SEPTIC IMPACT ASSESSMENT METCALFE FAIRGROUNDS - OFFICE & EVENT HALL – 2821 8TH LINE ROAD

Project No: CCO-24-3169

Prepared for:

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Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Egis Canada Ltd ('Egis') was retained by Deimling Architecture & Interior Design ('the Client') to conduct a Septic Impact Assessment in support of a Site Plan Application located at 2821 8th Line Road, Metcalfe, Ontario ('the Site'). The proposed development plans include demolishing the existing Lion's Den building and replacing it with a new single-storey building in the same location. A new sewage treatment system will be installed at the southwestern corner of the Site and service the Lion's Den buildings. A new water supply well (PW25-01) was installed at the Site in September 2025 and will service the new Lion's Den building and the Curling Club, replacing the existing drilled well (scheduled to be decommissioned) currently serving the same purpose.

As part of pre-consultation with the City of Ottawa, it was identified that a Septic Impact Assessment was required to ensure that the proposed septic system does not impact the groundwater should it be used as a source of drinking water in the surrounding area.

This work was conducted in general accordance with the City of Ottawa's guidance document; City of Ottawa - Hydrogeological and Terrain Analysis Guidelines (March 2021).

The following report describes the terrain analysis and associated Sewage System Impact Assessment that was undertaken. This Septic Impact Assessment addresses the following:

- General Site setting information;
- Geological and hydrogeological background;
- Site-specific conditions; and
- Existing and proposed water and wastewater infrastructure (on-site and off-site).

1.1 Consultation

On August 26, 2025, Egis completed a pre-consultation with the City of Ottawa Peer Reviewer to outline the subject investigation's methodology, and to discuss any known hydrogeological issues for the investigation area, namely:

- A previous groundwater assessment program completed for the Village of Metcalfe (Golder 2003) identified groundwater quality concerns in the shallow bedrock aquifer.

- Thin overburden soils (less than 2 m thick) are mapped in the north and northwest portion of the Site requiring an investigation to determine if the Site is hydrogeologically sensitive.

As a result of the consultation, a hydrogeological investigation and a terrain analysis were deemed a necessary component of the Site Plan Control application. This hydrogeological report (prepared by Stantec Consulting Ltd. (Stantec) under separate cover) has been prepared in accordance with the following: Ontario Ministry of Environment, Conservation and Parks (MECP) provincial procedure D-5-5

(MOEE 1996) and the City of Ottawa's hydrogeological and terrain analysis guidelines (City of Ottawa 2021). Performance testing of the new groundwater supply well was undertaken to determine sustainable yield and groundwater samples were collected to assess groundwater quality.

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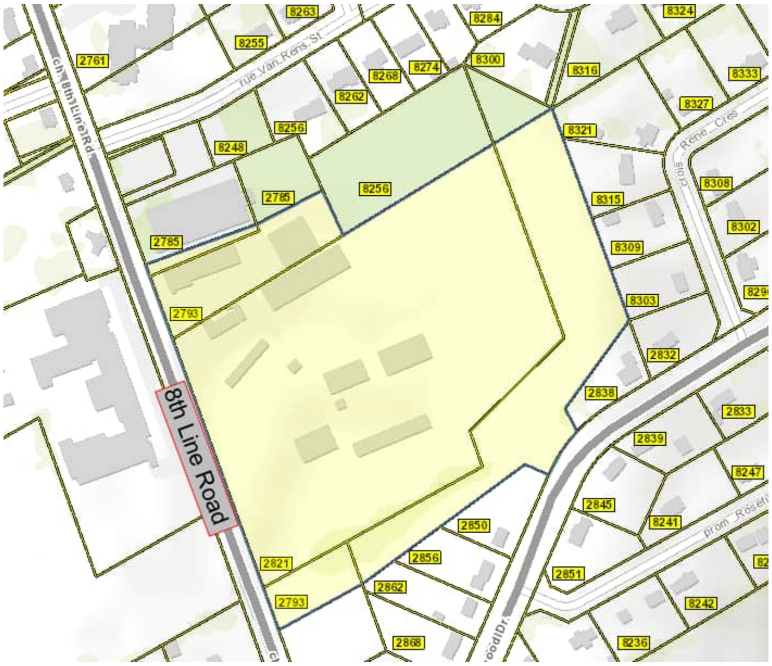
Additionally, a follow-up consultation took place between Egis with the City of Ottawa Peer Reviewer on October 3rd, 2025 to discuss the proposed revised location for the proposed sewage system leaching bed following additional terrain analysis findings from on-site investigation in the context of the proposed development.

