: 1. Groundwater measured at approximately 0.3 m depth in open borehole upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.											
7													

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Jan. 08/24	0.45 ▽	396.52

GEMTEC
Consulting Engineers and Scientists

LOGGED: CB
CHECKED: SE

RECORD OF BOREHOLE BH23-N2

CLIENT: FERGUS DEVELOPMENT INC.
PROJECT: Fergus Golf Course Redevelopment, Fergus, Ontario (North Parcel, Site 2)
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Local
BORING DATE: Dec 20 2023

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLE DATA: NUMBER	TYPE	RECOVERY (mm)	BLOWS/0.3m	LABORATORY ANALYSES	COMBUSTIBLE VAPOUR CONCENTRATION (ppm)	ODOUR	TPH (mg/kg)	MONITORING WELL INSTALLATION AND NOTES
		Ground Surface		396.41									Monument
0	Direct Push Dual Tube Lines (50mm)	TOPSOIL		0.00 0.20									Gravel
		(SM) SILTY SAND, trace gravel, trace clay; brown; non-cohesive, moist			1	DP	762			HEX: 5 IBL: 5			
1					2	DP	305			HEX: 25 IBL: 2			Bentonite
2					3	DP	762			HEX: 10 IBL: 1			
					4	DP	254			HEX: 15 IBL: 0			Filter Sand
3					5	DP	762			HEX: 5 IBL: 1			
		- wet at approximately 3.7 m depth		392.60									
		(ML) SANDY SILT, some gravel, trace clay; brown to grey; non-cohesive, moist		3.81	6	DP	762			HEX: 25 IBL: 1			
4				391.84									
		(ML) CLAYEY SILT, some sand, trace gravel; grey; non-cohesive, moist		4.57	7	DP	914						50mm dia. Well Screen
5					8	DP	610						
6				390.31									End of Augering
		End of Borehole Notes: 1. Borehole open and dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling.		6.10									

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEVATION (m)
Jan. 08/24	1.08 ▽	395.33

GEMTEC
Consulting Engineers and Scientists

LOGGED: CB
CHECKED: SE

ENV - BOREHOLE LOG 101987.017_GINT_ENVIRO_PHASETWOESA_R0_2024_02_02.GPJ GEMTEC 2018.GDT 3/13/24

RECORD OF BOREHOLE BH24-1

CLIENT: Fergus development Inc.
PROJECT: Fergus Golf Course Redevelopment, Fergus
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Unknown
BORING DATE: Jan 3 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0	Power Auger Hollow Stem Auger (200mm OD)	Ground Surface							
		TOPSOIL		0.15	1	SS	254	7	
		(ML) CLAYEY SILT, some sand; brown to grey, mottled; cohesive, w~PL, firm			2	SS	406	7	
		(ML) sandy CLAYEY SILT, some gravel; brown to grey (TILL), mottled; cohesive, w<PL to w>PL, stiff to hard		1.37	3	SS	457	13	
					4	SS	457	34	
					5	SS	457	38	MH
		(CL) SILTY CLAY, trace sand, trace gravel; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		4.04	6	SS	356	18	
					7	SS	406	22	
					8	SS	152	16	
		- soft to firm between approximately 9.1 m and 9.6 m depths			9A	SS	457	8	MH
					9B				
					10	SS	457	38	
		(ML) SILT, trace sand, trace clay; grey; non-cohesive, wet, dense		11.66	11	SS	203	46	
		(ML) CLAYEY SILT, trace sand, trace gravel; grey (TILL); cohesive, w<PL to w~PL, hard		13.18	12	SS	457	30	
					13	SS	457	44	
		End of Borehole		15.70					

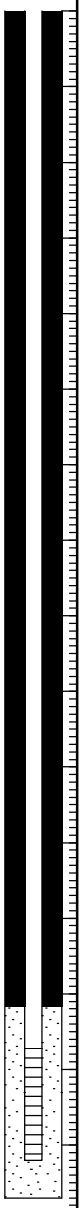
SAMPLES: ● PENETRATION RESISTANCE (N), BLOWS/0.3m; ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m

SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED

WATER CONTENT, %: W_P — W — W_L

10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



Notes:

1. Borehole was dry upon completion of drilling.

2. Monitoring well installed as shown upon completion of drilling.

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUS_2024_01_12.GPJ GEMTEC 2018.GDT 1/24/24

RECORD OF BOREHOLE BH24-2

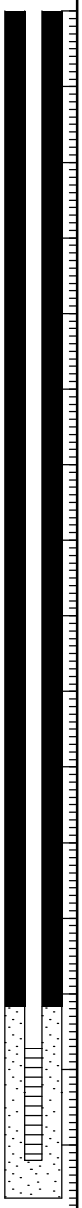
CLIENT: Fergus development Inc.
PROJECT: Fergus Golf Course Redevelopment, Fergus
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Unknown
BORING DATE: Jan 3 2024

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	ADDITIONAL LAB. TESTING
0	Power Auger Hollow Stem Auger (200mm OD)	Ground Surface							
		TOPSOIL		0.15	1	SS	406	15	
		(ML) CLAYEY SILT, some sand, trace gravel; brown; cohesive, w<PL to w~PL, stiff to very stiff			2	SS	406	12	
		(ML) CLAYEY SILT, some sand, trace gravel; brown (TILL); cohesive, w<PL, very stiff		1.37	3	SS	406	20	
		(CL) SILTY CLAY, trace sand, trace gravel; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard		2.13	4	SS	457	24	
					5	SS	406	18	
					6	SS	356	19	
					7	SS	406	21	MH
		- stiff between approximately 7.6 m and 8.1 m depths			8	SS	457	14	MH
					9	SS	254	31	
					10	SS	432	71	
					11	SS	457	46	
					12	SS	457	40	
					13	SS	51	67	
		End of Borehole		15.70					

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, % W_P W W_L
10 20 30 40 50 60 70 80 90

PIEZOMETER OR STANDPIPE INSTALLATION



Notes:

1. Borehole was dry upon completion of drilling.

2. Monitoring well installed as shown upon completion of drilling.

GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUS_2024_01_12.GPJ GEMTEC 2018.GDT 1/24/24

RECORD OF BOREHOLE BH24-3

CLIENT: Fergus development Inc.
PROJECT: Fergus Golf Course Redevelopment, Fergus
JOB#: 101987.017
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Unknown
BORING DATE: Jan 4 2024

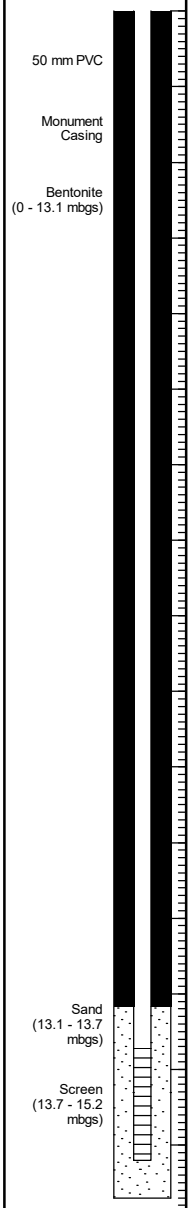
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m
0	Power Auger Hollow Stem Auger (200mm OD)	Ground Surface						
		TOPSOIL		0.20	1	SS	457	12
1		(ML) CLAYEY SILT, some sand, trace gravel; brown; cohesive, w~PL, firm to stiff			2	SS	254	7
				1.37				
2		(CL) SILTY CLAY, trace sand, trace gravel; grey (TILL); cohesive, w<PL to w~PL, very stiff to hard			3	SS	152	28
					4	SS	203	23
3					5	SS	305	28
4								
5					6	SS	51	30
6								
					7	SS	457	20
7								
8					8	SS	457	75
9								
					9	SS	254	100
10								
11					10	SS	457	32
12								
					11	SS	457	41
13								
14					12	SS	457	42
15								
					13	SS	457	45
16		End of Borehole		15.70				
17		Notes:						
		1. Borehole was dry upon completion of drilling.						
18		2. Monitoring well installed as shown upon completion of drilling.						
19								
20								

SAMPLES

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA
NATURAL REMOULDED
WATER CONTENT, %
W_P W W_L
10 20 30 40 50 60 70 80 90

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION



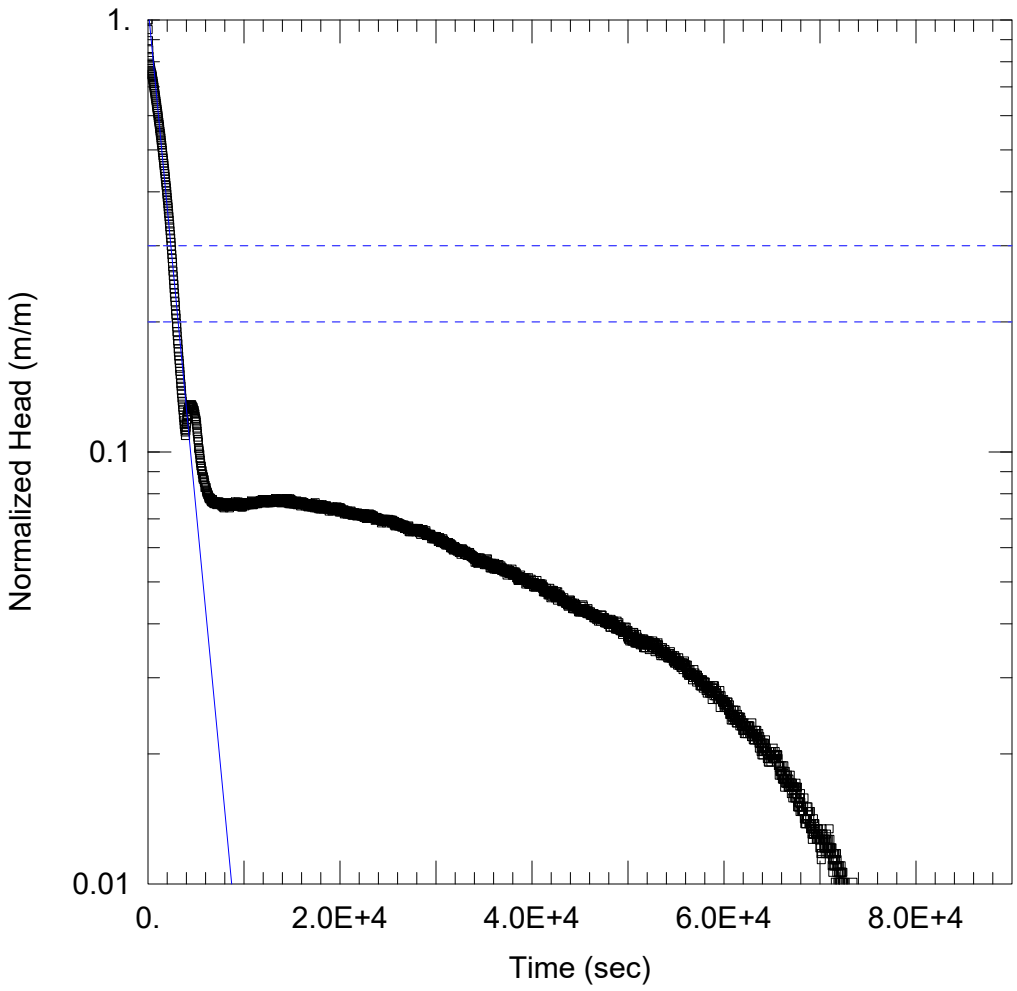
GEMTEC
Consulting Engineers and Scientists

LOGGED: RH
CHECKED: MWK

GEO - BOREHOLE LOG 101987.017_FERGUS_2024_01_12.GPJ GEMTEC 2018.GDT 1/24/24

APPENDIX G

Hydraulic Response Testing



BH23-02 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-02.aqt
Date: 01/31/24 Time: 09:18:06

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-02
Test Date: December 18, 2023

AQUIFER DATA

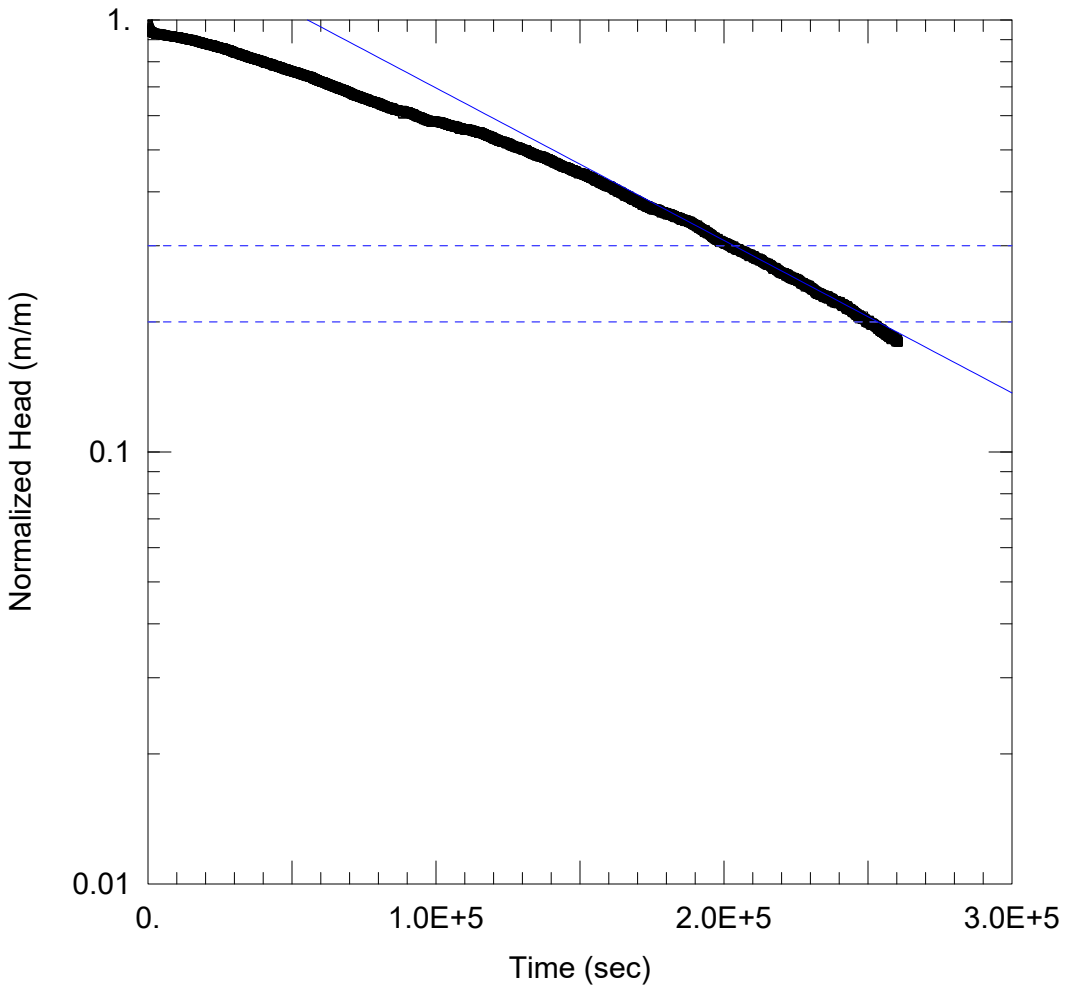
Saturated Thickness: 3.76 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-02)

Initial Displacement: 3.156 m
Total Well Penetration Depth: 3.756 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.76 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.155E-7 m/sec
y0 = 3.402 m



BH23-09 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-09.aqt
Date: 01/31/24 Time: 09:25:14

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-09
Test Date: December 18, 2023

AQUIFER DATA

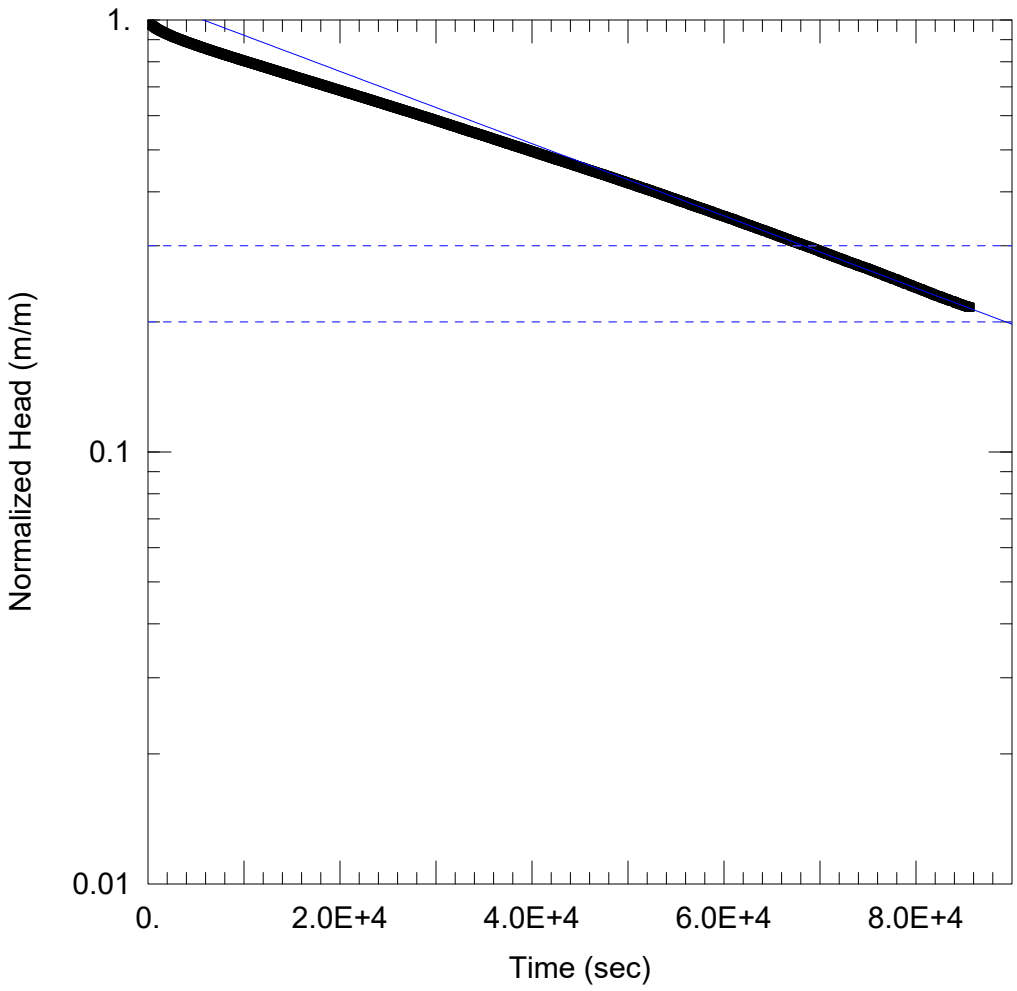
Saturated Thickness: 2.58 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-09)

Initial Displacement: 1.694 m
Total Well Penetration Depth: 2.572 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.58 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.74E-9 m/sec
y0 = 2.657 m



BH23-20D RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-20D.aqt
Date: 01/31/24 Time: 09:27:23

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-20D
Test Date: December 18, 2023

AQUIFER DATA

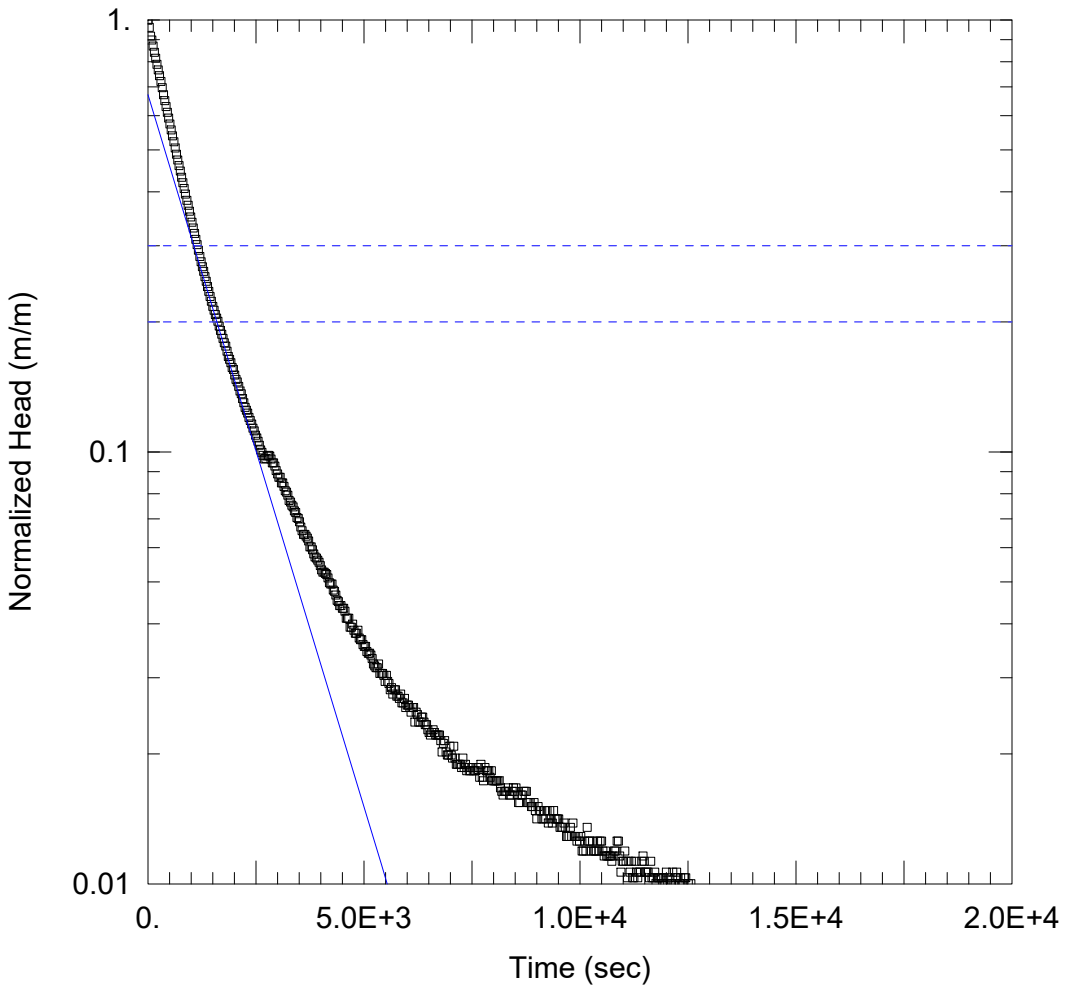
Saturated Thickness: 8.12 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-20D)

Initial Displacement: 7.683 m
Total Well Penetration Depth: 8.113 m
Casing Radius: 0.0254 m
Static Water Column Height: 8.12 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.653E-8 m/sec
y0 = 8.581 m



BH23-20S RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-20S.aqt
Date: 01/31/24 Time: 09:29:51

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-20S
Test Date: December 18, 2023

AQUIFER DATA

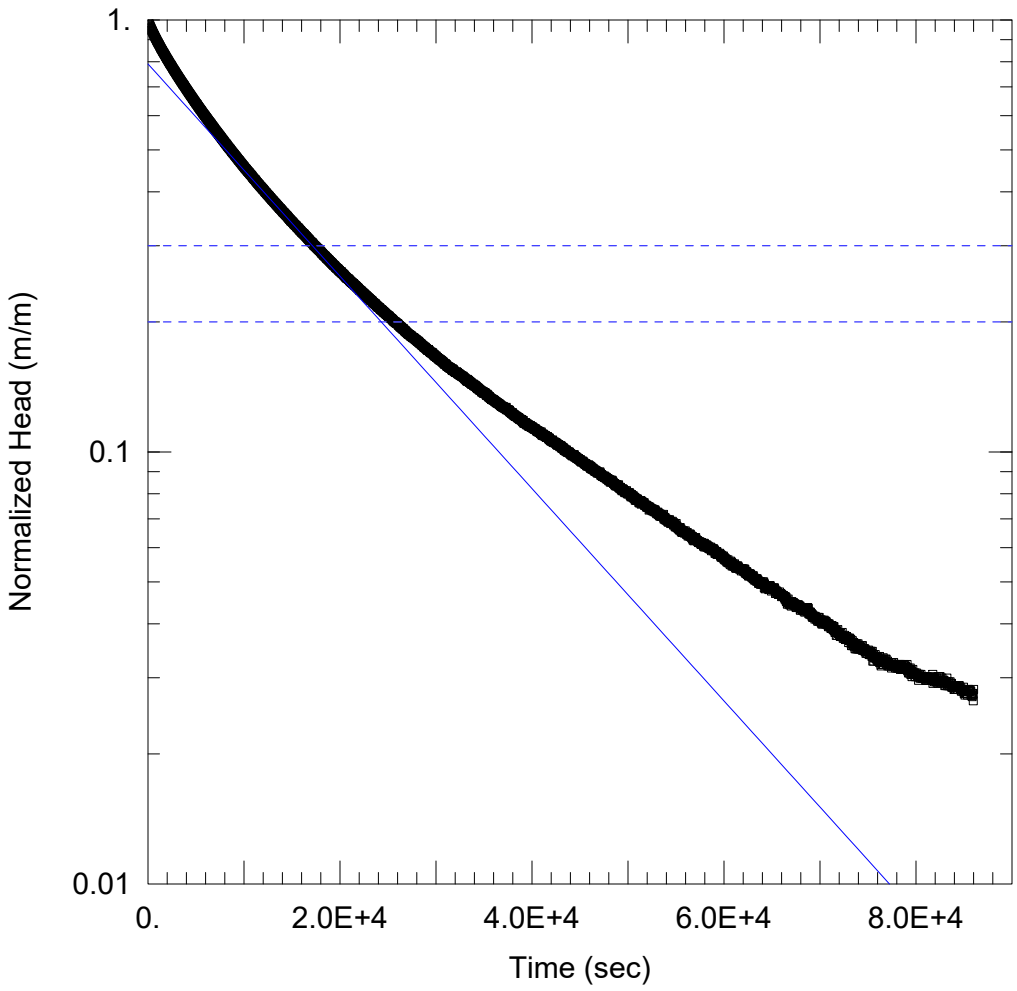
Saturated Thickness: 4.07 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-20S)

Initial Displacement: 2.88 m
Total Well Penetration Depth: 4.071 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.07 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.733E-7 m/sec
y0 = 1.932 m



BH23-27 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-27 - Copy.aqt
Date: 01/19/24 Time: 14:08:08

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-27
Test Date: December 18, 2023

AQUIFER DATA

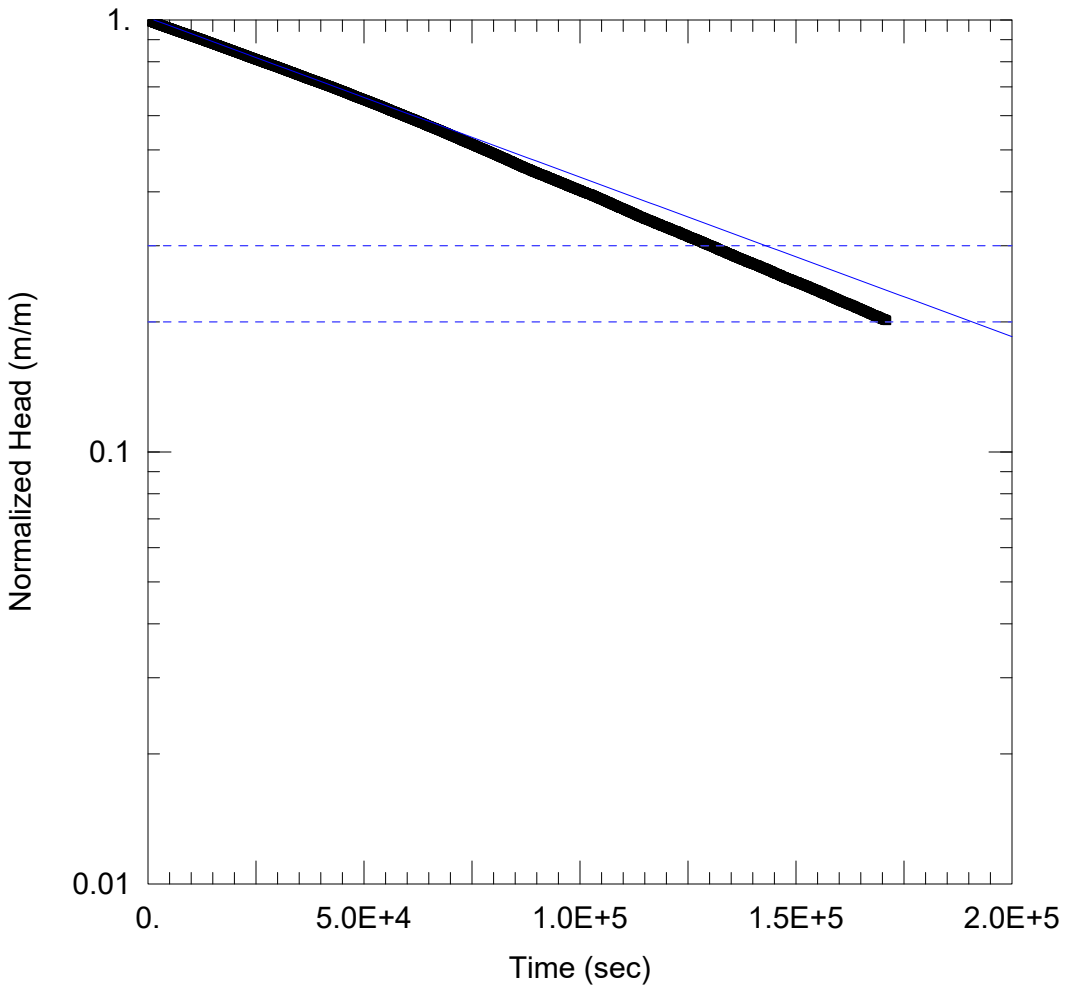
Saturated Thickness: 6.3 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-27)

Initial Displacement: 4.949 m
Total Well Penetration Depth: 6.291 m
Casing Radius: 0.0254 m
Static Water Column Height: 6.3 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.646E-8 m/sec
y0 = 3.914 m



BH23-29 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-29 - Copy.aqt
Date: 01/19/24 Time: 14:11:43

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-29
Test Date: December 19, 2023

AQUIFER DATA

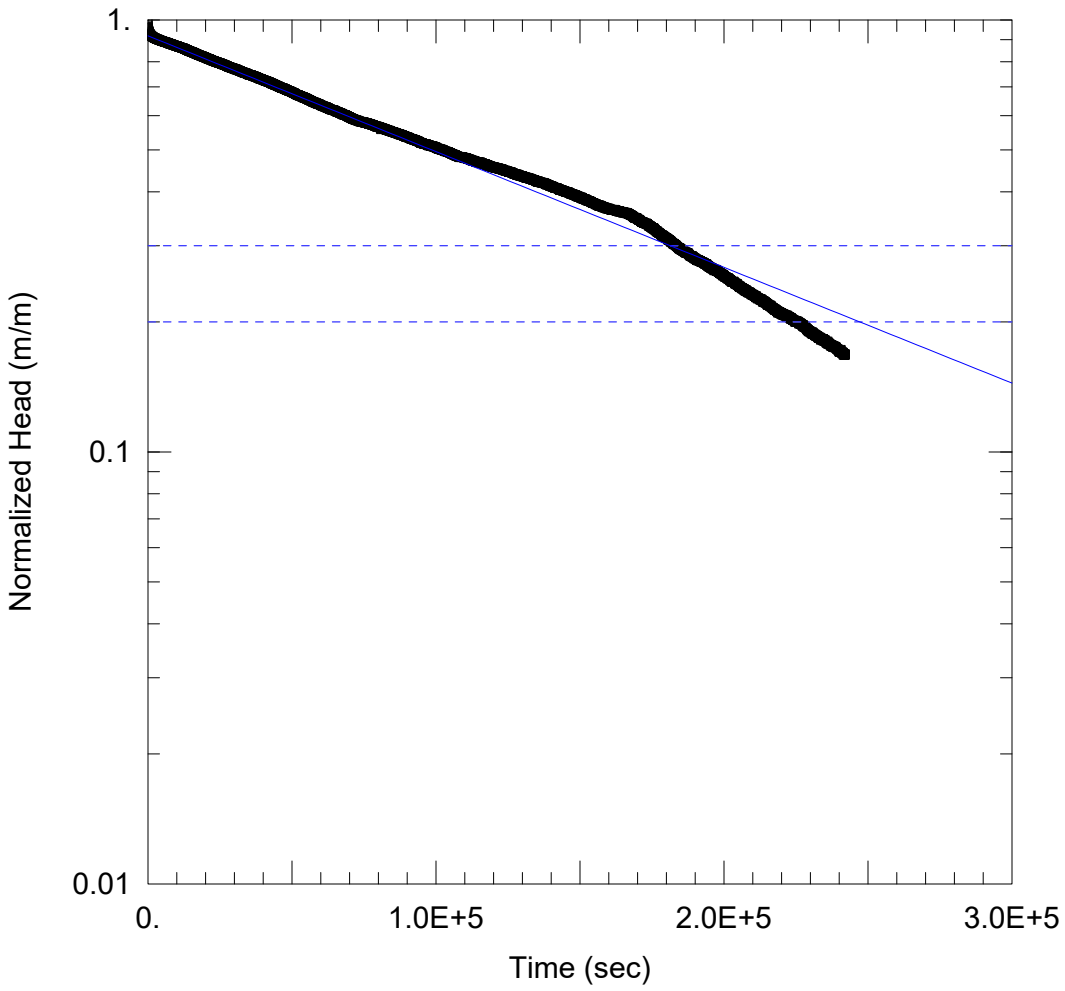
Saturated Thickness: 8.76 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-29)

Initial Displacement: 5.682 m
Total Well Penetration Depth: 8.76 m
Casing Radius: 0.0254 m
Static Water Column Height: 8.76 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.215E-9 m/sec
y0 = 5.75 m



BH23-33 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-33 - Copy.aqt
Date: 01/19/24 Time: 14:18:09

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-33
Test Date: December 18, 2023

AQUIFER DATA

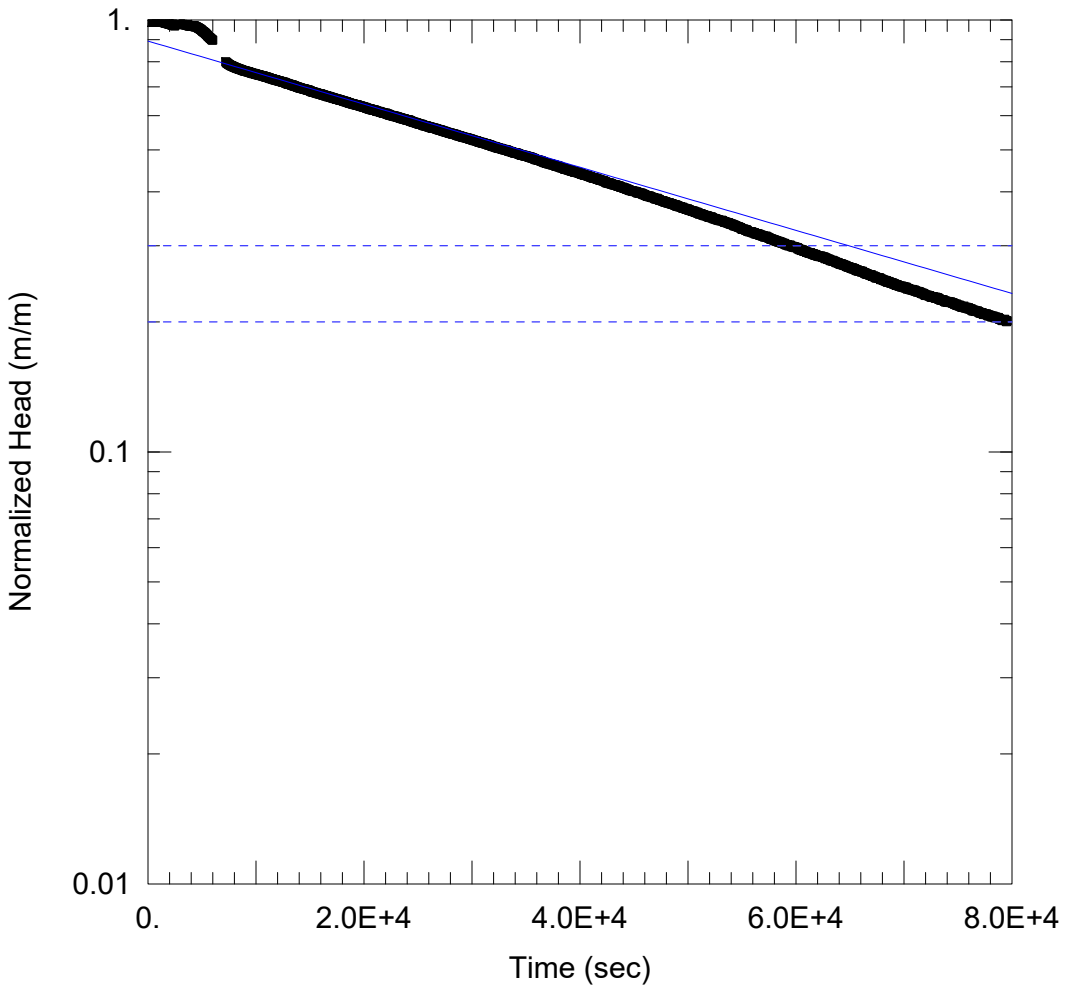
Saturated Thickness: 2.51 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-33)

Initial Displacement: 2.197 m
Total Well Penetration Depth: 2.5 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.51 m
Screen Length: 1.52 m
Well Radius: 0.1016 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.369E-8 m/sec
y0 = 2.018 m



BH23-36 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-36_V2 - Copy.aqt
Date: 01/19/24 Time: 14:27:59

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-36
Test Date: December 18, 2023