2.0 BACKGROUND

2.1 Site Setting

Figure 1: Site Map



The property is located at 2821 8th Line Road within the City of Ottawa. It is described as Part of lots 23 and 22 Concession 8 and part of Block 79 Registered Plan 4M-896, Geographic Township of Osgoode, City of Ottawa. The land in question covers approximately 8.36 ha and is located along 8th Line Road between Van Rens Street and Glenwood Drive.

The existing site is a developed fairgrounds containing multiple buildings, including but not limited to a fair office, agricultural hall, curling club, and dining hall. The existing buildings are serviced by on-site wells, and a mix of Class 4 sewage systems (septic tank and leaching bed) and Class 5 sewage system (holding tanks). A mix of paved and gravel parking areas are located near the main Site buildings located nearest 8th Line Road. An easement for the high-voltage hydro corridor (which includes transmission towers) bisects the southern-most portion of the Site.

Based on a review of historical imagery, it appears that the majority of the existing Site Buildings have been present since at least 1976. It is Egis' understanding that groundwater is used for potable purposes at the Site.

2.2 Neighbouring Properties and Land Uses

Land uses within 500 m of the proposed severances consists primarily of institution, residential and agricultural/rural properties. The Site has frontage on 8th Line Road on its wester boundary, and on Glenwood Drive for a small portion of its southern boundary.

The potential for private wells within 500 m of the Site was reviewed as part of the Hydrogeological Assessment Report (Stantec, 2025). Results of the MECP Water Well Records (WWR) review identified 103 records, with five reporting wells as abandoned and the remaining reporting wells utilized for water supply. These wells were constructed between 1949 and 2019 and completed to depths ranging from 10 m to 135 m BGS in bedrock. The median well depth within 500 m of the Site is about 30 m BGS.

The shallow bedrock aquifers (the March / Oxford formation) are interpreted to be the main water supply aquifer for the surrounding private water supply wells. At the Site, the private well that provides potable drinking water to the Lion's Den and Curling Club is interpreted to be associated with MECP WWR ID 1517002. The water supply well on the west side of the Hicks Building which supplies water to a livestock wash station is interpreted to be associated with WWR ID 1507651. Refer to the Hydrogeological Assessment report (Stantec, 2025) for further information.

2.3 Topography and Hydrology

Per the Hydrogeological Assessment report (Stantec, 2025), regional topographic mapping, ground surface topography in Metcalfe generally slopes from northwest to southeast towards the Middle Cator River. Ground surface elevations on Site generally range between 85 m above mean sea level (AMSL) along the generally flatter western and norther ends of the Site and rises to about 90 m AMSL towards the south-eastern portion of the Site (MNR, 2025).

Based on a review of the Ministry of Natural Resources (MNR) Web Mapping application (MNR, 2025), the Middle Castor River is located approximately 650 m southeast of the Site and flows eastward into the Castor River. There is an unnamed tributary of the Middle Castor River located approximately 500 m west of the Site.

Surface drainage at the Site appears to be largely controlled by the sheet flow, tile drainage (only in the middle-western portion of the site) and surface ditches, all of which eventually appear to discharge to the south of the property and eventually into local drainage ditches located along Glenwood Drive.

2.4 Background Geology and Hydrogeology

Geological maps of the area classify the overburden at the Site as Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain.

On-Site bedrock is generally characterized as Dolostone, and sandstone of the Oxford Formation, part of the Beekmantown Group. Bedrock beneath the Site consists of limestone and was confirmed during coring completed as part of Stantec's geotechnical investigation (2025) at depths between 0.9 m and 0.8 m below ground surface (BGS) (Stantec, 2025). Based on well records within 500 m of the Site, the depth to bedrock is approximately 3.5 m on average.

Review of a map on karst topography indicates that the Site is not located within an area identified as having potential karst formation. No karst topography was observed on-site at the time of site visits.

Per the Hydrogeological Assessment report (Stantec, 2025) the key geological units in the vicinity of the Site are presented below based on the review of the regional mapping, MECP WWR and available public reports:

- Overburden: MECP WWR within 500 m of the Site indicate the overburden material is generally characterized by clay with some silt and sand (MECP 2024). Overburden generally extends from ground surface to about 17 m BGS.
- Oxford Formation (Aquifer): The Oxford Formation is characterized by dolostone with thin shale interbeds (Golder, MRSPR, 2009). The dolostone can be thinly to thickly bedded and occurrences of calcite-filled vugs are common (OGS 1991).
- March Formation (Aquifer): The March Formation is composed of interbedded quartz sandstone and dolostone. This formation represents a transition zone from the dolostone and shale of the Oxford Formation to the sandstone of the underlying Nepean Formation (OGS 1991). The Oxford / March Formation contact is about 40 m BGS in the Metcalfe area (Golder 2003). Sustainable yield for the Oxford and March formations is estimated at 7.87 L/s and 47.2 L/s, respectively (Golder 2003).
- Nepean Formation (Aquifer): The Nepean Formation is a sandstone bedrock aquifer that underlies a large portion of the City of Ottawa. The Nepean Sandstone Aquifer is a significant regional bedrock aquifer that provides drinking water to the City of Ottawa and central Eastern Ontario (Golder, MRSPR, 2009). The Nepean Formation is about 67 m BGS in the Metcalfe area

and is expected to be at least 10m thick (Golder 2003). Pumping tests indicate sustainable yield in the Nepean aquifer is about 92 L/s (Golder 2003).

The inferred direction of regional groundwater flow in the lower Oxford / March and Nepean Formations is to the east / southeast (Golder 2003). The inferred direction of groundwater flow in the upper shallow aquifer (Oxford Formation) is to the southeast, toward the Middle Castor River.

2.4.1 Local Groundwater Use

Per the Hydrogeological Assessment report (Stantec, 2025) there are two water supply wells near the western end of the Site. The MECP WWR for the commercial well (Well ID 1517002) indicates a layer of clay with sand from ground surface to 1 m BGS followed by limestone bedrock to 40 m BGS. The domestic well (Well ID 1507651) describes the subsurface as hardpan (cemented soil) from surface to 4 m BGS, underlain by limestone bedrock to its completion depth of 10 m BGS.

The Stantec (2025) geotechnical investigation reported similar subsurface conditions to those described above for WWRs. The subsurface conditions encountered consisted of topsoil / fill extending from surface to approximately 1 m BGS followed by limestone bedrock (Stantec, 2025).

Lithology at the new water supply well (PW25-01) is described as gravel / broken rock from surface to 1.8 m BGS followed by blue limestone to 11 m BGS. Grey limestone was observed from 11 m BGS to the completion depth. It is noted trace white sandstone was observed between 55 m and 73 m BGS, suggesting potential transition zone from the Oxford / March to the Nepean Formation. Refer to the Hydrogeological Assessment Report of the location of PW25-01 and a copy of the MECP well records.

Based on the available WWR and existing reports, overburden thickness in the vicinity of the proposed building is expected to be 1 m or less deeming the Site hydrogeologically sensitive.

The closest water body to the Site is located 450 m north of the Site, at the Westbrook Snow Dump. It is noted that this is an artificial body of water (presumably with a liner), with controlled discharge to a nearby local watercourse.

2.4.2 Potential Sources of Contamination and Potential Impacts to Hydrogeological Conditions

A windshield survey of the surrounding area was conducted in combination with a site walkthrough and review of maps and zoning information. The Site is located in a predominantly institutional and residential area, with some rural open space/agricultural areas located to the south and south-west. The current neighbouring land use of the property usage does not appear to pose any significant environmental risk to the Site.