AQUIFER DATA

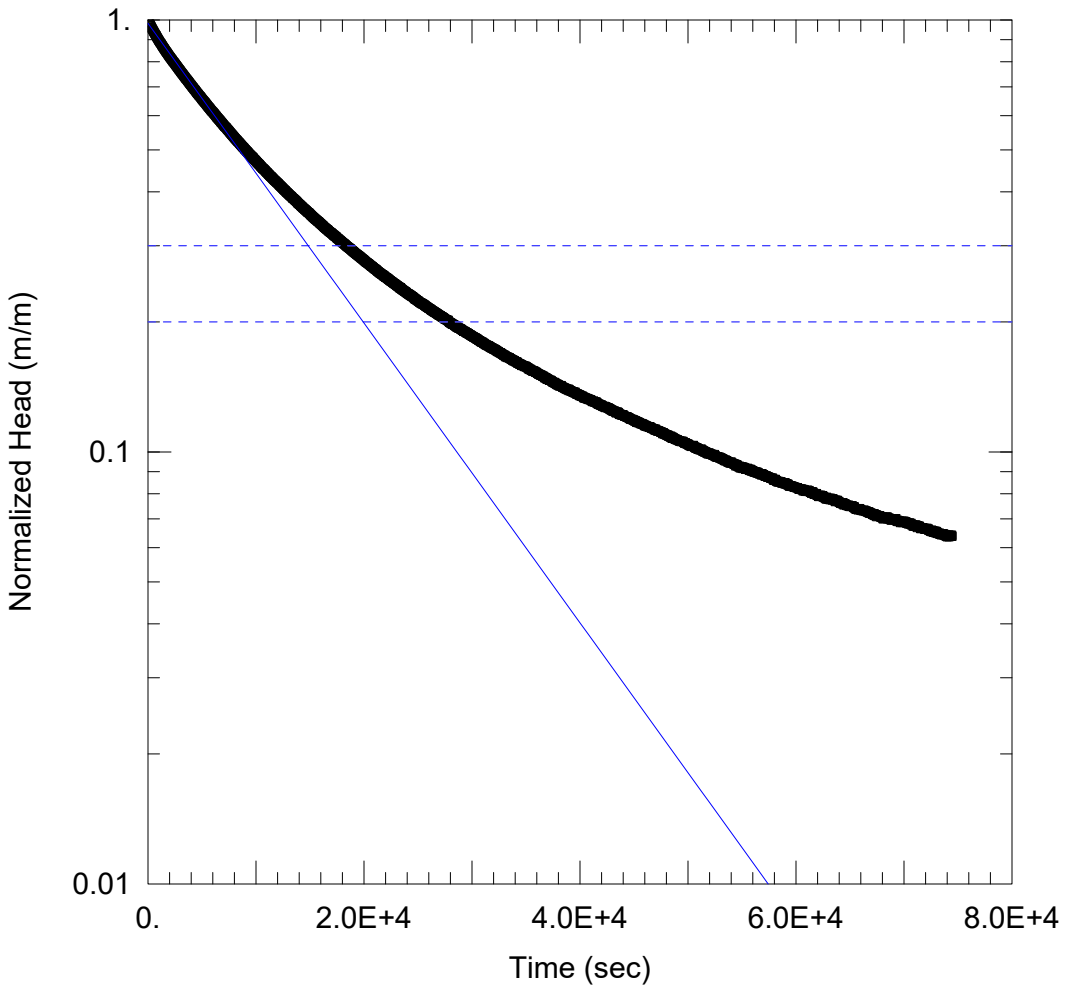
Saturated Thickness: 3.55 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-36)

Initial Displacement: 2.885 m
Total Well Penetration Depth: 3.55 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.35 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.241E-8 m/sec
y0 = 2.577 m



BH23-41 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-41 - Copy.aqt
Date: 01/19/24 Time: 14:29:43

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-41
Test Date: December 18, 2023

AQUIFER DATA

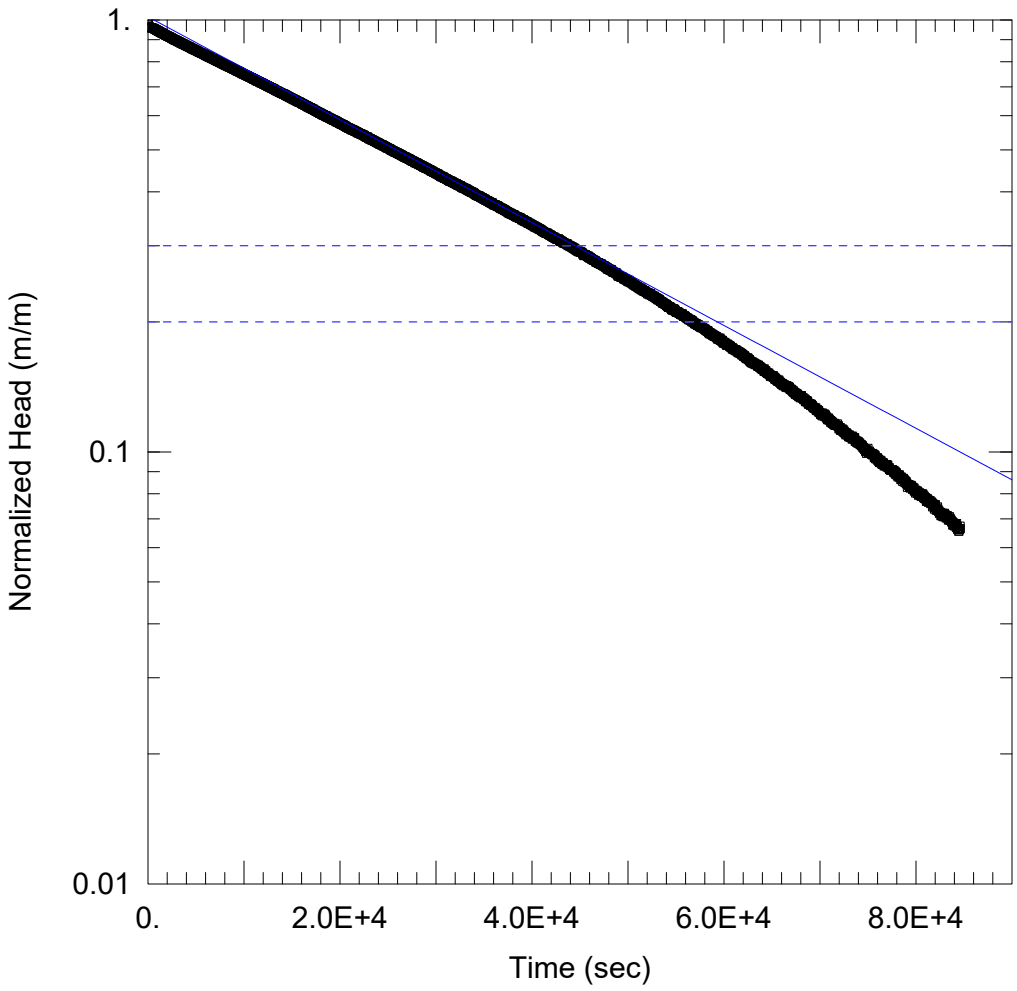
Saturated Thickness: 7.38 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-41)

Initial Displacement: 5.605 m
Total Well Penetration Depth: 7.376 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.38 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.938E-8 m/sec
y0 = 5.503 m



BH23-46 RISING HEAD TEST

Data Set: N:\Projects\101900\101987.017\Technical Work\HydroG\Analysis\BH23-46 - Copy.aqt
Date: 01/19/24 Time: 14:42:56

PROJECT INFORMATION

Company: GEMTEC
Client: Geranium
Project: 101987.017
Location: Fergus, ON
Test Well: BH23-46
Test Date: December 18, 2023

AQUIFER DATA

Saturated Thickness: 4.28 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH23-46)

Initial Displacement: 3.207 m
Total Well Penetration Depth: 4.281 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.28 m
Screen Length: 1.52 m
Well Radius: 0.1016 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.088E-8 m/sec
y0 = 3.26 m

APPENDIX H

Water Quality Results
Table H.1 Summary of Groundwater Quality Analytical Results
8243 and 8282 Wellington Road 19, Fergus, Ontario
Certificate of Analysis C3BP885

Table H.1: Summary of Water Quality Analytical Results
8243 and 8282 Wellington Road 19, Fergus, Ontario

Sample Location					Fergus	Fergus
Sample Date					19-Dec-23	21-Dec-23
Sample ID					MW23-20S	MW23-33
Sampling Company					GEMTEC	GEMTEC
Laboratory					BV	BV
Laboratory Work Order					C3BM625	C3BP885
Laboratory Sample ID		Schedule A	Schedule B		XYB080	XYS806
Sample Matrix	Units	Sanitary	Storm	PWQO	Groundwater	Groundwater
General Chemistry						
Biochemical Oxygen Demand	mg/L	300	15	n/v	<2	<2
Chemical Oxygen Demand	mg/L	600	n/v	n/v	82	34
Chloride	mg/L	1,500	n/v	n/v	48	11
Chlorine	mg/L	n/v	4	0.002	*<0.1*	*<0.1*
Cyanide	mg/L	1.2	n/v	0.005	<0.005	<0.005
Fluoride	mg/L	10	n/v	n/v	<0.1	0.14
pH, lab	pH	6.0-8.5	6.5-8.5	6.5-8.5	7.64	7.81
Phenols-4AAP	mg/L	0.1	n/v	0.001	<0.001	<0.001
Phosphorus	mg/L	10	n/v	0.03	*<0.1*	*<0.1*
Sulphate, Dissolved	mg/L	1,500	n/v	n/v	84	35
Sulphide	mg/L	1	n/v	n/v	<0.02	<0.02
Total Animal/Vegetable Oil and Grease, Calculated[1]	mg/L	150	n/v	n/v	<0.5	<0.5
Total Kjeldahl Nitrogen	mg/L	50	n/v	n/v	1.3	0.19
Total Suspended Solids	mg/L	350	15	n/v	32	<10
Petroleum Hydrocarbons						
Total Oil & Grease, Mineral/Synthetic[1]	mg/L	15	n/v	n/v	<0.5	<0.5
Total Oil & Grease[1]	mg/L	n/v	n/v	n/v	<0.5	<0.5
Total Metals						
Aluminum	mg/L	50	n/v	0.075	0.3	0.04
Antimony	mg/L	5	n/v	0.02	<0.0005	0.00075
Arsenic	mg/L	1	n/v	0.1	0.0016	<0.001
Bismuth	mg/L	5	n/v	n/v	<0.001	<0.001
Cadmium	mg/L	0.7	0.001	0.0002	<0.00009	<0.00009
Chromium	mg/L	3	0.08	0.0099	<0.005	<0.005
Cobalt	mg/L	5	n/v	0.0009	0.0034	0.00084
Copper	mg/L	2	0.005	0.005	0.0044	0.0013
Iron	mg/L	50	n/v	0.3	0.5	<0.1
Lead	mg/L	0.7	0.03	0.025	0.00056	<0.0005
Manganese	mg/L	5	n/v	n/v	0.53	0.0095
Mercury	mg/L	0.1	n/v	0.0002	<0.0001	<0.0001
Molybdenum	mg/L	5	n/v	0.04	0.0025	0.0047
Nickel	mg/L	2	0.03	0.025	0.0049	0.0025
Selenium	mg/L	2	n/v	0.1	<0.002	<0.002
Silver	mg/L	1	n/v	0.0001	<0.00009	<0.00009
Tin	mg/L	5	n/v	n/v	<0.001	<0.001
Titanium	mg/L	5	n/v	n/v	0.014	<0.005
Vanadium	mg/L	5	n/v	0.006	0.0017	0.00097
Zinc	mg/L	2	0.03	0.03	0.0062	0.011
Polychlorinated Biphenyls						
Polychlorinated Biphenyls (PCBs)	mg/L	0.004	n/v	0.000001	*<0.00005*	*<0.00005*
Pesticides & Herbicides						
Hexachlorobenzene	mg/L	0.0001	n/v	0.0000065	<0.000005	<0.000005
Calculated Parameters						
Aldrin + Dieldrin	mg/L	n/v	n/v	0.000001	*<0.000005*	*<0.000005*
Chlordane (Total)	mg/L	n/v	n/v	0.00006	<0.000005	<0.000005
DDT + Metabolites	mg/L	n/v	n/v	0.000003	*<0.000005*	*<0.000005*
Heptachlor + Heptachlor epoxide	mg/L	n/v	n/v	0.000001	*<0.000005*	*<0.000005*
p,p-DDD + p,p-DDD	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
p,p-DDE + p,p-DDE	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
p,p-DDT + p,p-DDT	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
Total Endosulfan	mg/L	n/v	n/v	0.000003	*<0.000005*	*<0.000005*

Table H.1: Summary of Water Quality Analytical Results
8243 and 8282 Wellington Road 19, Fergus, Ontario

Sample Location					Fergus	Fergus
Sample Date					19-Dec-23	21-Dec-23
Sample ID					MW23-20S	MW23-33
Sampling Company					GEMTEC	GEMTEC
Laboratory					BV	BV
Laboratory Work Order					C3BM625	C3BP885
Laboratory Sample ID		Schedule A	Schedule B		XYB080	XYS806
Sample Matrix	Units	Sanitary	Storm	PWQO	Groundwater	Groundwater
Volatile Organic Compounds						
Benzene	mg/L	0.01	n/v	0.1	<0.0002	<0.0002
Chloroform	mg/L	0.04	n/v	n/v	<0.0002	<0.0002
Dichlorobenzene, 1,2-	mg/L	0.05	n/v	0.0025	<0.0004	<0.0004
Dichlorobenzene, 1,4-	mg/L	0.08	n/v	0.004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.06	n/v	0.008	<0.0002	<0.0002
Methylene Chloride (Dichloromethane)	mg/L	0.09	n/v	0.1	<0.002	<0.002
Tetrachloroethane, 1,1,2,2-	mg/L	0.06	n/v	0.07	<0.0004	<0.0004
Tetrachloroethylene (PCE)	mg/L	0.06	n/v	0.05	<0.0002	<0.0002
Toluene	mg/L	0.02	n/v	0.0008	<0.0002	<0.0002
Trichloroethylene (TCE)	mg/L	0.05	n/v	0.02	<0.0002	<0.0002
Xylene, p+m-	mg/L	n/v	n/v	0.032	<0.0002	<0.0002
Xylene, o-	mg/L	n/v	n/v	0.040	<0.0002	<0.0002
Total Xylenes	mg/L	0.3	n/v	0.072	<0.0002	<0.0002

Notes:

Schedule A Sanitary	Township of Centre Wellington By-Law 2022-66; Schedule A - Restricted Wastes - Sanitary Sewer
Schedule B Storm	Township of Centre Wellington By-Law 2022-66; Schedule B - Restricted Wastes - Storm Sewer
PWQO	Provincial Water Quality Objectives, *Table 2 - Table of PWQOs and Interim PWQOs*
6.5	Bold font = concentration greater than Schedule A Sanitary Sewer Discharge Limit.
6.5	Underlined font = concentration greater than Schedule B Storm Sewer Discharge Limit.
6.5	Shaded cell = concentration greater than Table 2 - Table of PWQOs and Interim PWQOs Objective.
<0.50	Italicized font = reportable detection limit was greater than one or more applicable criteria.
<	Concentration less than the accompanying reportable detection limit.
n/v	No value.
[1]Oil and Grease	No concentraion in the PWQO. Objective is visual, olfactory and qualitative.
-	Parameter not analyzed.

Table H.1: Summary of Water Quality Analytical Results
8243 and 8282 Wellington Road 19, Fergus, Ontario

Sample Location					Fergus	Fergus
Sample Date					19-Dec-23	19-Dec-23
Sample ID					MW23-41	SW
Sampling Company					GEMTEC	GEMTEC
Laboratory					BV	BV
Laboratory Work Order					C3BM625	C3BM625
Laboratory Sample ID		Schedule A	Schedule B		XYB081	XYB082
Sample Matrix	Units	Sanitary	Storm	PWQO	Groundwater	Surface Water
General Chemistry						
Biochemical Oxygen Demand	mg/L	300	15	n/v	<2	<2
Chemical Oxygen Demand	mg/L	600	n/v	n/v	14	26
Chloride	mg/L	1,500	n/v	n/v	32	130
Chlorine	mg/L	n/v	4	0.002	*<0.1*	*<0.1*
Cyanide	mg/L	1.2	n/v	0.005	<0.005	<0.005
Fluoride	mg/L	10	n/v	n/v	0.42	<0.1
pH, lab	pH	6.0-8.5	6.5-8.5	6.5-8.5	8.20	7.87
Phenols-4AAP	mg/L	0.1	n/v	0.001	<0.001	<0.001
Phosphorus	mg/L	10	n/v	0.03	*<0.1*	*<0.1*
Sulphate, Dissolved	mg/L	1,500	n/v	n/v	16	24
Sulphide	mg/L	1	n/v	n/v	<0.02	<0.02
Total Animal/Vegetable Oil and Grease, Calculated[1]	mg/L	150	n/v	n/v	0.9	<0.5
Total Kjeldahl Nitrogen	mg/L	50	n/v	n/v	0.31	0.43
Total Suspended Solids	mg/L	350	15	n/v	20	<10
Petroleum Hydrocarbons						
Total Oil & Grease, Mineral/Synthetic[1]	mg/L	15	n/v	n/v	<0.5	<0.5
Total Oil & Grease[1]	mg/L	n/v	n/v	n/v	0.9	<0.5
Total Metals						
Aluminum	mg/L	50	n/v	0.075	0.19	0.019
Antimony	mg/L	5	n/v	0.02	<0.0005	<0.0005
Arsenic	mg/L	1	n/v	0.1	0.0027	<0.001
Bismuth	mg/L	5	n/v	n/v	<0.001	<0.001
Cadmium	mg/L	0.7	0.001	0.0002	<0.00009	<0.00009
Chromium	mg/L	3	0.08	0.0099	<0.005	<0.005
Cobalt	mg/L	5	n/v	0.0009	<0.0005	<0.0005
Copper	mg/L	2	0.005	0.005	<0.0009	0.0035
Iron	mg/L	50	n/v	0.3	0.36	0.15
Lead	mg/L	0.7	0.03	0.025	<0.0005	<0.0005
Manganese	mg/L	5	n/v	n/v	0.019	0.039
Mercury	mg/L	0.1	n/v	0.0002	<0.0001	<0.0001
Molybdenum	mg/L	5	n/v	0.04	0.022	<0.0005
Nickel	mg/L	2	0.03	0.025	<0.001	0.001
Selenium	mg/L	2	n/v	0.1	<0.002	<0.002
Silver	mg/L	1	n/v	0.0001	<0.00009	<0.00009
Tin	mg/L	5	n/v	n/v	<0.001	<0.001
Titanium	mg/L	5	n/v	n/v	0.011	<0.005
Vanadium	mg/L	5	n/v	0.006	0.00064	<0.0005
Zinc	mg/L	2	0.03	0.03	<0.005	<0.005
Polychlorinated Biphenyls						
Polychlorinated Biphenyls (PCBs)	mg/L	0.004	n/v	0.000001	*<0.00005*	*<0.00005*
Pesticides & Herbicides						
Hexachlorobenzene	mg/L	0.0001	n/v	0.0000065	<0.000005	<0.000005
Calculated Parameters						
Aldrin + Dieldrin	mg/L	n/v	n/v	0.000001	*<0.000005*	*<0.000005*
Chlordane (Total)	mg/L	n/v	n/v	0.00006	<0.000005	<0.000005
DDT + Metabolites	mg/L	n/v	n/v	0.000003	*<0.000005*	*<0.000005*
Heptachlor + Heptachlor epoxide	mg/L	n/v	n/v	0.000001	*<0.000005*	*<0.000005*
p,p-DDD + p,p-DDD	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
p,p-DDE + p,p-DDE	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
p,p-DDT + p,p-DDT	mg/L	n/v	n/v	n/v	<0.000005	<0.000005
Total Endosulfan	mg/L	n/v	n/v	0.000003	*<0.000005*	*<0.000005*

Table H.1: Summary of Water Quality Analytical Results
8243 and 8282 Wellington Road 19, Fergus, Ontario

Sample Location					Fergus	Fergus
Sample Date					19-Dec-23	19-Dec-23
Sample ID					MW23-41	SW
Sampling Company					GEMTEC	GEMTEC
Laboratory					BV	BV
Laboratory Work Order					C3BM625	C3BM625
Laboratory Sample ID		Schedule A	Schedule B		XYB081	XYB082
Sample Matrix	Units	Sanitary	Storm	PWQO	Groundwater	Surface Water
Volatile Organic Compounds						
Benzene	mg/L	0.01	n/v	0.1	0.00029	<0.0002
Chloroform	mg/L	0.04	n/v	n/v	<0.0002	<0.0002
Dichlorobenzene, 1,2-	mg/L	0.05	n/v	0.0025	<0.0004	<0.0004
Dichlorobenzene, 1,4-	mg/L	0.08	n/v	0.004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.06	n/v	0.008	<0.0002	<0.0002
Methylene Chloride (Dichloromethane)	mg/L	0.09	n/v	0.1	<0.002	<0.002
Tetrachloroethane, 1,1,2,2-	mg/L	0.06	n/v	0.07	<0.0004	<0.0004
Tetrachloroethylene (PCE)	mg/L	0.06	n/v	0.05	<0.0002	<0.0002
Toluene	mg/L	0.02	n/v	0.0008	0.00036	<0.0002
Trichloroethylene (TCE)	mg/L	0.05	n/v	0.02	<0.0002	<0.0002
Xylene, p+m-	mg/L	n/v	n/v	0.032	<0.0002	<0.0002
Xylene, o-	mg/L	n/v	n/v	0.040	<0.0002	<0.0002
Total Xylenes	mg/L	0.3	n/v	0.072	<0.0002	<0.0002

Notes:

Schedule A Sanitary	Township of Centre Wellington By-Law 2022-66; Schedule A - Restricted Wastes - Sanitary Sewer
Schedule B Storm	Township of Centre Wellington By-Law 2022-66; Schedule B - Restricted Wastes - Storm Sewer
PWQO	Provincial Water Quality Objectives, *Table 2 - Table of PWQOs and Interim PWQOs*
6.5	Bold font = concentration greater than Schedule A Sanitary Sewer Discharge Limit.
6.5	Underlined font = concentration greater than Schedule B Storm Sewer Discharge Limit.
6.5	Shaded cell = concentration greater than Table 2 - Table of PWQOs and Interim PWQOs Objective.
<0.50	Italicized font = reportable detection limit was greater than one or more applicable criteria.
<	Concentration less than the accompanying reportable detection limit.
n/v	No value.
[1]Oil and Grease	No concentraion in the PWQO. Objective is visual, olfactory and qualitative.
-	Parameter not analyzed.