The Site and the village of Metcalfe is not connected to municipal services, therefore it is assumed that all developed neighbouring properties are serviced by private water wells. Similarly, due to the fact that there are no municipal sanitary services near the area, it is expected that all developed properties in the vicinity of the subject site are serviced by private sewage systems.

3.0 TERRAIN ANALYSIS

3.1 On-Site Investigation

As part of a geotechnical investigation conducted by Stantec (2025), 4 boreholes were advanced via drilling within the proposed building's footprint to assess its geology and subsurface conditions, including properties of the on-site overburden. In total, 4 geotechnical boreholes were advanced.

The subsurface conditions encountered consisted of 0.05m to 0.075m of topsoil or asphalt underlain by silty sand fill with gravel, extending down to 0.8 to 0.9m below ground surface (BGS) followed by limestone bedrock. For further details, please refer to the Geotechnical Investigation Report (Stantec, 2025).

In addition to the geotechnical investigation conducted by Stantec (2025), Egis oversaw a test pitting program at two (2) locations on the Site to assess the geotechnical characteristics and properties of the on-site overburden (see Figure 2). In total, 2 test pits were advanced south-west of the new building location, while another 6 test pits were advanced further south, on both side of the easement for the high-voltage hydro corridor (which includes transmission towers) that bisects the southern-most portion of the Site. Test pits were advanced for this investigation by an Owner's representative using a track-mounted excavator.

3.2 Site Evaluation

3.2.1 Overburden Depth

Geotechnical borehole and test pitting refusal was encountered on inferred bedrock at depths ranging from 0.24m to 1.6m m BGS in all of the test pits except for TP4 and TP5, which were advanced down to 1.6m to 1.95m BGS, respectively, without encountering refusal.

3.2.2 Overburden Characterization

The site stratigraphy typically consists of five distinct layers. The layers were identified as Topsoil/Asphalt, Fill (Silty Sand with Gravel), Silt with some Sand and some Clay with Gravel and Cobbles, Silty Sand/Sand with some Silt, and Limestone Bedrock. For classification purposes, the pavement structure, fill materials, and surficial soils encountered at this site can be divided into five (5) general layers:

1. Topsoil/Asphalt
2. Fill: Silty Sand with Gravel

3. Silt with some Sand and some Clay with Gravel and Cobbles
4. Silty Sand/Sand with some Silt
5. Limestone Bedrock/Refusal

A summary of the findings encountered during test pitting investigation is presented in Table 1, while soil laboratory test results from the same investigation are included in Appendix A. Geotechnical borehole logs and laboratory test results are also included in Appendix B. Description of the strata encountered are given below.

3.2.2.1 Asphalt/Topsoil

Two boreholes (BH24-3 and BH24-4A') were advanced within the existing paved section of the site, where asphalt was measured to extend approximately 0.05m to 0.075m in the depth BGS. In all other boreholes and test pits, topsoil was encountered and measured to extend approximately 0.05m to 0.40m in depth BGS.

3.2.2.2 Fill: Silty Sand with Gravel

The fill layer was encountered below the topsoil and asphalt pavement in all geotechnical boreholes and extended to a depth ranging from 0.80m to 0.90m BGS to the inferred bedrock surface. The fill layer is composed of moist brown silty sand (SM) with gravel.

Two (2) representative sample from the fill layer was subjected to grain-size analysis and the layer was observed to contain on average 31% of Gravel, 42% of Sand and 27% of Fines. The laboratory test results of the grain size analysis are shown in Appendix B.

3.2.2.3 Silt with some Sand, Clay and Gravel with Cobbles

A layer of silt with some sand, clay and gravel with cobbles was encountered below the topsoil in all test pits except for TP7, and extended down to the end of hole or the inferred bedrock surface in all test pits, with the exception of TP3, where it was underlain by layer of brown silty sand/sand with some silt. The layer of silt was observed to extend to a depth varying from 0.6m to 1.95m BGS.