Your Project #: 101987.017
Your C.O.C. #: 966628-01-01

Attention: Jacqueline Brook

GEMTEC LIMITED
6695 Millcreek Drive
Unit 7
Mississauga, ON
Canada L5N 5M4

Report Date: 2024/01/17
Report #: R7992373
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3BM625
Received: 2023/12/19, 16:42

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	3	2023/12/23	2023/12/28	CAM SOP-00427	SM 24 5210B m
Total Residual Chlorine	2	2023/12/21	2023/12/21	CAM SOP 00425	SM 24 4500-CL G m
Total Residual Chlorine	1	2023/12/22	2023/12/22	CAM SOP 00425	SM 24 4500-CL G m
Chloride by Automated Colourimetry	2	N/A	2023/12/21	CAM SOP-00463	SM 24 4500-Cl E m
Chloride by Automated Colourimetry	1	N/A	2023/12/27	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	2	N/A	2023/12/21	CAM SOP-00416	SM 24 5220 D m
Chemical Oxygen Demand	1	N/A	2023/12/22	CAM SOP-00416	SM 24 5220 D m
Total Cyanide	2	2023/12/21	2023/12/21	CAM SOP-00457	OMOE E3015 5 m
Total Cyanide	1	2023/12/22	2023/12/22	CAM SOP-00457	OMOE E3015 5 m
Fluoride	2	2023/12/20	2023/12/21	CAM SOP-00449	SM 24 4500-F C m
Fluoride	1	2023/12/22	2023/12/23	CAM SOP-00449	SM 24 4500-F C m
Sulphide as H2S	2	N/A	2023/12/21		
Sulphide as H2S	1	N/A	2023/12/22		
Dissolved Mercury in Water by CVAA	1	2023/12/29	2024/01/02	CAM SOP-00453	EPA 7470A m
Mercury in Water by CVAA	2	2023/12/28	2023/12/28	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	3	2023/12/28	2023/12/29	CAM SOP-00447	EPA 6020B m
Animal and Vegetable Oil and Grease	3	N/A	2023/12/31	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	3	2023/12/31	2023/12/31	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (1)	3	2023/12/28	2023/12/29	CAM SOP-00307	EPA 8081B/ 8082A
OC Pesticides Summed Parameters	2	N/A	2023/12/21	CAM SOP-00307	EPA 8081B/ 8082A
OC Pesticides Summed Parameters	1	N/A	2023/12/22	CAM SOP-00307	EPA 8081B/ 8082A
Phenols (4AAP)	3	N/A	2023/12/27	CAM SOP-00444	OMOE E3179 m
pH	2	2023/12/20	2023/12/21	CAM SOP-00413	SM 24th-4500H+ B
pH	1	2023/12/22	2023/12/23	CAM SOP-00413	SM 24th-4500H+ B
Sulphate by Automated Turbidimetry	2	N/A	2023/12/21	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	1	N/A	2023/12/27	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphide	2	N/A	2023/12/21	CAM SOP-00455	SM 24 4500-S G m
Sulphide	1	N/A	2023/12/22	CAM SOP-00455	SM 24 4500-S G m
Total Kjeldahl Nitrogen in Water	3	2023/12/22	2023/12/27	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (2)	3	2023/12/31	2023/12/31	CAM SOP-00326	EPA1664B m,SM5520F m

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 101987.017
Your C.O.C. #: 966628-01-01

Attention: Jacqueline Brook

GEMTEC LIMITED
6695 Millcreek Drive
Unit 7
Mississauga, ON
Canada L5N 5M4

Report Date: 2024/01/17
Report #: R7992373
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3BM625
Received: 2023/12/19, 16:42

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Suspended Solids	2	2023/12/21	2023/12/23	CAM SOP-00428	SM 24 2540D m
Total Suspended Solids	1	2023/12/22	2023/12/23	CAM SOP-00428	SM 24 2540D m
Volatile Organic Compounds in Water	1	N/A	2023/12/21	CAM SOP-00228	EPA 8260D
Volatile Organic Compounds in Water	1	N/A	2023/12/22	CAM SOP-00228	EPA 8260D
Volatile Organic Compounds in Water	1	N/A	2023/12/27	CAM SOP-00228	EPA 8260D

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Your Project #: 101987.017
Your C.O.C. #: 966628-01-01

Attention: Jacqueline Brook

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Report Date: 2024/01/17
Report #: R7992373
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3BM625
Received: 2023/12/19, 16:42

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

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

Bureau Veritas Job #: C3BM625
Report Date: 2024/01/17

GEMTEC LIMITED
Client Project #: 101987.017
Sampler Initials: CC

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID				XYB080	XYB081		XYB082			
Sampling Date				2023/12/19 10:30	2023/12/19 13:00		2023/12/19 11:30			
COC Number				966628-01-01	966628-01-01		966628-01-01			
	UNITS	Criteria	Criteria-2	MW23-20S	MW23-41	QC Batch	SW	RDL	MDL	QC Batch
Calculated Parameters										
Total Animal/Vegetable Oil and Grease	mg/L	-	150	<0.50	0.90	9122732	<0.50	0.50	0.10	9128649
Sulphide (as H2S)	mg/L	-	1	<0.021	<0.021	9124463	<0.021	0.021	0.011	9128923
Inorganics										
Total BOD	mg/L	15	300	<2	4	9130593	<2	2	0.5	9130593
Total Chemical Oxygen Demand (COD)	mg/L	-	600	82	14	9126537	26	4.0	3.0	9129461
Total Chlorine	mg/L	-	-	<0.1	<0.1	9127004	<0.1	0.1	0.02	9130345
Fluoride (F-)	mg/L	-	10	<0.10	0.42	9122520	<0.10	0.10	0.014	9130416
Total Kjeldahl Nitrogen (TKN)	mg/L	-	50	1.3	0.31	9128770	0.43	0.10	0.060	9129667
pH	pH	6.5:8.5	6.0:8.5	7.64	8.20	9122522	7.87			9130415
Phenols-4AAP	mg/L	-	0.1	<0.0010	<0.0010	9132960	<0.0010	0.0010	0.00040	9132960
Total Suspended Solids	mg/L	15	350	32	20	9126529	<10	10	9.6	9129333
Dissolved Sulphate (SO4)	mg/L	-	1500	84	16	9125214	24	1.0	0.49	9130224
Sulphide	mg/L	-	-	<0.020	<0.020	9126351	<0.020	0.020	0.010	9128381
Total Cyanide (CN)	mg/L	-	1.2	<0.0050	<0.0050	9125477	<0.0050	0.0050	0.00028	9128773
Dissolved Chloride (Cl-)	mg/L	-	1500	48	32	9125210	130	1.0	0.66	9130223
Petroleum Hydrocarbons										
Total Oil & Grease	mg/L	-	-	<0.50	0.90	9138296	<0.50	0.50	0.10	9138296
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<0.50	<0.50	9138297	<0.50	0.50	0.10	9138297

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Storm Sewer By-law 2022-66
Criteria-2: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				XYB080	XYB081			
Sampling Date				2023/12/19 10:30	2023/12/19 13:00			
COC Number				966628-01-01	966628-01-01			
	UNITS	Criteria	Criteria-2	MW23-20S	MW23-41	RDL	MDL	QC Batch
Metals								
Mercury (Hg)	mg/L	-	0.1	<0.00010	<0.00010	0.00010	0.000050	9134253
Total Aluminum (Al)	ug/L	-	50000	300	190	4.9	2.0	9133930
Total Antimony (Sb)	ug/L	-	5000	<0.50	<0.50	0.50	0.30	9133930
Total Arsenic (As)	ug/L	-	1000	1.6	2.7	1.0	0.50	9133930
Total Bismuth (Bi)	ug/L	-	5000	<1.0	<1.0	1.0	0.070	9133930
Total Cadmium (Cd)	ug/L	1	700	<0.090	<0.090	0.090	0.090	9133930
Total Chromium (Cr)	ug/L	80	3000	<5.0	<5.0	5.0	5.0	9133930
Total Cobalt (Co)	ug/L	-	5000	3.4	<0.50	0.50	0.10	9133930
Total Copper (Cu)	ug/L	5	2000	4.4	<0.90	0.90	0.50	9133930
Total Iron (Fe)	ug/L	-	50000	500	360	100	10	9133930
Total Lead (Pb)	ug/L	30	700	0.56	<0.50	0.50	0.10	9133930
Total Manganese (Mn)	ug/L	-	5000	530	19	2.0	0.50	9133930
Total Molybdenum (Mo)	ug/L	-	5000	2.5	22	0.50	0.20	9133930
Total Nickel (Ni)	ug/L	30	2000	4.9	<1.0	1.0	0.50	9133930
Total Phosphorus (P)	ug/L	-	10000	<100	<100	100	30	9133930
Total Selenium (Se)	ug/L	-	2000	<2.0	<2.0	2.0	0.50	9133930
Total Silver (Ag)	ug/L	-	1000	<0.090	<0.090	0.090	0.070	9133930
Total Tin (Sn)	ug/L	-	5000	<1.0	<1.0	1.0	0.50	9133930
Total Titanium (Ti)	ug/L	-	5000	14	11	5.0	4.0	9133930
Total Vanadium (V)	ug/L	-	5000	1.7	0.64	0.50	0.40	9133930
Total Zinc (Zn)	ug/L	30	2000	6.2	<5.0	5.0	3.0	9133930

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Storm Sewer By-law 2022-66
Criteria-2: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				XYB082			
Sampling Date				2023/12/19 11:30			
COC Number				966628-01-01			
	UNITS	Criteria	Criteria-2	SW	RDL	MDL	QC Batch
Metals							
Dissolved Mercury (Hg)	ug/L	-	100	<0.10	0.10	0.0040	9136687
Total Aluminum (Al)	ug/L	-	50000	19	4.9	2.0	9133930
Total Antimony (Sb)	ug/L	-	5000	<0.50	0.50	0.30	9133930
Total Arsenic (As)	ug/L	-	1000	<1.0	1.0	0.50	9133930
Total Bismuth (Bi)	ug/L	-	5000	<1.0	1.0	0.070	9133930
Total Cadmium (Cd)	ug/L	1	700	<0.090	0.090	0.090	9133930
Total Chromium (Cr)	ug/L	80	3000	<5.0	5.0	5.0	9133930
Total Cobalt (Co)	ug/L	-	5000	<0.50	0.50	0.10	9133930
Total Copper (Cu)	ug/L	5	2000	3.5	0.90	0.50	9133930
Total Iron (Fe)	ug/L	-	50000	150	100	10	9133930
Total Lead (Pb)	ug/L	30	700	<0.50	0.50	0.10	9133930
Total Manganese (Mn)	ug/L	-	5000	39	2.0	0.50	9133930
Total Molybdenum (Mo)	ug/L	-	5000	<0.50	0.50	0.20	9133930
Total Nickel (Ni)	ug/L	30	2000	1.0	1.0	0.50	9133930
Total Phosphorus (P)	ug/L	-	10000	<100	100	30	9133930
Total Selenium (Se)	ug/L	-	2000	<2.0	2.0	0.50	9133930
Total Silver (Ag)	ug/L	-	1000	<0.090	0.090	0.070	9133930
Total Tin (Sn)	ug/L	-	5000	<1.0	1.0	0.50	9133930
Total Titanium (Ti)	ug/L	-	5000	<5.0	5.0	4.0	9133930
Total Vanadium (V)	ug/L	-	5000	<0.50	0.50	0.40	9133930
Total Zinc (Zn)	ug/L	30	2000	<5.0	5.0	3.0	9133930

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Criteria: The Corporation of the Township of Centre Wellington: Storm Sewer By-law 2022-66

Criteria-2: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID			XYB080	XYB081		XYB082			
Sampling Date			2023/12/19 10:30	2023/12/19 13:00		2023/12/19 11:30			
COC Number			966628-01-01	966628-01-01		966628-01-01			
	UNITS	Criteria	MW23-20S	MW23-41	QC Batch	SW	RDL	MDL	QC Batch
Volatile Organics									
Benzene	ug/L	10	<0.20	0.29	9125914	<0.20	0.20	0.020	9129218
Chloroform	ug/L	40	<0.20	<0.20	9125914	<0.20	0.20	0.050	9129218
1,2-Dichlorobenzene	ug/L	50	<0.40	<0.40	9125914	<0.40	0.40	0.050	9129218
1,4-Dichlorobenzene	ug/L	80	<0.40	<0.40	9125914	<0.40	0.40	0.050	9129218
Ethylbenzene	ug/L	60	<0.20	<0.20	9125914	<0.20	0.20	0.010	9129218
Methylene Chloride(Dichloromethane)	ug/L	90	<2.0	<2.0	9125914	<2.0	2.0	0.10	9129218
1,1,2,2-Tetrachloroethane	ug/L	60	<0.40	<0.40	9125914	<0.40	0.40	0.050	9129218
Tetrachloroethylene	ug/L	60	<0.20	<0.20	9125914	<0.20	0.20	0.050	9129218
Toluene	ug/L	20	<0.20	0.36	9125914	<0.20	0.20	0.010	9129218
Trichloroethylene	ug/L	50	<0.20	<0.20	9125914	<0.20	0.20	0.050	9129218
p+m-Xylene	ug/L	-	<0.20	<0.20	9125914	<0.20	0.20	0.010	9129218
o-Xylene	ug/L	-	<0.20	<0.20	9125914	<0.20	0.20	0.010	9129218
Total Xylenes	ug/L	300	<0.20	<0.20	9125914	<0.20	0.20	0.010	9129218
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	-	105	105	9125914	101			9129218
D4-1,2-Dichloroethane	%	-	101	100	9125914	106			9129218
D8-Toluene	%	-	91	93	9125914	90			9129218

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

Bureau Veritas ID			XYB080	XYB081		XYB082			
Sampling Date			2023/12/19 10:30	2023/12/19 13:00		2023/12/19 11:30			
COC Number			966628-01-01	966628-01-01		966628-01-01			
	UNITS	Criteria	MW23-20S	MW23-41	QC Batch	SW	RDL	MDL	QC Batch
Calculated Parameters									
Aldrin + Dieldrin	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
Chlordane (Total)	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
DDT+ Metabolites	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
Heptachlor + Heptachlor epoxide	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
o,p-DDD + p,p-DDD	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
o,p-DDE + p,p-DDE	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
o,p-DDT + p,p-DDT	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
Total Endosulfan	ug/L	-	<0.005	<0.005	9123072	<0.005	0.005	N/A	9128912
Total PCB	ug/L	4	<0.05	<0.05	9123072	<0.05	0.05	N/A	9128912
Pesticides & Herbicides									
Hexachlorobenzene	ug/L	0.1	<0.005	<0.005	9133830	<0.005	0.005	0.001	9133830
Surrogate Recovery (%)									
2,4,5,6-Tetrachloro-m-xylene	%	-	60	64	9133830	59			9133830
Decachlorobiphenyl	%	-	79	92	9133830	84			9133830

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66
N/A = Not Applicable

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

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GENERAL COMMENTS

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

Package 1	6.7°C

Revised Report [2024/01/17]: Chloroform added to VOC analysis per client request.
Revision: Additional analysis has been added per P191 on 2023/12/22

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9122520	NGI	Matrix Spike	Fluoride (F-)	2023/12/21		100	%	80 - 120
9122520	NGI	Spiked Blank	Fluoride (F-)	2023/12/21		101	%	80 - 120
9122520	NGI	Method Blank	Fluoride (F-)	2023/12/21	<0.10		mg/L	
9122520	NGI	RPD	Fluoride (F-)	2023/12/21	NC		%	20
9122522	NGI	Spiked Blank	pH	2023/12/21		101	%	98 - 103
9122522	NGI	RPD	pH	2023/12/21	2.0		%	N/A
9125210	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/12/21		NC	%	80 - 120
9125210	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/12/21		101	%	80 - 120
9125210	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/12/21	<1.0		mg/L	
9125210	ADB	RPD	Dissolved Chloride (Cl-)	2023/12/21	0.22		%	20
9125214	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2023/12/21		NC	%	75 - 125
9125214	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2023/12/21		101	%	80 - 120
9125214	ADB	Method Blank	Dissolved Sulphate (SO4)	2023/12/21	<1.0		mg/L	
9125214	ADB	RPD	Dissolved Sulphate (SO4)	2023/12/21	0.73		%	20
9125477	GYA	Matrix Spike	Total Cyanide (CN)	2023/12/21		99	%	80 - 120
9125477	GYA	Spiked Blank	Total Cyanide (CN)	2023/12/21		103	%	80 - 120
9125477	GYA	Method Blank	Total Cyanide (CN)	2023/12/21	<0.0050		mg/L	
9125477	GYA	RPD	Total Cyanide (CN)	2023/12/21	NC		%	20
9125914	HST	Matrix Spike	4-Bromofluorobenzene	2023/12/21		106	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/21		100	%	70 - 130
			D8-Toluene	2023/12/21		99	%	70 - 130
			Benzene	2023/12/21		93	%	70 - 130
			Chloroform	2023/12/21		103	%	70 - 130
			1,2-Dichlorobenzene	2023/12/21		101	%	70 - 130
			1,4-Dichlorobenzene	2023/12/21		115	%	70 - 130
			Ethylbenzene	2023/12/21		94	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/21		100	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/21		108	%	70 - 130
			Tetrachloroethylene	2023/12/21		102	%	70 - 130
			Toluene	2023/12/21		93	%	70 - 130
			Trichloroethylene	2023/12/21		104	%	70 - 130
			p+m-Xylene	2023/12/21		100	%	70 - 130
			o-Xylene	2023/12/21		87	%	70 - 130
9125914	HST	Spiked Blank	4-Bromofluorobenzene	2023/12/21		111	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/21		101	%	70 - 130
			D8-Toluene	2023/12/21		99	%	70 - 130
			Benzene	2023/12/21		91	%	70 - 130
			Chloroform	2023/12/21		101	%	70 - 130
			1,2-Dichlorobenzene	2023/12/21		97	%	70 - 130
			1,4-Dichlorobenzene	2023/12/21		112	%	70 - 130
			Ethylbenzene	2023/12/21		96	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/21		96	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/21		120	%	70 - 130
			Tetrachloroethylene	2023/12/21		94	%	70 - 130
			Toluene	2023/12/21		92	%	70 - 130
			Trichloroethylene	2023/12/21		99	%	70 - 130
			p+m-Xylene	2023/12/21		102	%	70 - 130
			o-Xylene	2023/12/21		92	%	70 - 130
9125914	HST	Method Blank	4-Bromofluorobenzene	2023/12/21		104	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/21		100	%	70 - 130
			D8-Toluene	2023/12/21		96	%	70 - 130
			Benzene	2023/12/21	<0.20		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chloroform	2023/12/21	<0.20		ug/L	
			1,2-Dichlorobenzene	2023/12/21	<0.40		ug/L	
			1,4-Dichlorobenzene	2023/12/21	<0.40		ug/L	
			Ethylbenzene	2023/12/21	<0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2023/12/21	<2.0		ug/L	
			1,1,2,2-Tetrachloroethane	2023/12/21	<0.40		ug/L	
			Tetrachloroethylene	2023/12/21	<0.20		ug/L	
			Toluene	2023/12/21	<0.20		ug/L	
			Trichloroethylene	2023/12/21	<0.20		ug/L	
			p+m-Xylene	2023/12/21	<0.20		ug/L	
			o-Xylene	2023/12/21	<0.20		ug/L	
			Total Xylenes	2023/12/21	<0.20		ug/L	
9125914	HST	RPD	Benzene	2023/12/21	NC		%	30
			Chloroform	2023/12/21	NC		%	30
			1,2-Dichlorobenzene	2023/12/21	NC		%	30
			1,4-Dichlorobenzene	2023/12/21	NC		%	30
			Ethylbenzene	2023/12/21	NC		%	30
			Methylene Chloride(Dichloromethane)	2023/12/21	NC		%	30
			1,1,2,2-Tetrachloroethane	2023/12/21	NC		%	30
			Tetrachloroethylene	2023/12/21	NC		%	30
			Toluene	2023/12/21	NC		%	30
			Trichloroethylene	2023/12/21	NC		%	30
			Total Xylenes	2023/12/21	NC		%	30
9126351	SAU	Matrix Spike	Sulphide	2023/12/21		88	%	80 - 120
9126351	SAU	Spiked Blank	Sulphide	2023/12/21		92	%	80 - 120
9126351	SAU	Method Blank	Sulphide	2023/12/21	<0.020		mg/L	
9126351	SAU	RPD	Sulphide	2023/12/21	NC		%	20
9126529	DPC	Spiked Blank	Total Suspended Solids	2023/12/23		97	%	80 - 120
9126529	DPC	Method Blank	Total Suspended Solids	2023/12/23	<10		mg/L	
9126529	DPC	RPD [XYB081-04]	Total Suspended Solids	2023/12/23	0		%	20
9126537	NS3	Matrix Spike [XYB081-10]	Total Chemical Oxygen Demand (COD)	2023/12/21		98	%	80 - 120
9126537	NS3	Spiked Blank	Total Chemical Oxygen Demand (COD)	2023/12/21		98	%	80 - 120
9126537	NS3	Method Blank	Total Chemical Oxygen Demand (COD)	2023/12/21	<4.0		mg/L	
9126537	NS3	RPD [XYB081-10]	Total Chemical Oxygen Demand (COD)	2023/12/21	0		%	20
9127004	LKI	Matrix Spike [XYB080-17]	Total Chlorine	2023/12/21		31 (1)	%	85 - 115
9127004	LKI	Spiked Blank	Total Chlorine	2023/12/21		95	%	85 - 115
9127004	LKI	Method Blank	Total Chlorine	2023/12/21	<0.1		mg/L	
9127004	LKI	RPD [XYB080-17]	Total Chlorine	2023/12/21	NC		%	25
9128381	SAU	Matrix Spike	Sulphide	2023/12/22		96	%	80 - 120
9128381	SAU	Spiked Blank	Sulphide	2023/12/22		96	%	80 - 120
9128381	SAU	Method Blank	Sulphide	2023/12/22	<0.020		mg/L	
9128381	SAU	RPD	Sulphide	2023/12/22	NC		%	20
9128770	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2023/12/27		103	%	80 - 120
9128770	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/12/27		96	%	80 - 120
9128770	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/27		106	%	80 - 120
9128770	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/27	<0.10		mg/L	
9128770	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2023/12/27	3.6		%	20
9128773	GYA	Matrix Spike	Total Cyanide (CN)	2023/12/22		96	%	80 - 120
9128773	GYA	Spiked Blank	Total Cyanide (CN)	2023/12/22		98	%	80 - 120
9128773	GYA	Method Blank	Total Cyanide (CN)	2023/12/22	<0.0050		mg/L	
9128773	GYA	RPD	Total Cyanide (CN)	2023/12/22	NC		%	20
9129218	HST	Matrix Spike	4-Bromofluorobenzene	2023/12/27		102	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D4-1,2-Dichloroethane	2023/12/27		102	%	70 - 130
			D8-Toluene	2023/12/27		102	%	70 - 130
			Benzene	2023/12/27		103	%	70 - 130
			Chloroform	2023/12/27		114	%	70 - 130
			1,2-Dichlorobenzene	2023/12/27		107	%	70 - 130
			1,4-Dichlorobenzene	2023/12/27		119	%	70 - 130
			Ethylbenzene	2023/12/27		100	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/27		114	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/27		117	%	70 - 130
			Tetrachloroethylene	2023/12/27		107	%	70 - 130
			Toluene	2023/12/27		104	%	70 - 130
			Trichloroethylene	2023/12/27		111	%	70 - 130
			p+m-Xylene	2023/12/27		107	%	70 - 130
			o-Xylene	2023/12/27		90	%	70 - 130
9129218	HST	Spiked Blank	4-Bromofluorobenzene	2023/12/27		103	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/27		96	%	70 - 130
			D8-Toluene	2023/12/27		105	%	70 - 130
			Benzene	2023/12/27		97	%	70 - 130
			Chloroform	2023/12/27		107	%	70 - 130
			1,2-Dichlorobenzene	2023/12/27		103	%	70 - 130
			1,4-Dichlorobenzene	2023/12/27		114	%	70 - 130
			Ethylbenzene	2023/12/27		99	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/27		105	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/27		108	%	70 - 130
			Tetrachloroethylene	2023/12/27		105	%	70 - 130
			Toluene	2023/12/27		102	%	70 - 130
			Trichloroethylene	2023/12/27		106	%	70 - 130
			p+m-Xylene	2023/12/27		107	%	70 - 130
			o-Xylene	2023/12/27		93	%	70 - 130
9129218	HST	Method Blank	4-Bromofluorobenzene	2023/12/27		105	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/27		102	%	70 - 130
			D8-Toluene	2023/12/27		89	%	70 - 130
			Benzene	2023/12/27	<0.20		ug/L	
			Chloroform	2023/12/27	<0.20		ug/L	
			1,2-Dichlorobenzene	2023/12/27	<0.40		ug/L	
			1,4-Dichlorobenzene	2023/12/27	<0.40		ug/L	
			Ethylbenzene	2023/12/27	<0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2023/12/27	<2.0		ug/L	
			1,1,2,2-Tetrachloroethane	2023/12/27	<0.40		ug/L	
			Tetrachloroethylene	2023/12/27	<0.20		ug/L	
			Toluene	2023/12/27	<0.20		ug/L	
			Trichloroethylene	2023/12/27	<0.20		ug/L	
			p+m-Xylene	2023/12/27	<0.20		ug/L	
			o-Xylene	2023/12/27	<0.20		ug/L	
			Total Xylenes	2023/12/27	<0.20		ug/L	
9129218	HST	RPD	Benzene	2023/12/27	0		%	30
			Chloroform	2023/12/27	NC		%	30
			1,2-Dichlorobenzene	2023/12/27	NC		%	30
			1,4-Dichlorobenzene	2023/12/27	NC		%	30
			Ethylbenzene	2023/12/27	NC		%	30
			Methylene Chloride(Dichloromethane)	2023/12/27	NC		%	30
			1,1,2,2-Tetrachloroethane	2023/12/27	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Tetrachloroethylene	2023/12/27	NC		%	30
			Toluene	2023/12/27	NC		%	30
			Trichloroethylene	2023/12/27	NC		%	30
			p+m-Xylene	2023/12/27	0.96		%	30
			o-Xylene	2023/12/27	NC		%	30
			Total Xylenes	2023/12/27	0.96		%	30
9129333	DPC	Spiked Blank	Total Suspended Solids	2023/12/23		96	%	80 - 120
9129333	DPC	Method Blank	Total Suspended Solids	2023/12/23	<10		mg/L	
9129333	DPC	RPD	Total Suspended Solids	2023/12/23	13		%	20
9129461	NS3	Matrix Spike	Total Chemical Oxygen Demand (COD)	2023/12/22		95	%	80 - 120
9129461	NS3	Spiked Blank	Total Chemical Oxygen Demand (COD)	2023/12/22		97	%	80 - 120
9129461	NS3	Method Blank	Total Chemical Oxygen Demand (COD)	2023/12/22	<4.0		mg/L	
9129461	NS3	RPD	Total Chemical Oxygen Demand (COD)	2023/12/22	NC		%	20
9129667	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2023/12/27		NC	%	80 - 120
9129667	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/12/27		97	%	80 - 120
9129667	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/27		95	%	80 - 120
9129667	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/27	<0.10		mg/L	
9129667	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2023/12/27	3.6		%	20
9130223	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/12/27		NC	%	80 - 120
9130223	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/12/27		92	%	80 - 120
9130223	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/12/27	<1.0		mg/L	
9130223	ADB	RPD	Dissolved Chloride (Cl-)	2023/12/27	0.13		%	20
9130224	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2023/12/27		92	%	75 - 125
9130224	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2023/12/27		92	%	80 - 120
9130224	ADB	Method Blank	Dissolved Sulphate (SO4)	2023/12/27	<1.0		mg/L	
9130224	ADB	RPD	Dissolved Sulphate (SO4)	2023/12/27	0.47		%	20
9130345	LKI	Matrix Spike [XYB082-17]	Total Chlorine	2023/12/22		63 (1)	%	85 - 115
9130345	LKI	Spiked Blank	Total Chlorine	2023/12/22		98	%	85 - 115
9130345	LKI	Method Blank	Total Chlorine	2023/12/22	<0.1		mg/L	
9130345	LKI	RPD [XYB082-17]	Total Chlorine	2023/12/22	NC		%	25
9130415	NGI	Spiked Blank	pH	2023/12/23		101	%	98 - 103
9130415	NGI	RPD	pH	2023/12/23	0.68		%	N/A
9130416	NGI	Matrix Spike	Fluoride (F-)	2023/12/23		106	%	80 - 120
9130416	NGI	Spiked Blank	Fluoride (F-)	2023/12/23		105	%	80 - 120
9130416	NGI	Method Blank	Fluoride (F-)	2023/12/23	<0.10		mg/L	
9130416	NGI	RPD	Fluoride (F-)	2023/12/23	9.0		%	20
9130593	GUJ	QC Standard	Total BOD	2023/12/28		92	%	80 - 120
9130593	GUJ	Method Blank	Total BOD	2023/12/28	<2		mg/L	
9130593	GUJ	RPD	Total BOD	2023/12/28	NC		%	30
9132960	CPO	Matrix Spike [XYB080-12]	Phenols-4AAP	2023/12/27		103	%	80 - 120
9132960	CPO	Spiked Blank	Phenols-4AAP	2023/12/27		100	%	80 - 120
9132960	CPO	Method Blank	Phenols-4AAP	2023/12/27	<0.0010		mg/L	
9132960	CPO	RPD [XYB080-12]	Phenols-4AAP	2023/12/27	NC		%	20
9133830	JZ	Matrix Spike	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		79	%	50 - 130
			Decachlorobiphenyl	2023/12/29		119	%	50 - 130
			Hexachlorobenzene	2023/12/29		86	%	50 - 130
9133830	JZ	Spiked Blank	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		78	%	50 - 130
			Decachlorobiphenyl	2023/12/29		129	%	50 - 130
			Hexachlorobenzene	2023/12/29		95	%	50 - 130
9133830	JZ	RPD	Hexachlorobenzene	2023/12/29	8.2		%	30
			Hexachlorobenzene	2023/12/29	NC		%	30
9133830	JZ	Method Blank	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		52	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Decachlorobiphenyl	2023/12/29		87	%	50 - 130
			Hexachlorobenzene	2023/12/29	<0.005		ug/L	
9133930	ADA	Reagent Blank	Total Aluminum (Al)	2023/12/29	<4.9		ug/L	
			Total Antimony (Sb)	2023/12/29	<0.50		ug/L	
			Total Arsenic (As)	2023/12/29	<1.0		ug/L	
			Total Bismuth (Bi)	2023/12/29	<1.0		ug/L	
			Total Cadmium (Cd)	2023/12/29	<0.090		ug/L	
			Total Chromium (Cr)	2023/12/29	<5.0		ug/L	
			Total Cobalt (Co)	2023/12/29	<0.50		ug/L	
			Total Copper (Cu)	2023/12/29	<0.90		ug/L	
			Total Iron (Fe)	2023/12/29	<100		ug/L	
			Total Lead (Pb)	2023/12/29	<0.50		ug/L	
			Total Manganese (Mn)	2023/12/29	<2.0		ug/L	
			Total Molybdenum (Mo)	2023/12/29	<0.50		ug/L	
			Total Nickel (Ni)	2023/12/29	<1.0		ug/L	
			Total Phosphorus (P)	2023/12/29	<100		ug/L	
			Total Selenium (Se)	2023/12/29	<2.0		ug/L	
			Total Silver (Ag)	2023/12/29	<0.090		ug/L	
			Total Tin (Sn)	2023/12/29	<1.0		ug/L	
			Total Titanium (Ti)	2023/12/29	<5.0		ug/L	
			Total Vanadium (V)	2023/12/29	<0.50		ug/L	
			Total Zinc (Zn)	2023/12/29	<5.0		ug/L	
9133930	ADA	Matrix Spike	Total Aluminum (Al)	2023/12/29		114	%	80 - 120
			Total Antimony (Sb)	2023/12/29		102	%	80 - 120
			Total Arsenic (As)	2023/12/29		100	%	80 - 120
			Total Bismuth (Bi)	2023/12/29		94	%	80 - 120
			Total Cadmium (Cd)	2023/12/29		98	%	80 - 120
			Total Chromium (Cr)	2023/12/29		94	%	80 - 120
			Total Cobalt (Co)	2023/12/29		99	%	80 - 120
			Total Copper (Cu)	2023/12/29		97	%	80 - 120
			Total Iron (Fe)	2023/12/29		97	%	80 - 120
			Total Lead (Pb)	2023/12/29		98	%	80 - 120
			Total Manganese (Mn)	2023/12/29		95	%	80 - 120
			Total Molybdenum (Mo)	2023/12/29		98	%	80 - 120
			Total Nickel (Ni)	2023/12/29		98	%	80 - 120
			Total Phosphorus (P)	2023/12/29		103	%	80 - 120
			Total Selenium (Se)	2023/12/29		101	%	80 - 120
			Total Silver (Ag)	2023/12/29		91	%	80 - 120
			Total Tin (Sn)	2023/12/29		100	%	80 - 120
			Total Titanium (Ti)	2023/12/29		98	%	80 - 120
			Total Vanadium (V)	2023/12/29		95	%	80 - 120
			Total Zinc (Zn)	2023/12/29		99	%	80 - 120
9133930	ADA	Spiked Blank	Total Aluminum (Al)	2023/12/29		96	%	80 - 120
			Total Antimony (Sb)	2023/12/29		99	%	80 - 120
			Total Arsenic (As)	2023/12/29		99	%	80 - 120
			Total Bismuth (Bi)	2023/12/29		94	%	80 - 120
			Total Cadmium (Cd)	2023/12/29		96	%	80 - 120
			Total Chromium (Cr)	2023/12/29		94	%	80 - 120
			Total Cobalt (Co)	2023/12/29		98	%	80 - 120
			Total Copper (Cu)	2023/12/29		98	%	80 - 120
			Total Iron (Fe)	2023/12/29		97	%	80 - 120
			Total Lead (Pb)	2023/12/29		95	%	80 - 120

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Manganese (Mn)	2023/12/29		95	%	80 - 120
			Total Molybdenum (Mo)	2023/12/29		94	%	80 - 120
			Total Nickel (Ni)	2023/12/29		97	%	80 - 120
			Total Phosphorus (P)	2023/12/29		91	%	80 - 120
			Total Selenium (Se)	2023/12/29		99	%	80 - 120
			Total Silver (Ag)	2023/12/29		90	%	80 - 120
			Total Tin (Sn)	2023/12/29		97	%	80 - 120
			Total Titanium (Ti)	2023/12/29		96	%	80 - 120
			Total Vanadium (V)	2023/12/29		94	%	80 - 120
			Total Zinc (Zn)	2023/12/29		98	%	80 - 120
9133930	ADA	Method Blank	Total Aluminum (Al)	2023/12/29	<4.9		ug/L	
			Total Antimony (Sb)	2023/12/29	<0.50		ug/L	
			Total Arsenic (As)	2023/12/29	<1.0		ug/L	
			Total Bismuth (Bi)	2023/12/29	<1.0		ug/L	
			Total Cadmium (Cd)	2023/12/29	<0.090		ug/L	
			Total Chromium (Cr)	2023/12/29	<5.0		ug/L	
			Total Cobalt (Co)	2023/12/29	<0.50		ug/L	
			Total Copper (Cu)	2023/12/29	<0.90		ug/L	
			Total Iron (Fe)	2023/12/29	<100		ug/L	
			Total Lead (Pb)	2023/12/29	<0.50		ug/L	
			Total Manganese (Mn)	2023/12/29	<2.0		ug/L	
			Total Molybdenum (Mo)	2023/12/29	<0.50		ug/L	
			Total Nickel (Ni)	2023/12/29	<1.0		ug/L	
			Total Phosphorus (P)	2023/12/29	<100		ug/L	
			Total Selenium (Se)	2023/12/29	<2.0		ug/L	
			Total Silver (Ag)	2023/12/29	<0.090		ug/L	
			Total Tin (Sn)	2023/12/29	<1.0		ug/L	
			Total Titanium (Ti)	2023/12/29	<5.0		ug/L	
			Total Vanadium (V)	2023/12/29	<0.50		ug/L	
			Total Zinc (Zn)	2023/12/29	<5.0		ug/L	
9133930	ADA	RPD	Total Aluminum (Al)	2023/12/29	4.0		%	20
			Total Antimony (Sb)	2023/12/29	5.0		%	20
			Total Arsenic (As)	2023/12/29	2.4		%	20
			Total Bismuth (Bi)	2023/12/29	4.2		%	20
			Total Cadmium (Cd)	2023/12/29	NC		%	20
			Total Chromium (Cr)	2023/12/29	NC		%	20
			Total Cobalt (Co)	2023/12/29	4.7		%	20
			Total Copper (Cu)	2023/12/29	6.0		%	20
			Total Iron (Fe)	2023/12/29	5.4		%	20
			Total Lead (Pb)	2023/12/29	3.1		%	20
			Total Manganese (Mn)	2023/12/29	4.4		%	20
			Total Molybdenum (Mo)	2023/12/29	1.2		%	20
			Total Nickel (Ni)	2023/12/29	2.5		%	20
			Total Phosphorus (P)	2023/12/29	NC		%	20
			Total Selenium (Se)	2023/12/29	NC		%	20
			Total Silver (Ag)	2023/12/29	0.83		%	20
			Total Tin (Sn)	2023/12/29	NC		%	20
			Total Titanium (Ti)	2023/12/29	3.2		%	20
			Total Vanadium (V)	2023/12/29	1.2		%	20
			Total Zinc (Zn)	2023/12/29	3.4		%	20
9134253	ANF	Matrix Spike	Mercury (Hg)	2023/12/28		90	%	75 - 125
9134253	ANF	Spiked Blank	Mercury (Hg)	2023/12/28		96	%	80 - 120

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9134253	ANF	Method Blank	Mercury (Hg)	2023/12/28	<0.00010		mg/L	
9134253	ANF	RPD	Mercury (Hg)	2023/12/28	NC		%	20
			Mercury (Hg)	2023/12/28	NC		%	20
			Mercury (Hg)	2023/12/28	NC		%	20
9136687	ANF	Matrix Spike [XYB082-11]	Dissolved Mercury (Hg)	2024/01/02		97	%	75 - 125
9136687	ANF	Spiked Blank	Dissolved Mercury (Hg)	2024/01/02		99	%	80 - 120
9136687	ANF	Method Blank	Dissolved Mercury (Hg)	2024/01/02	<0.10		ug/L	
9136687	ANF	RPD [XYB082-11]	Dissolved Mercury (Hg)	2024/01/02	NC		%	20
9138296	K1P	Spiked Blank	Total Oil & Grease	2023/12/31		99	%	80 - 110
9138296	K1P	RPD	Total Oil & Grease	2023/12/31	0.76		%	25
9138296	K1P	Method Blank	Total Oil & Grease	2023/12/31	<0.50		mg/L	
9138297	K1P	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2023/12/31		97	%	65 - 130
9138297	K1P	RPD	Total Oil & Grease Mineral/Synthetic	2023/12/31	0.52		%	25
9138297	K1P	Method Blank	Total Oil & Grease Mineral/Synthetic	2023/12/31	<0.50		mg/L	

N/A = Not Applicable

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

Reagent Blank: A blank matrix containing all reagents used in the analytical procedure. Used to determine any analytical contamination.