One (1) representative sample from the silt layer was subjected to particle size analysis and the layer was observed to contain 3.6% gravel, 18.5% sand, 59.7% silt and 18.2% clay. The laboratory test results of grain size analysis of the silt/sandy silt are included in Appendix A.

3.2.2.4 Silty Sand/Sand with some Silt

A layer of silty sand/sand with some silt was encountered below the silt layer in a single test pit (TP3). This sand layer had a thickness of 0.4m and was observed at a depth of 1.22m to 1.62m BGS, between the silt layer and the bedrock surface.

3.2.3 Soil Classification for Private Sanitary Servicing

Comparison of the soil classification for the Unified Soil Classification as provided in the Ministry of Municipal Affairs and Housing (MMAH) Supplementary Standard SB-6: Time and Soil Descriptions, reveals that the main shallow horizon native soil assessed on-site into which any private sewage system would discharge consists of the following:

- ML: Silt with some sand, clay and gravel.
    - According to Table 2 of SB-6, the ML group of soils have a coefficient of permeability (K) of 10^{-5} to 10^{-6} cm/sec and a percolation time (T) of 20 to 50 min/cm. This soil type has a medium to low permeability and is deemed acceptable as the native receiving soil for a proposed Class 4 sewage system.

Based on the above-noted soil classifications, it is proposed the development be serviced with a Class 4 sewage system with a leaching bed constructed to discharge where native silt deposits are thicker near the high-voltage hydro corridor (which includes transmission towers) that bisects the southern-most portion of the Site to provide more vertical setback from the local bedrock surface. Additionally, the leaching bed is recommended to be constructed as a partially or fully-raised bed using clean imported sand fill overlaying the silt deposit present at the Site.

3.2.4 Groundwater

Groundwater was not observed in the four (4) boreholes during the geotechnical investigation completed by Stantec (2025). Additionally, no groundwater was observed in the eight (8) test pits advanced as part of the terrain analysis investigation. Note that the shallow groundwater levels may be expected to fluctuate due to seasonal changes.

3.2.5 Recharge and Discharge Areas

Based on a review of topographic data, and geological maps, and the local Source Water Protection mapping (Raisin-South Nation, 2016), it is Egis's interpretation that the Site is not located in a significant groundwater recharge zone. Based a review of surface water drainage features in the local area, it is also not expected that the Site is in a discharge area.

3.2.6 Hydrogeologically Sensitive Areas

Due to the presence of shallow bedrock in the area, the Site is considered to be in a hydrogeologically sensitive area while also being located within a highly vulnerable aquifer area as per the local Source Water Protection mapping (Raisin-South Nation, 2016). It should be noted that no unacceptable aquifer impacts have been observed by the current level of development at and near the Site, therefore, it is reasonable to expect that a marginal increase in sewage effluent discharge associated with the proposed redevelopment project will not disrupt the existing subsurface flow patterns on-site.

4.0 SEPTIC IMPACT ASSESSMENT

4.1 Guideline

As part of the development application process, the City of Ottawa requires that a septic impact assessment be completed as per the City's Hydrogeological and Terrain Analysis Guidelines. The City's guidelines as part of Site Plan application for Impact Risk Assessments where the design flow is 10,000 L/day or less, requires that sufficient information is provided to assess the likelihood that the operation of the on-site sewage system will not adversely impact the well(s) to be construction on the subject property or existing wells on surrounding properties.

4.2 Existing and Proposed Sanitary Flows and Approvals

4.2.1 Existing Sanitary Flows and Approval

As part of the sanitary servicing review for the proposed redevelopment of subject site, it was established that the site is currently serviced by the following:

- One private Class 4 sewage system servicing the existing Curling Club building with a rated capacity of 4,455 L/day, and which consists of a septic tank, pump chamber and leaching bed dating back to 1982 and as approved per Ministry of the Environment Certificate of Approval/Use Permit no. 82 (23-VIII) 46 (refer to Appendix C). *Note that this sewage system (and its approval) and the facility it services are proposed to remain unchanged as part of the proposed redevelopment project.*

- Two private Class 5 sewage systems:
    - One Class 5 sewage system servicing the existing Den building, of unknown age and for which no sewage system permit was available, consisting of a concrete holding tank with a suspected working volume of 5,500 gallons (25,000 L) per available septage pumping records. The Owner indicated that the contents of the holding tank gets pumped out as required by a licensed septage hauler for eventual off-site discharge at an approved sewage treatment facility. *Note that this sewage system and the building it services are*

both scheduled to be decommissioned and replaced as part of the current proposed redevelopment project.