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

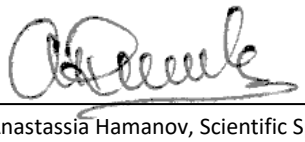
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Additional Analysis: P191

BV Job#:	C3BM625
Requested By:	Nikhil Dalal
Requested Date:	2023/12/22
Submitted By:	Nikhil Dalal
Submitted Date:	2023/12/22
Service Level Requested:	Standard TAT

Invoice Information

Attn: Invoicing
GEMTEC LIMITED
32 Steacie Drive
Ottawa , ON , K2K 2A9
Email to:
accountspayable@gemtec.ca

Report Information

Attn: Jacqueline Brook
GEMTEC LIMITED
6695 Millcreek Drive
Unit 7
Mississauga , ON , L5N 5M4
Email to:
jacqueline.brook@gemtec.ca

Project Information

Quote #: C32976
PO/AFE #:
Project #: 101987.017
Site Location:

Analytical Summary

V: Previous Request(s), sample on HOLD if not present
A: Additional Analysis Request 2023/12/22

Client Sample ID	Sampling Date/Time	Matrix	#Cont	Centre Wellington Sanitary By-Law(22-66)
SW	2023/12/19 11:30	WATER	18	A
Total			18	1

Please refer to your Job Confirmation report for final analytical testing and due dates.
Deadlines will be confirmed once the request is approved.

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

CH

HONT-2023-12-1508

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#35525 GEMTEC LIMITED	Company Name:	#34261 GEMTEC LIMITED	Quotation #:	C32976
Attention:	Invoicing	Attention:	Jacqueline Brook	P.O. #:	
Address:	32 Steacie Drive	Address:	6695 Millcreek Drive Unit 7	Project:	101987.017
	Ottawa ON K2K 2A9		Mississauga ON L5N 5M4	Project Name:	
Tel:	(613) 836-1422 Fax: (613) 836-9731	Tel:	(289) 814-1940 Fax:	Site #:	
Email:	accountspayable@gemtec.ca	Email:	jacqueline.brook@gemtec.ca ; chloe.choi@gemtec	Sampled By:	Chloe Choi

Bottle Order #: 966628

COC #: C#966628-01-01

Project Manager: Katherine Szozda

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☑ Sanitary Sewer Bylaw
- ☐ Reg 558 ☑ Storm Sewer Bylaw
- ☐ MISA Municipality Wellington
- ☑ PWQO ☐ Reg 406 Table
- ☐ Other

Special Instructions
compare the results against the PWQO

Include Criteria on Certificate of Analysis (Y/N)? Y

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Centre Wellington Sanitary By-Law(22-66)	Centre Wellington Storm By-Law (22-66)								# of Bottles	Comments
1		MW23-20S	23/12/19	10:30am	GW		✓	✓								18	
2		MW23-41	23/12/19	1:00pm	GW		✓	✓								18	
3		SW	23/12/19	11:30am	SW	✓										18	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Chloe Choi	23/12/19		Ashlee Sukumar ASHLEE SUKUMAR	23/12/19	16:42	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes	No
	7/6/6	Intact		✓

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

2/2/3

Bureau Veritas Canada (2019) Inc.

Your Project #: 101987.017
Site Location: FERGUS
Your C.O.C. #: 969738-01-01

Attention: Jacqueline Brook

GEMTEC LIMITED
6695 Millcreek Drive
Unit 7
Mississauga, ON
Canada L5N 5M4

Report Date: 2024/01/17
Report #: R7992372
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3BP885
Received: 2023/12/21, 13:11

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	1	2023/12/24	2023/12/29	CAM SOP-00427	SM 24 5210B m
Total Residual Chlorine	1	2023/12/23	2023/12/23	CAM SOP 00425	SM 24 4500-CL G m
Chloride by Automated Colourimetry	1	N/A	2023/12/28	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2023/12/29	CAM SOP-00416	SM 24 5220 D m
Total Cyanide	1	2023/12/27	2023/12/27	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2023/12/27	2023/12/27	CAM SOP-00449	SM 24 4500-F C m
Sulphide as H2S	1	N/A	2023/12/27		
Mercury in Water by CVAA	2	2023/12/28	2023/12/28	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	2023/12/29	2023/12/29	CAM SOP-00447	EPA 6020B m
Animal and Vegetable Oil and Grease	1	N/A	2024/01/02	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2024/01/02	2024/01/02	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (1)	1	2023/12/28	2023/12/29	CAM SOP-00307	EPA 8081B/ 8082A
OC Pesticides Summed Parameters	1	N/A	2023/12/27	CAM SOP-00307	EPA 8081B/ 8082A
Phenols (4AAP)	1	N/A	2023/12/28	CAM SOP-00444	OMOE E3179 m
pH	1	2023/12/27	2023/12/27	CAM SOP-00413	SM 24th-4500H+ B
Sulphate by Automated Turbidimetry	1	N/A	2023/12/28	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphide	1	N/A	2023/12/27	CAM SOP-00455	SM 24 4500-S G m
Total Kjeldahl Nitrogen in Water	1	2023/12/28	2023/12/29	CAM SOP-00938	OMOE E3516 m
Mineral/Synthetic O & G (TPH Heavy Oil) (2)	1	2024/01/02	2024/01/02	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2023/12/27	2023/12/28	CAM SOP-00428	SM 24 2540D m
Volatile Organic Compounds in Water	1	N/A	2023/12/28	CAM SOP-00228	EPA 8260D

Remarks:

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

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

Your Project #: 101987.017
Site Location: FERGUS
Your C.O.C. #: 969738-01-01

Attention: Jacqueline Brook

GEMTEC LIMITED
6695 Millcreek Drive
Unit 7
Mississauga, ON
Canada L5N 5M4

Report Date: 2024/01/17
Report #: R7992372
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C3BP885
Received: 2023/12/21, 13:11

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

==========

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

Bureau Veritas Job #: C3BP885
Report Date: 2024/01/17

GEMTEC LIMITED
Client Project #: 101987.017
Site Location: FERGUS
Sampler Initials: CC

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID				XYS806			
Sampling Date				2023/12/21 10:00			
COC Number				969738-01-01			
	UNITS	Criteria	Criteria-2	MW23-33	RDL	MDL	QC Batch
Calculated Parameters							
Total Animal/Vegetable Oil and Grease	mg/L	-	150	<0.50	0.50	0.10	9130676
Sulphide (as H2S)	mg/L	-	1	<0.021	0.021	0.011	9131037
Inorganics							
Total BOD	mg/L	15	300	<2	2	0.5	9131255
Total Chemical Oxygen Demand (COD)	mg/L	-	600	34	4.0	3.0	9134276
Total Chlorine	mg/L	-	-	<0.1	0.1	0.02	9132627
Fluoride (F-)	mg/L	-	10	0.14	0.10	0.014	9133035
Total Kjeldahl Nitrogen (TKN)	mg/L	-	50	0.19	0.10	0.060	9134489
pH	pH	6.5:8.5	6.0:8.5	7.81			9133049
Phenols-4AAP	mg/L	-	0.1	<0.0010	0.0010	0.00040	9135404
Total Suspended Solids	mg/L	15	350	<10	10	9.6	9131994
Dissolved Sulphate (SO4)	mg/L	-	1500	35	1.0	0.49	9132181
Sulphide	mg/L	-	-	<0.020	0.020	0.010	9132491
Total Cyanide (CN)	mg/L	-	1.2	<0.0050	0.0050	0.00028	9132147
Dissolved Chloride (Cl-)	mg/L	-	1500	11	1.0	0.66	9132171
Petroleum Hydrocarbons							
Total Oil & Grease	mg/L	-	-	<0.50	0.50	0.10	9138688
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	<0.50	0.50	0.10	9138690

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Storm Sewer By-law 2022-66
Criteria-2: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3BP885
Report Date: 2024/01/17

GEMTEC LIMITED
Client Project #: 101987.017
Site Location: FERGUS
Sampler Initials: CC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				XYS806				XYS807			
Sampling Date				2023/12/21 10:00				2023/12/21 11:00			
COC Number				969738-01-01				969738-01-01			
	UNITS	Criteria	Criteria-2	MW23-33	RDL	MDL	QC Batch	BLACK CREEK	RDL	MDL	QC Batch
Metals											
Mercury (Hg)	mg/L	-	0.1	<0.00010	0.00010	0.000050	9134253	<0.00010	0.00010	0.000050	9134253
Total Aluminum (Al)	ug/L	-	50000	40	4.9	2.0	9136120				
Total Antimony (Sb)	ug/L	-	5000	0.75	0.50	0.30	9136120				
Total Arsenic (As)	ug/L	-	1000	<1.0	1.0	0.50	9136120				
Total Bismuth (Bi)	ug/L	-	5000	<1.0	1.0	0.070	9136120				
Total Cadmium (Cd)	ug/L	1	700	<0.090	0.090	0.090	9136120				
Total Chromium (Cr)	ug/L	80	3000	<5.0	5.0	5.0	9136120				
Total Cobalt (Co)	ug/L	-	5000	0.84	0.50	0.10	9136120				
Total Copper (Cu)	ug/L	5	2000	1.3	0.90	0.50	9136120				
Total Iron (Fe)	ug/L	-	50000	<100	100	10	9136120				
Total Lead (Pb)	ug/L	30	700	<0.50	0.50	0.10	9136120				
Total Manganese (Mn)	ug/L	-	5000	9.5	2.0	0.50	9136120				
Total Molybdenum (Mo)	ug/L	-	5000	4.7	0.50	0.20	9136120				
Total Nickel (Ni)	ug/L	30	2000	2.5	1.0	0.50	9136120				
Total Phosphorus (P)	ug/L	-	10000	<100	100	30	9136120				
Total Selenium (Se)	ug/L	-	2000	<2.0	2.0	0.50	9136120				
Total Silver (Ag)	ug/L	-	1000	<0.090	0.090	0.070	9136120				
Total Tin (Sn)	ug/L	-	5000	<1.0	1.0	0.50	9136120				
Total Titanium (Ti)	ug/L	-	5000	<5.0	5.0	4.0	9136120				
Total Vanadium (V)	ug/L	-	5000	0.97	0.50	0.40	9136120				
Total Zinc (Zn)	ug/L	30	2000	11	5.0	3.0	9136120				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Storm Sewer By-law 2022-66
Criteria-2: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID			XYS806			
Sampling Date			2023/12/21 10:00			
COC Number			969738-01-01			
	UNITS	Criteria	MW23-33	RDL	MDL	QC Batch
Volatile Organics						
Benzene	ug/L	10	<0.20	0.20	0.020	9132256
Chloroform	ug/L	40	<0.20	0.20	0.050	9132256
1,2-Dichlorobenzene	ug/L	50	<0.40	0.40	0.050	9132256
1,4-Dichlorobenzene	ug/L	80	<0.40	0.40	0.050	9132256
Ethylbenzene	ug/L	60	<0.20	0.20	0.010	9132256
Methylene Chloride(Dichloromethane)	ug/L	90	<2.0	2.0	0.10	9132256
1,1,2,2-Tetrachloroethane	ug/L	60	<0.40	0.40	0.050	9132256
Tetrachloroethylene	ug/L	60	<0.20	0.20	0.050	9132256
Toluene	ug/L	20	<0.20	0.20	0.010	9132256
Trichloroethylene	ug/L	50	<0.20	0.20	0.050	9132256
p+m-Xylene	ug/L	-	<0.20	0.20	0.010	9132256
o-Xylene	ug/L	-	<0.20	0.20	0.010	9132256
Total Xylenes	ug/L	300	<0.20	0.20	0.010	9132256
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	-	101			9132256
D4-1,2-Dichloroethane	%	-	106			9132256
D8-Toluene	%	-	89			9132256

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66

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ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

Bureau Veritas ID			XYS806			
Sampling Date			2023/12/21 10:00			
COC Number			969738-01-01			
	UNITS	Criteria	MW23-33	RDL	MDL	QC Batch
Calculated Parameters						
Aldrin + Dieldrin	ug/L	-	<0.005	0.005	N/A	9130576
Chlordane (Total)	ug/L	-	<0.005	0.005	N/A	9130576
DDT+ Metabolites	ug/L	-	<0.005	0.005	N/A	9130576
Heptachlor + Heptachlor epoxide	ug/L	-	<0.005	0.005	N/A	9130576
o,p-DDD + p,p-DDD	ug/L	-	<0.005	0.005	N/A	9130576
o,p-DDE + p,p-DDE	ug/L	-	<0.005	0.005	N/A	9130576
o,p-DDT + p,p-DDT	ug/L	-	<0.005	0.005	N/A	9130576
Total Endosulfan	ug/L	-	<0.005	0.005	N/A	9130576
Total PCB	ug/L	4	<0.05	0.05	N/A	9130576
Pesticides & Herbicides						
Hexachlorobenzene	ug/L	0.1	<0.005	0.005	0.001	9133830
Surrogate Recovery (%)						
2,4,5,6-Tetrachloro-m-xylene	%	-	71			9133830
Decachlorobiphenyl	%	-	93			9133830

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The Corporation of the Township of Centre Wellington: Sanitary Sewer By-law 2022-66
N/A = Not Applicable

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GENERAL COMMENTS

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

Package 1	3.3°C

Revised Report [2024/01/17]: Chloroform added to VOC analysis per client request.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9131255	FZH	QC Standard	Total BOD	2023/12/29		94	%	80 - 120
9131255	FZH	Method Blank	Total BOD	2023/12/29	<2		mg/L	
9131255	FZH	RPD	Total BOD	2023/12/29	NC		%	30
9131994	RTB	Spiked Blank	Total Suspended Solids	2023/12/28		95	%	80 - 120
9131994	RTB	Method Blank	Total Suspended Solids	2023/12/28	<10		mg/L	
9131994	RTB	RPD	Total Suspended Solids	2023/12/28	NC		%	20
9132147	GYA	Matrix Spike	Total Cyanide (CN)	2023/12/27		72 (1)	%	80 - 120
9132147	GYA	Spiked Blank	Total Cyanide (CN)	2023/12/27		104	%	80 - 120
9132147	GYA	Method Blank	Total Cyanide (CN)	2023/12/27	<0.0050		mg/L	
9132147	GYA	RPD	Total Cyanide (CN)	2023/12/27	12		%	20
9132171	S1L	Matrix Spike	Dissolved Chloride (Cl-)	2023/12/28		NC	%	80 - 120
9132171	S1L	Spiked Blank	Dissolved Chloride (Cl-)	2023/12/28		95	%	80 - 120
9132171	S1L	Method Blank	Dissolved Chloride (Cl-)	2023/12/28	<1.0		mg/L	
9132171	S1L	RPD	Dissolved Chloride (Cl-)	2023/12/28	1.4		%	20
9132181	S1L	Matrix Spike	Dissolved Sulphate (SO4)	2023/12/28		NC	%	75 - 125
9132181	S1L	Spiked Blank	Dissolved Sulphate (SO4)	2023/12/28		93	%	80 - 120
9132181	S1L	Method Blank	Dissolved Sulphate (SO4)	2023/12/28	<1.0		mg/L	
9132181	S1L	RPD	Dissolved Sulphate (SO4)	2023/12/28	5.7		%	20
9132256	GMN	Matrix Spike [XYS806-17]	4-Bromofluorobenzene	2023/12/28		103	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/28		100	%	70 - 130
			D8-Toluene	2023/12/28		105	%	70 - 130
			Benzene	2023/12/28		95	%	70 - 130
			Chloroform	2023/12/28		106	%	70 - 130
			1,2-Dichlorobenzene	2023/12/28		99	%	70 - 130
			1,4-Dichlorobenzene	2023/12/28		110	%	70 - 130
			Ethylbenzene	2023/12/28		92	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/28		105	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/28		110	%	70 - 130
			Tetrachloroethylene	2023/12/28		100	%	70 - 130
			Toluene	2023/12/28		97	%	70 - 130
			Trichloroethylene	2023/12/28		102	%	70 - 130
			p+m-Xylene	2023/12/28		99	%	70 - 130
			o-Xylene	2023/12/28		83	%	70 - 130
9132256	GMN	Spiked Blank	4-Bromofluorobenzene	2023/12/28		103	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/28		97	%	70 - 130
			D8-Toluene	2023/12/28		104	%	70 - 130
			Benzene	2023/12/28		87	%	70 - 130
			Chloroform	2023/12/28		97	%	70 - 130
			1,2-Dichlorobenzene	2023/12/28		93	%	70 - 130
			1,4-Dichlorobenzene	2023/12/28		103	%	70 - 130
			Ethylbenzene	2023/12/28		86	%	70 - 130
			Methylene Chloride(Dichloromethane)	2023/12/28		95	%	70 - 130
			1,1,2,2-Tetrachloroethane	2023/12/28		99	%	70 - 130
			Tetrachloroethylene	2023/12/28		94	%	70 - 130
			Toluene	2023/12/28		91	%	70 - 130
			Trichloroethylene	2023/12/28		95	%	70 - 130
			p+m-Xylene	2023/12/28		93	%	70 - 130
			o-Xylene	2023/12/28		82	%	70 - 130
9132256	GMN	Method Blank	4-Bromofluorobenzene	2023/12/28		105	%	70 - 130
			D4-1,2-Dichloroethane	2023/12/28		103	%	70 - 130
			D8-Toluene	2023/12/28		89	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzene	2023/12/28	<0.20		ug/L	
			Chloroform	2023/12/28	<0.20		ug/L	
			1,2-Dichlorobenzene	2023/12/28	<0.40		ug/L	
			1,4-Dichlorobenzene	2023/12/28	<0.40		ug/L	
			Ethylbenzene	2023/12/28	<0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2023/12/28	<2.0		ug/L	
			1,1,2,2-Tetrachloroethane	2023/12/28	<0.40		ug/L	
			Tetrachloroethylene	2023/12/28	<0.20		ug/L	
			Toluene	2023/12/28	<0.20		ug/L	
			Trichloroethylene	2023/12/28	<0.20		ug/L	
			p+m-Xylene	2023/12/28	<0.20		ug/L	
			o-Xylene	2023/12/28	<0.20		ug/L	
			Total Xylenes	2023/12/28	<0.20		ug/L	
9132256	GMN	RPD [XYS806-17]	Benzene	2023/12/28	NC		%	30
			Chloroform	2023/12/28	NC		%	30
			1,2-Dichlorobenzene	2023/12/28	NC		%	30
			1,4-Dichlorobenzene	2023/12/28	NC		%	30
			Ethylbenzene	2023/12/28	NC		%	30
			Methylene Chloride(Dichloromethane)	2023/12/28	NC		%	30
			1,1,2,2-Tetrachloroethane	2023/12/28	NC		%	30
			Tetrachloroethylene	2023/12/28	NC		%	30
			Toluene	2023/12/28	NC		%	30
			Trichloroethylene	2023/12/28	NC		%	30
			p+m-Xylene	2023/12/28	NC		%	30
			o-Xylene	2023/12/28	NC		%	30
			Total Xylenes	2023/12/28	NC		%	30
9132491	TAK	Matrix Spike	Sulphide	2023/12/27		95	%	80 - 120
9132491	TAK	Spiked Blank	Sulphide	2023/12/27		95	%	80 - 120
9132491	TAK	Method Blank	Sulphide	2023/12/27	<0.020		mg/L	
9132491	TAK	RPD	Sulphide	2023/12/27	NC		%	20
9132627	LKI	Matrix Spike [XYS806-16]	Total Chlorine	2023/12/23		90	%	85 - 115
9132627	LKI	Spiked Blank	Total Chlorine	2023/12/23		95	%	85 - 115
9132627	LKI	Method Blank	Total Chlorine	2023/12/23	<0.1		mg/L	
9132627	LKI	RPD [XYS806-16]	Total Chlorine	2023/12/23	NC		%	25
9133035	NGI	Matrix Spike [XYS806-03]	Fluoride (F-)	2023/12/27		107	%	80 - 120
9133035	NGI	Spiked Blank	Fluoride (F-)	2023/12/27		104	%	80 - 120
9133035	NGI	Method Blank	Fluoride (F-)	2023/12/27	<0.10		mg/L	
9133035	NGI	RPD [XYS806-03]	Fluoride (F-)	2023/12/27	10		%	20
9133049	NGI	Spiked Blank	pH	2023/12/27		102	%	98 - 103
9133049	NGI	RPD [XYS806-03]	pH	2023/12/27	1.0		%	N/A
9133830	JZ	Matrix Spike	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		79	%	50 - 130
			Decachlorobiphenyl	2023/12/29		119	%	50 - 130
			Hexachlorobenzene	2023/12/29		86	%	50 - 130
9133830	JZ	Spiked Blank	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		78	%	50 - 130
			Decachlorobiphenyl	2023/12/29		129	%	50 - 130
			Hexachlorobenzene	2023/12/29		95	%	50 - 130
9133830	JZ	RPD	Hexachlorobenzene	2023/12/29	8.2		%	30
			Hexachlorobenzene	2023/12/29	NC		%	30
9133830	JZ	Method Blank	2,4,5,6-Tetrachloro-m-xylene	2023/12/29		52	%	50 - 130
			Decachlorobiphenyl	2023/12/29		87	%	50 - 130
			Hexachlorobenzene	2023/12/29	<0.005		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9134253	ANF	Matrix Spike	Mercury (Hg)	2023/12/28		90	%	75 - 125
9134253	ANF	Spiked Blank	Mercury (Hg)	2023/12/28		96	%	80 - 120
9134253	ANF	Method Blank	Mercury (Hg)	2023/12/28	<0.00010		mg/L	
9134253	ANF	RPD	Mercury (Hg)	2023/12/28	NC		%	20
			Mercury (Hg)	2023/12/28	NC		%	20
			Mercury (Hg)	2023/12/28	NC		%	20
9134276	NS3	Matrix Spike	Total Chemical Oxygen Demand (COD)	2023/12/29		NC	%	80 - 120
9134276	NS3	Spiked Blank	Total Chemical Oxygen Demand (COD)	2023/12/29		95	%	80 - 120
9134276	NS3	Method Blank	Total Chemical Oxygen Demand (COD)	2023/12/29	<4.0		mg/L	
9134276	NS3	RPD	Total Chemical Oxygen Demand (COD)	2023/12/29	2.8		%	20
9134489	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2023/12/29		NC	%	80 - 120
9134489	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/12/29		99	%	80 - 120
9134489	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/29		100	%	80 - 120
9134489	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/12/29	<0.10		mg/L	
9134489	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2023/12/29	1.2		%	20
9135404	CPO	Matrix Spike [XYS806-13]	Phenols-4AAP	2023/12/28		104	%	80 - 120
9135404	CPO	Spiked Blank	Phenols-4AAP	2023/12/28		99	%	80 - 120
9135404	CPO	Method Blank	Phenols-4AAP	2023/12/28	<0.0010		mg/L	
9135404	CPO	RPD [XYS806-13]	Phenols-4AAP	2023/12/28	NC		%	20
9136120	TLG	Matrix Spike	Total Aluminum (Al)	2023/12/29		NC	%	80 - 120
			Total Antimony (Sb)	2023/12/29		102	%	80 - 120
			Total Arsenic (As)	2023/12/29		97	%	80 - 120
			Total Bismuth (Bi)	2023/12/29		97	%	80 - 120
			Total Cadmium (Cd)	2023/12/29		96	%	80 - 120
			Total Chromium (Cr)	2023/12/29		96	%	80 - 120
			Total Cobalt (Co)	2023/12/29		97	%	80 - 120
			Total Copper (Cu)	2023/12/29		93	%	80 - 120
			Total Iron (Fe)	2023/12/29		94	%	80 - 120
			Total Lead (Pb)	2023/12/29		97	%	80 - 120
			Total Manganese (Mn)	2023/12/29		94	%	80 - 120
			Total Molybdenum (Mo)	2023/12/29		101	%	80 - 120
			Total Nickel (Ni)	2023/12/29		94	%	80 - 120
			Total Phosphorus (P)	2023/12/29		NC	%	80 - 120
			Total Selenium (Se)	2023/12/29		98	%	80 - 120
			Total Silver (Ag)	2023/12/29		95	%	80 - 120
			Total Tin (Sn)	2023/12/29		94	%	80 - 120
			Total Titanium (Ti)	2023/12/29		91	%	80 - 120
			Total Vanadium (V)	2023/12/29		97	%	80 - 120
			Total Zinc (Zn)	2023/12/29		95	%	80 - 120
9136120	TLG	Spiked Blank	Total Aluminum (Al)	2023/12/29		97	%	80 - 120
			Total Antimony (Sb)	2023/12/29		104	%	80 - 120
			Total Arsenic (As)	2023/12/29		97	%	80 - 120
			Total Bismuth (Bi)	2023/12/29		97	%	80 - 120
			Total Cadmium (Cd)	2023/12/29		98	%	80 - 120
			Total Chromium (Cr)	2023/12/29		96	%	80 - 120
			Total Cobalt (Co)	2023/12/29		97	%	80 - 120
			Total Copper (Cu)	2023/12/29		96	%	80 - 120
			Total Iron (Fe)	2023/12/29		97	%	80 - 120
			Total Lead (Pb)	2023/12/29		99	%	80 - 120
			Total Manganese (Mn)	2023/12/29		95	%	80 - 120
			Total Molybdenum (Mo)	2023/12/29		101	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Nickel (Ni)	2023/12/29		95	%	80 - 120
			Total Phosphorus (P)	2023/12/29		91	%	80 - 120
			Total Selenium (Se)	2023/12/29		100	%	80 - 120
			Total Silver (Ag)	2023/12/29		98	%	80 - 120
			Total Tin (Sn)	2023/12/29		100	%	80 - 120
			Total Titanium (Ti)	2023/12/29		97	%	80 - 120
			Total Vanadium (V)	2023/12/29		97	%	80 - 120
			Total Zinc (Zn)	2023/12/29		98	%	80 - 120
9136120	TLG	Method Blank	Total Aluminum (Al)	2023/12/29	<4.9		ug/L	
			Total Antimony (Sb)	2023/12/29	<0.50		ug/L	
			Total Arsenic (As)	2023/12/29	<1.0		ug/L	
			Total Bismuth (Bi)	2023/12/29	<1.0		ug/L	
			Total Cadmium (Cd)	2023/12/29	<0.090		ug/L	
			Total Chromium (Cr)	2023/12/29	<5.0		ug/L	
			Total Cobalt (Co)	2023/12/29	<0.50		ug/L	
			Total Copper (Cu)	2023/12/29	<0.90		ug/L	
			Total Iron (Fe)	2023/12/29	<100		ug/L	
			Total Lead (Pb)	2023/12/29	<0.50		ug/L	
			Total Manganese (Mn)	2023/12/29	<2.0		ug/L	
			Total Molybdenum (Mo)	2023/12/29	<0.50		ug/L	
			Total Nickel (Ni)	2023/12/29	<1.0		ug/L	
			Total Phosphorus (P)	2023/12/29	<100		ug/L	
			Total Selenium (Se)	2023/12/29	<2.0		ug/L	
			Total Silver (Ag)	2023/12/29	<0.090		ug/L	
			Total Tin (Sn)	2023/12/29	<1.0		ug/L	
			Total Titanium (Ti)	2023/12/29	<5.0		ug/L	
			Total Vanadium (V)	2023/12/29	<0.50		ug/L	
			Total Zinc (Zn)	2023/12/29	<5.0		ug/L	
9136120	TLG	RPD	Total Aluminum (Al)	2023/12/29	2.2		%	20
			Total Cadmium (Cd)	2023/12/29	16		%	20
			Total Chromium (Cr)	2023/12/29	9.9		%	20
			Total Copper (Cu)	2023/12/29	10		%	20
			Total Iron (Fe)	2023/12/29	5.3		%	20
			Total Lead (Pb)	2023/12/29	4.8		%	20
			Total Nickel (Ni)	2023/12/29	13		%	20
			Total Zinc (Zn)	2023/12/29	2.4		%	20
9138688	K1P	Spiked Blank	Total Oil & Grease	2024/01/02		98	%	80 - 110
9138688	K1P	RPD	Total Oil & Grease	2024/01/02	0.76		%	25
9138688	K1P	Method Blank	Total Oil & Grease	2024/01/02	<0.50		mg/L	
9138690	K1P	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2024/01/02		96	%	65 - 130
9138690	K1P	RPD	Total Oil & Grease Mineral/Synthetic	2024/01/02	0.52		%	25

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9138690	K1P	Method Blank	Total Oil & Grease Mineral/Synthetic	2024/01/02	<0.50		mg/L	

N/A = Not Applicable

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

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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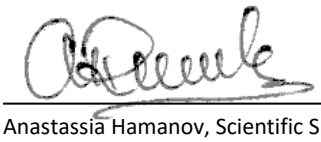
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C3BP885
Report Date: 2024/01/17

GEMTEC LIMITED
Client Project #: 101987.017
Site Location: FERGUS
Sampler Initials: CC

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

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IIONT-2023-12-1688

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		
Company Name:	#35525 GEMTEC LIMITED	Company Name:	#34261 GEMTEC LIMITED	Quotation #:	C32976	Bottle Order #:
Attention:	Invoicing	Attention:	Jacqueline Brook	P.O. #:		969738
Address:	32 Steacie Drive Ottawa ON K2K 2A9	Address:	6695 Millcreek Drive Unit 7 Mississauga ON L5N 5M4	Project:	101987.017	
Tel:	(613) 836-1422 Fax: (613) 836-9731	Tel:	(289) 814-1940 Fax:	Project Name:	Fergus	COC #: / Project Manager:
Email:	accountspayable@gemtec.ca	Email:	jacqueline.brook@gemtec.ca; chloe.choi@gemtec.ca	Site #:		C#969738-01-01 / Katherine Szozda
				Sampled By:	Chloe Choi	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☑ Sanitary Sewer Bylaw
- ☐ Reg 558. ☑ Storm Sewer Bylaw
- ☐ MISA Municipality Centre Wellington
- ☑ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions
- Compare the result to the PWQO

Include Criteria on Certificate of Analysis (Y/N)? Y

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☑
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Centre Wellington Sanitary By-Law (22-66)	Dissolved Mercury in Water by CVAA	Centre Wellington Storm By-Law (22-66)	# of Bottles	Comments
1		BH23-33	23/12/21	10:00 AM	GW	No	✓		✓	18	
2		Black Creek	23/12/21	11:00 AM	SW	Yes	✓	✓	✓	18	- one of the Hg bottles is field-filtered as indicated on the bottle
3											
4											
5											
6											
7											
8											
9											
10											

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Chloe Choi	23/12/21	1:03PM	[signature] IDCOOLSDOU	2023/12/21	12:11	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes ✓	No
	7.5/7.5	Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

APPENDIX I

Water Balance

Table I.1 to I.7 Environment Canada Precipitation, Surplus, Data Fergus Shand Dam

Table I.8 Pre-Development Water Budget (SE site)

Table I.9 Post-Development Water Budget (SE site)

Table I.10 Mitigated Post-Development Water Budget (SE site)

Table I.11 Pre-Development Water Budget (WHPA-Q)

Table I.12 Post-Development Water Budget (WHPA-Q)

Table I.13 Mitigated Post-Development Water Budget (WHPA-Q)

Table I.1- Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	75	mm
Heat Index	34.97	
Lower Zone	45	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	38	69	75	324
February	-7.2	61	18	25	1	1	0	42	87	75	384
March	-2.1	66	38	74	7	7	0	104	41	75	450
April	5.2	79	72	48	30	30	0	90	0	75	529
May	12.3	80	80	0	76	76	0	18	0	61	610
June	17.4	93	93	0	110	103	-7	11	0	40	704
July	19.9	82	82	0	128	103	-25	2	0	17	786
August	19.1	89	89	0	114	88	-26	4	0	15	875
September	15	88	88	0	77	67	-10	7	0	28	963
October	8.4	84	84	0	38	37	-1	20	0	55	83
November	2	86	74	8	12	12	0	53	4	72	168
December	-4.1	79	33	17	2	2	0	45	33	75	247
Average	6.4										
Total		961	771	191	596	527	-69	434			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.2- Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	100	mm
Heat Index	34.97	
Lower Zone	60	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	37	69	100	324
February	-7.2	61	18	25	1	1	0	42	87	100	384
March	-2.1	66	38	74	7	7	0	104	41	100	450
April	5.2	79	72	48	30	30	0	90	0	100	529
May	12.3	80	80	0	76	76	0	18	0	86	610
June	17.4	93	93	0	110	107	-3	11	0	61	704
July	19.9	82	82	0	128	112	-16	2	0	29	786
August	19.1	89	89	0	114	91	-23	4	0	23	875
September	15	88	88	0	77	68	-9	7	0	37	963
October	8.4	84	84	0	38	37	-1	16	0	68	83
November	2	86	74	8	12	12	0	45	4	94	168
December	-4.1	79	33	17	2	2	0	42	33	99	247
Average	6.4										
Total		961	771	191	596	544	-52	418			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.3 - Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	125	mm
Heat Index	34.97	
Lower Zone	75	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	36	69	124	324
February	-7.2	61	18	25	1	1	0	42	87	125	384
March	-2.1	66	38	74	7	7	0	104	41	125	450
April	5.2	79	72	48	30	30	0	90	0	125	529
May	12.3	80	80	0	76	76	0	18	0	111	610
June	17.4	93	93	0	110	109	-1	11	0	84	704
July	19.9	82	82	0	128	118	-10	2	0	46	786
August	19.1	89	89	0	114	96	-18	4	0	35	875
September	15	88	88	0	77	68	-9	7	0	48	963
October	8.4	84	84	0	38	38	-1	13	0	82	83
November	2	86	74	8	12	12	0	37	4	115	168
December	-4.1	79	33	17	2	2	0	40	33	123	247
Average	6.4										
Total		961	771	191	596	558	-39	404			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.4 - Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	150	mm
Heat Index	34.97	
Lower Zone	90	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	34	69	148	324
February	-7.2	61	18	25	1	1	0	41	87	149	384
March	-2.1	66	38	74	7	7	0	103	41	150	450
April	5.2	79	72	48	30	30	0	90	0	150	529
May	12.3	80	80	0	76	76	0	18	0	136	610
June	17.4	93	93	0	110	110	0	11	0	108	704
July	19.9	82	82	0	128	122	-6	2	0	66	786
August	19.1	89	89	0	114	100	-14	4	0	51	875
September	15	88	88	0	77	69	-8	7	0	64	963
October	8.4	84	84	0	38	38	-1	12	0	98	83
November	2	86	74	8	12	12	0	34	4	135	168
December	-4.1	79	33	17	2	2	0	38	33	145	247
Average	6.4										
Total		961	771	191	596	568	-29	394			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.5 - Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	250	mm
Heat Index	34.97	
Lower Zone	150	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	29	69	244	324
February	-7.2	61	18	25	1	1	0	39	87	246	384
March	-2.1	66	38	74	7	7	0	102	41	248	450
April	5.2	79	72	48	30	30	0	88	0	250	529
May	12.3	80	80	0	76	76	0	18	0	236	610
June	17.4	93	93	0	110	110	0	11	0	208	704
July	19.9	82	82	0	128	127	-1	2	0	161	786
August	19.1	89	89	0	114	110	-4	4	0	136	875
September	15	88	88	0	77	73	-4	7	0	145	963
October	8.4	84	84	0	38	38	0	11	0	180	83
November	2	86	74	8	12	12	0	30	4	220	168
December	-4.1	79	33	17	2	2	0	33	33	235	247
Average	6.4										
Total		961	771	191	596	587	-9	374			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.6 - Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	300	mm
Heat Index	34.97	
Lower Zone	180	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	27	69	292	324
February	-7.2	61	18	25	1	1	0	39	87	295	384
March	-2.1	66	38	74	7	7	0	102	41	298	450
April	5.2	79	72	48	30	30	0	88	0	300	529
May	12.3	80	80	0	76	76	0	18	0	286	610
June	17.4	93	93	0	110	110	0	11	0	258	704
July	19.9	82	82	0	128	128	0	2	0	210	786
August	19.1	89	89	0	114	112	-2	4	0	184	875
September	15	88	88	0	77	74	-3	7	0	191	963
October	8.4	84	84	0	38	38	0	11	0	227	83
November	2	86	74	8	12	12	0	30	4	267	168
December	-4.1	79	33	17	2	2	0	33	33	282	247
Average	6.4										
Total		961	771	191	596	591	-5	372			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.7 - Environment Canada Precipitation, Surplus Data Fergus Shand Dam, Ontario
Hydrogeological Investigation
Fergus, Ontario

Fergus Shand Dam Water Budget Means for the period 1965-2022 6142400

Water Holding Capacity	400	mm
Heat Index	34.97	
Lower Zone	240	mm
A	1.054	
Date Range	1965	2022