- One Class 5 sewage system servicing the existing Fairgrounds Washrooms building, suspected to have been constructed between 1976 and 1991 based on a review of publicly available historical aerial imagery and for which no sewage system permit was available. During Egis's site investigation, it was confirmed via measurements that the concrete holding tank has a working volume of approximately 25,920 L, which gets pumped out by a licensed septage hauler (as required) for off-site discharge at an approved sewage treatment facility. *Note that this sewage system and the facility it services are proposed to remain unchanged as part of the proposed redevelopment project. As part of the proposed redevelopment project, it is proposed to retroactively submit and obtain a sewage system permit for continued operation of the existing Class 5 sewage system.*

4.2.2 Proposed Sanitary Flows and Approval

The architectural details and proposed occupancy new Lion's Den building were reviewed to establish the daily sanitary flow for the facility. Following an OBC review, it was established that the average balanced daily sanitary design flow for the proposed Class 4 sewage system servicing the replacement building would be 3,336 L/day. Similarly, the daily sanitary flow for the existing Class 4 sewage system servicing the existing Curling Club is 4,455 L/day per the approved sewage system approval. The flow from both of these Class 4 sewage systems are the only two that are schedule to involve effluent discharge to the site via subsurface leaching bed, resulting in a total on-site sanitary sewage leaching bed discharge of 7791 L/day. It should be noted that the existing Class 5 sewage system servicing the existing Fairgrounds Washrooms building scheduled to remain is estimated to have a balanced average rated daily sanitary flow of 2,209 L/day, but does not factor in to the total daily sanitary flows accounted in the septic impact assessment since the sanitary flows generated in that facility are collected in the holding tank and pumped out by a licensed septage hauler (as required) for off-site discharge at an approved sewage treatment facility.

4.3 Septic Impact Assessment

As part of the development application process, the City of Ottawa requires that a septic impact assessment be completed as per the City's Hydrogeological and Terrain Analysis Guidelines. The City's guidelines generally follow the MECP's Procedure D-5-4 (Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment), which outlines the following steps to be completed as part of a septic impact assessment for residential developments:

- Step 1 – Lot Size Consideration
- Step 2 – System Isolation Consideration

- Step 3 – Contaminant Attenuation Considerations

4.3.1 Lot Size Consideration

For this commercial development, it was estimated that lot size consideration would not be applicable given the proposed density of the development, therefore system isolation and contamination attenuation consideration were reviewed. Per the City of Ottawa guidelines for commercial development, the evaluation requires that a maximum allowable flow for each lot or block in the commercial development be established. Section 5.6.3 of the Procedure D-5-4 outlines a simplified approach for determining the maximum allowable flow calculated by dividing the site-specific amount of available infiltration by a factor of three. Given the specific characteristics of the proposed project are known, MP has elected to proceed with a site-specific predictive assessment that does not rely on the simplified approach, but instead takes into consideration the available project-specific information.

4.3.2 System Isolation Consideration

As previously outlined, the existing site is considered not appropriate for lot size consideration; therefore, Egis assessed whether System Isolation Considerations were applicable. If it can be demonstrated that the sewage system effluent is hydrogeologically isolated from the existing or potential drinking water supply aquifer, then the risk to groundwater is considered to be low. The system isolation argument applies to lands that extend up to 500 metres from the Site.

Based on a review of available geological information and mapping, in conjunction with site observations made during the Terrain Analysis and background information review, overburden depth on-site is shallow (< 2.0m). The Site is therefore determined not to be hydrogeologically isolated and, as such, the consideration for system isolation of sewage system effluent from the groundwater supply aquifer is not applicable to this site.