Date	Temperature (°C)	Precipitation (mm)	Rain (mm)	Melt (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Deficit (mm)	Surplus (mm)	Snow (mm)	Soil (mm)	Accumulated Precipitation (mm)
January	-7.7	74	20	19	1	1	0	26	69	390	324
February	-7.2	61	18	25	1	1	0	39	87	393	384
March	-2.1	66	38	74	7	7	0	101	41	396	450
April	5.2	79	72	48	30	30	0	86	0	400	529
May	12.3	80	80	0	76	76	0	18	0	386	610
June	17.4	93	93	0	110	110	0	11	0	358	704
July	19.9	82	82	0	128	128	0	2	0	310	786
August	19.1	89	89	0	114	113	-1	4	0	282	875
September	15	88	88	0	77	76	-1	7	0	287	963
October	8.4	84	84	0	38	38	0	11	0	323	83
November	2	86	74	8	12	12	0	29	4	364	168
December	-4.1	79	33	17	2	2	0	32	33	379	247
Average	6.4										
Total		961	771	191	596	594	-2	366			

Entered by: CC
Checked by: JB

Client: Fergus Development Inc.
Project Number: 101987.017
November 2024

Table I.8: Pre-Development Water Budget (SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus, Ontario

Description	Units	House	Entrance Roadways	Ponds	Wetland	Forested Area		Lawn			Undeveloped Area (Pasture and Shrubs)		TOTALS	Notes
Soil Type	-	n/a	n/a	n/a	n/a	Sand Loam	Silt Loam	Sand Loam	Silt Loam	Clay	Sandy Loam	Clay Loam		
Topography	-	n/a	n/a	n/a	n/a	Rolling to Hilly	Hilly	Rolling to Hilly	Hilly	Hilly	Rolling to Hilly	Hilly		
WHC (mm)	-	n/a	n/a	n/a	n/a	300	400	75	125	100	150	250		
Pervious Area	m^2	0	0	2,909	22,419	58,324	28,562	80,858	139,876	9,845	31,098	22,913	396,804	
Impervious Area	m^2	408	1,288	0	0	0	0	0	0	0	0	0	1,696	
Total Area	m^2	408	1,288	2,909	22,419	58,324	28,562	80,858	139,876	9,845	31,098	22,913	398,500	
Infiltration Factor														
Soil Sub-Factor	-	n/a	n/a	n/a	n/a	0.4	0.3	0.4	0.3	0.2	0.4	0.2	-	
Land Cover Sub-Factor	-	n/a	n/a	n/a	n/a	0.2	0.2	0.1	0.1	0.1	0.1	0.1	-	
Topography Sub-Factor	-	n/a	n/a	n/a	n/a	0.15	0.1	0.15	0.1	0.1	0.15	0.1	-	
Infiltration Factor	-	0	0	0	0	0.75	0.6	0.65	0.5	0.4	0.65	0.4	-	
Runoff Factor	-	1	1	1	1	0.25	0.4	0.35	0.5	0.6	0.35	0.6	-	
Average Annual Water Balance (in mm/year)														
Inputs														
Precipitation	mm/yr	961	961	961	961	961	961	961	961	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**-**	
Outputs														
Actual Evapotranspiration	mm/yr	96	96	596	596	591	594	527	558	544	568	587	-	
Surplus	mm/yr	865	865	365	365	372	366	434	404	418	394	374	-	
Infiltration	mm/yr	0	0	0	0	279	220	282	202	167	256	150	-	
Runoff	mm/yr	865	865	365	365	93	146	152	202	251	138	224	-	
Total Outputs	**mm/yr**	**961**	**961**	**961**	**961**	**963**	**960**	**961**	**962**	**962**	**962**	**961**	**-**	
Average Annual Water Balance (in m^3/year)														
Inputs														
Precipitation	m^3/yr	392	1,238.00	2,795.55	21,544.66	56,049.36	27,448.08	77,704.54	134,420.84	9,461.05	29,885.18	22,019.39	382,959	
Total Inputs	**m3/yr**	**392**	**1,238**	**2,796**	**21,545**	**56,049**	**27,448**	**77,705**	**134,421**	**9,461**	**29,885**	**22,019**	**382,959**	
Outputs														
Actual Evapotranspiration	m3/yr	39	124	1,734	13,362	34,469	16,966	42,612	78,051	5,356	17,664	13,450	223,826	
Surplus	m3/yr	353	1,114	1,062	8,183	21,580	10,482	35,092	56,370	4,105	12,222	8,569	159,133	
Infiltration	m3/yr	0	0	0	0	16185	6289	22810	28185	1642	7944	3428	86,483	
Runoff	m3/yr	353	1,114	1,062	8,183	5,395	4,193	12,282	28,185	2,463	4,278	5,141	72,650	
Total Outputs	**m3/yr**	**392**	**1,238**	**2,796**	**21,545**	**56,049**	**27,448**	**77,705**	**134,421**	**9,461**	**29,885**	**22,019**	**382,959**	

Table I.9: Post-Development Water Budget (SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus, Ontario

Description	Units	House - Roof	House-Driveway	Sanitary pumping station	Roads	SWM Pond	Wetland	Lawn			Open Space / Landscaping			TOTALS	Notes
Soil Type	-	n/a	n/a	n/a	n/a	n/a	n/a	Sand Loam	Silt Loam	Clay Loam	Sand	Silt Loam	Clay		
Topography	-	n/a	n/a	n/a	n/a	n/a	n/a	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly		
WHC (mm)	-	n/a	n/a	n/a	n/a	n/a	n/a	75	125	100	75	125	100		
Pervious Area	m^2	0	0	0	0	12,935	34,539	108,448	82,250	23,947	15,410	22,253	1,693	301,476	
Impervious Area	m^2	40,710	10,030	400	45,884	0	0	0	0	0	0	0	0	97,024	
Total Area	m^2	40,710	10,030	400	45,884	12,935	34,539	108,448	82,250	23,947	15,410	22,253	1,693	398,500	
Infiltration Factor															
Soil Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	0.4	0.3	0.2	0.4	0.3	0.2	-	
Land Cover Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	0.1	0.1	0.1	0.1	0.1	0.1	-	
Topography Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	0.15	0.15	0.15	0.15	0.15	0.15	-	
Infiltration Factor	-	0	0	0	0	0	0	0.65	0.55	0.45	0.65	0.55	0.45	-	
Runoff Factor	-	1	1	1	1	1	1	0.35	0.45	0.55	0.35	0.45	0.55	-	
Average Annual Water Balance (in mm/year)															
Inputs															
Precipitation	mm/yr	961	961	961	961	961	961	961	961	961	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**-**	
Outputs															
Actual Evapotranspiration	mm/yr	96	96	96	96	596	596	527	558	544	527	558	544	-	
Surplus	mm/yr	865	865	865	865	365	365	434	404	418	434	404	418	-	
Infiltration	mm/yr	0	0	0	0	0	0	282	222	188	282	222	188	-	
Runoff	mm/yr	865	865	865	865	365	365	152	182	230	152	182	230	-	
Total Outputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**962**	**962**	**961**	**962**	**962**	**-**	
Average Annual Water Balance (in m^3/year)															
Inputs															
Precipitation	m^3/yr	39,122	9,639	384	44,095	12,431	33,192	104,219	79,042	23,013	14,809	21,385	1,627	382,959	
Total Inputs	**m3/yr**	**39,122**	**9,639**	**384**	**44,095**	**12,431**	**33,192**	**104,219**	**79,042**	**23,013**	**14,809**	**21,385**	**1,627**	**382,959**	
Outputs															
Actual Evapotranspiration	m3/yr	3,908	963	38	4,405	7,709	20,585	57,152	45,896	13,027	8,121	12,417	921	175,143	
Surplus	m3/yr	35,214	8,676	346	39,690	4,721	12,607	47,066	33,147	9,986	6,688	8,968	706	207,815	
Infiltration	m3/yr	0	0	0	0	0	0	30,593	18,231	4,494	4,347	4,932	318	62,915	
Runoff	m3/yr	35,214	8,676	346	39,690	4,721	12,607	16,473	14,916	5,492	2,341	4,036	388	144,900	
Total Outputs	**m3/yr**	**39,122**	**9,639**	**384**	**44,095**	**12,431**	**33,192**	**104,219**	**79,042**	**23,013**	**14,809**	**21,385**	**1,627**	**382,959**	

Table I.10: Mitigated Post-Development Water Budget (SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus, Ontario

Description	Units	Roof (to Downspout Disconnect)			Roof (to soakaway pits)		House-Driveway	Sanitary pumping station	Roads & Paths	SWM Pond	Wetland	Lawn			Open Space / Landscaping			TOTALS	Notes
Soil Type	-	Sand Loam	Silt Loam	Clay Loam	Sand Loam	Silt Loam	n/a	n/a	n/a	n/a	n/a	Sand Loam	Silt Loam	Clay Loam	Sandy Loam	Silt Loam	Clay Loam		
Topography	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly		
WHC (mm)	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	75	125	100	75	125	100		
Pervious Area	m^2	0	0	0	0	0	0	0	0	12,935	34,539	108,448	82,250	23,947	15,410	22,253	1,693	301,475	
Impervious Area	m^2	2,415	4,485	4,485	18,285	11,040	10,030	400	45,884	0	0	0	0	0	0	0	0	97,024	
Total Area	m^2	2,415	4,485	4,485	18,285	11,040	10,030	400	45,884	12,935	34,539	108,448	82,250	23,947	15,410	22,253	1,693	398,499	
						40,710	10,030	400	45,884	12,935	34,539	108,448	82,250	23,947	15,410	22,253	1,693		
Infiltration Factor																			
Soil Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.4	0.2	0.3	0.4	0.3	0.2	-	
Land Cover Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.1	0.1	0.1	0.10	0.10	0.1	-	
Topography Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.15	0.15	0.15	0.15	0.15	0.15	-	
Infiltration Factor	-	0.5	0.25	0.25	0.83	0.81	0	0	0	0	0	0.65	0.45	0.55	0.65	0.55	0.45	-	
Runoff Factor	-	0.5	0.75	0.75	0.17	0.19	1	1	1	1	1	0.35	0.55	0.45	0.35	0.45	0.55	-	
Average Annual Water Balance (in mm/year)																			
Inputs																			
Precipitation	mm/yr	961	961	961	961	961	961	961	961	961	961	961	961	961	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**-**	
Outputs																			
Actual Evapotranspiration	mm/yr	96	96	96	96	96	96	96	96	596	596	527	558	544	527	558	544	-	
Surplus	mm/yr	865	865	865	865	865	865	865	865	365	365	434	404	418	434	404	418	-	
Infiltration	mm/yr	433	216	216	718	701	0	0	0	0	0	282	182	230	282	222	188	-	
Runoff	mm/yr	432	649	649	147	164	865	865	865	365	365	152	222	188	152	182	230	-	
Total Outputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**962**	**962**	**961**	**962**	**962**	**-**	
Average Annual Water Balance (in m^3/year)																			
Inputs																			
Precipitation	m^3/yr	2,321	4,310	4,310	17,572	10,609	9,639	384	44,095	12,431	33,192	104,219	79,042	23,013	14,809	21,385	1,627	382,958	
Total Inputs	**m3/yr**	**2,321**	**4,310**	**4,310**	**17,572**	**10,609**	**9,639**	**384**	**44,095**	**12,431**	**33,192**	**104,219**	**79,042**	**23,013**	**14,809**	**21,385**	**1,627**	**382,958**	
Outputs																			
Actual Evapotranspiration	m3/yr	232	431	431	1,755	1,060	963	38	4,405	7,709	20,585	57,152	45,896	13,027	8,121	12,417	921	175,143	
Surplus	m3/yr	2,089	3,880	3,880	15,817	9,550	8,676	346	39,690	4,721	12,607	47,066	33,147	9,986	6,688	8,968	706	207,815	
Infiltration	m3/yr	1,044	970	970	13,128	7,735	0	0	0	0	0	30,593	14,916	5,492	4,347	4,932	318	84,445	
Runoff	m3/yr	1,045	2,910	2,910	2,689	1,815	8,676	346	39,690	4,721	12,607	16,473	18,231	4,494	2,341	4,036	388	123,370	
Total Outputs	**m3/yr**	**2,321**	**4,310**	**4,310**	**17,572**	**10,609**	**9,639**	**384**	**44,095**	**12,431**	**33,192**	**104,219**	**79,042**	**23,013**	**14,809**	**21,385**	**1,627**	**382,958**	

Table I.11: Pre-Development Water Budget (WHPA-Q area with SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus,

Description	Units	Wetland	Undeveloped Area (Pasture and Shrubs)		TOTALS	Notes
Soil Type	-	n/a	Sand Loam	Clay Loam		
Topography	-	n/a	Rolling to Hilly	Hilly		
WHC (mm)	-	n/a	150	250		
Pervious Area	m^2	5,021	22,651	14,766	42,438	
Impervious Area	m^2	0	0	0	0	
Total Area	m^2	5,021	22,651	14,766	42,438	
Infiltration Factor						
Soil Sub-Factor	-	n/a	0.4	0.2	-	
Land Cover Sub-Factor	-	n/a	0.1	0.1	-	
Topography Sub-Factor	-	n/a	0.15	0.15	-	
Infiltration Factor	-	0	0.65	0.45	-	
Runoff Factor	-	1	0.35	0.55	-	
Average Annual Water Balance (in mm/year)						
Inputs						
Precipitation	mm/yr	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**-**	
Outputs						
Actual Evapotranspiration	mm/yr	596	568	587	-	
Surplus	mm/yr	365	394	374	-	
Infiltration	mm/yr	0	256	168	-	
Runoff	mm/yr	365	138	206	-	
Total Outputs	**mm/yr**	**961**	**962**	**961**	**-**	
Average Annual Water Balance (in m^3/year)						
Inputs						
Precipitation	m^3/yr	4,825	21,768	14,190	40,782	
Total Inputs	**m3/yr**	**4,825**	**21,768**	**14,190**	**40,782**	
Outputs						
Actual Evapotranspiration	m3/yr	2,992	12,866	8,667	24,525	
Surplus	m3/yr	1,833	8,902	5,523	16,257	
Infiltration	m3/yr	0	5,786	2,485	8,271	
Runoff	m3/yr	1,833	3,116	3,038	7,986	
Total Outputs	**m3/yr**	**4,825**	**21,768**	**14,190**	**40,782**	

Table I.12: Post-Development Water Budge (WHPA-Q area with SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus, Ontario

Description	Units	House - Roof	House-Driveway	Road	Lawn		Open Space / Landscaping		TOTALS	Notes
Soil Type	-	n/a	n/a	n/a	Sand Loam Rolling to Hilly	Clay Loam Rolling to Hilly	Sand Loam Rolling to Hilly	Clay Loam Rolling to Hilly		
Topography	-	n/a	n/a	n/a	75	100	75	100		
WHC (mm)	-	n/a	n/a	n/a						
Pervious Area	m^2	0	0	0	18,967	10,577	2,352	824	32,720	
Impervious Area	m^2	4,485	1,105	4,128	0	0	0	0	9,718	
Total Area	m^2	4,485	1,105	4,128	18,967	10,577	2,352	824	42,438	
Infiltration Factor										
Soil Sub-Factor	-	n/a	n/a	n/a	0.4	0.2	0.4	0.2	-	
Land Cover Sub-Factor	-	n/a	n/a	n/a	0.1	0.1	0.1	0.10	-	
Topography Sub-Factor	-	n/a	n/a	n/a	0.15	0.15	0.15	0.15	-	
Infiltration Factor	-	0	0	0	0.65	0.45	0.65	0.45	-	
Runoff Factor	-	1	1	1	0.35	0.55	0.35	0.55	-	
Average Annual Water Balance (in mm/year)										
Inputs										
Precipitation	mm/yr	961	961	961	961	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**-**	
Outputs										
Actual Evapotranspiration	mm/yr	96	96	96	527	544	527	544	-	
Surplus	mm/yr	865	865	865	434	418	434	418	-	
Infiltration	mm/yr	0	0	0	282	188	282	188	-	
Runoff	mm/yr	865	865	865	152	230	152	230	-	
Total Outputs	**mm/yr**	**961**	**961**	**961**	**961**	**962**	**961**	**962**	**-**	
Average Annual Water Balance (in m^3/year)										
Inputs										
Precipitation	m^3/yr	4,310	1,062	3,967	18,227	10,164	2,260	792	40,782	
Total Inputs	**m3/yr**	**4,310**	**1,062**	**3,967**	**18,227**	**10,164**	**2,260**	**792**	**40,782**	
Outputs										
Actual Evapotranspiration	m3/yr	431	106	396	9,996	5,754	1,240	448	18,370	
Surplus	m3/yr	3,879	956	3,571	8,231	4,410	1,020	344	22,412	
Infiltration	m3/yr	0	0	0	5,350	1,985	663	155	8,153	
Runoff	m3/yr	3,879	956	3,571	2,881	2,425	357	189	14,259	
Total Outputs	**m3/yr**	**4,310**	**1,062**	**3,967**	**18,227**	**10,164**	**2,260**	**792**	**40,782**	

Table I.13: Post-Development Water Budget (WHPA-Q area with SE Site), Fergus Gold Course Redevelopment, Residential Development, Fergus, Ontario

Description	Units	House - Roof (downspout)		House - Roof (soakaway pit)	House - Driveway	Road	Lawn		Open Space / Landscaping		TOTALS	Notes
Soil Type	-	Sand Loam	Clay Loam	Sand Loam	n/a	n/a	Sand Loam	Clay Loam	Sand Loam	Clay Loam		
Topography	-	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	n/a	n/a	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly	Rolling to Hilly		
WHC (mm)	-	75	100	75	n/a	n/a	75	100	75	100		
Pervious Area	m^2	0	0	0	0	0	18,967	10,577	2,352	824	32,720	
Impervious Area	m^2	690	1,725	2,070	1,105	4,128	0	0	0	0	9,718	
Total Area	m^2	690	1,725	2,070	1,105	4,128	18,967	10,577	2,352	824	42,438	
Infiltration Factor												
Soil Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	0.4	0.2	0.4	0.2	-	
Land Cover Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	0.1	0.1	0.1	0.10	-	
Topography Sub-Factor	-	n/a	n/a	n/a	n/a	n/a	0.15	0.15	0.15	0.15	-	
Infiltration Factor	-	0.5	0.25	0.83	0	0	0.65	0.45	0.65	0.45	-	
Runoff Factor	-	0.5	0.75	0.17	1	1	0.35	0.55	0.35	0.55	-	
Average Annual Water Balance (in mm/year)												
Inputs												
Precipitation	mm/yr	961	961	961	961	961	961	961	961	961	-	
Total Inputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**961**	**-**	
Outputs												
Actual Evapotranspiration	mm/yr	96	96	96	96	96	527	544	527	544	-	
Surplus	mm/yr	865	865	865	865	865	434	418	434	418	-	
Infiltration	mm/yr	433	216	718	0	0	282	188	282	188	-	
Runoff	mm/yr	432	649	147	865	865	152	230	152	230	-	
Total Outputs	**mm/yr**	**961**	**961**	**961**	**961**	**961**	**961**	**962**	**961**	**962**	**-**	
Average Annual Water Balance (in m^3/year)												
Inputs												
Precipitation	m^3/yr	663	1,658	1,989	1,062	3,967	18,227	10,164	2,260	792	40,782	
Total Inputs	**m3/yr**	**663**	**1,658**	**1,989**	**1,062**	**3,967**	**18,227**	**10,164**	**2,260**	**792**	**40,782**	
Outputs												
Actual Evapotranspiration	m3/yr	66	166	199	106	396	9,996	5,754	1,240	448	18,370	
Surplus	m3/yr	597	1,492	1,790	956	3,571	8,231	4,410	1,020	344	22,412	
Infiltration	m3/yr	298	373	1,486	0	0	5,350	1,985	663	155	10,310	
Runoff	m3/yr	299	1,119	304	956	3,571	2,881	2,425	357	189	12,102	
Total Outputs	**m3/yr**	**663**	**1,658**	**1,989**	**1,062**	**3,967**	**18,227**	**10,164**	**2,260**	**792**	**40,782**	

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