4.3.3 Predictive Assessment – Commercial Development

The Thorthwaite Water Balance method, in conjunction with local climatic data available from Environment Canada for Ottawa's MacDonald-Cartier International Airport YOW (Site Climate ID: 6106000), was used to estimate the net potential infiltration for the subject site.

The maximum allowable effluent flows for the site without exceeding the ODWO of 10 mg/L at the property boundaries was calculated using the following information:

- A water surplus (Ws) value of **378 mm/yr** was used based on Environment Canada's reported Water Budget Means for 1985-2023 at Ottawa International Airport (Lat. 45.32, Long. 75.67).
- An infiltration factor (I_f) of **0.325** was calculated as per Table 2 of MECP's document titled "MOEE Hydrogeological Technical Requirements for Land Development Applications," dated

April 1995. The factors used to calculate the Infiltration Factor (If) and the associated rationale for selection are presented below:

  - A topographic factor of 0.155 was used as the average land slope on-site can be considered an interpolation between 'rolling land' and 'hilly land'.
  - A soil factor of 0.20 was used based on the native silt with some sand, clay and gravel (ML) encountered in the overburden throughout the site.
  - A cover factor of 0.10 was used for Cultivated Land (0.1) as the majority of the infiltrating area on-site are expected to remain as cultivated land/mowed grass.

- Available infiltration (I) was calculated by multiplying the water surplus (Ws) by the infiltration factor (If). This yielded an infiltration value of **0.171990 m/yr**.
- The infiltration area (A) was determined to be 7.78 ha (77,830 m^2) or 88% of the site, once adjustments were made for the approximately 9,806 m^2 of the existing and proposed hard-surfaced areas on-site (i.e., parking/pavers/driving surfaces, roofs) based on the latest Site Plan.
- The dilution water (D_w) available was calculated as 13,385.99 m^3/yr (36,673.94 L/day) by multiplying the infiltration area (A) with the available infiltration (I).
- Based on the review of the available Groundwater Assessment and Review of Alternative Servicing Solutions, Village of Metcalfe report prepared for the City of Ottawa (Golder, March 2003), a background nitrate concentration of 1.26 mg/L was used for this study. This nitrate concentration represents the average nitrate concentration (based on 87 samples) that was reported in 2000 for the "Core Area" of the study, which represents the area that included the Site in the study. It should be noted the groundwater samples collected by Stantec from the new on-site well PW25-01 was associated with a *combined nitrate+nitrite (as N) concentration* (C_b) of 0.50 mg/L, which is less than the concentration used for this study.
- The site-wide sewage system sewage flow discharging on-site (Q_e) was set at 7,791 L/day, at a standard concentration ((C_e) of 40 mg/L since the effluent is generally expected to be from domestic origins based on the type of facility being serviced. *It should be noted that the proposed sewage system is set to incorporate Level IV treatment via the use of an OBC BMEC-approved Eljen combined treatment/leaching bed sewage system. Although Level IV sewage system in Ontario provide enhanced treatment of sewage effluent prior to subsurface discharge and set effluent quality criteria for Suspended Solids (SS) and $CBOD_5$, this standard does not set nitrogen reduction criteria or targets.*
- Target nitrate concentration at the property boundaries of 10 mg/L (as per ODWO).

Based on the above-noted information, the average nitrate concentration at the downgradient property boundary (C_w) would of be 8.269 mg/L, which is below the maximum boundary nitrate concentration of 10 mg/L.

Calculations for the predictive nitrate attenuation are presented in Appendix D.

5.0 RECOMMENDATIONS

5.1 Wastewater Servicing

Private Sewage Systems

- Approval for on-site septic treatment is governed by the OBC as it is understood that the Total Daily Design Flow proposed for the entire site will be no greater than 10,000 litres per day.

- The balanced average Daily Design Flow of 3,336 L/day for the new proposed redeveloped building is proposed to be serviced by a proposed new Class 4 sewage system incorporating Level IV treatment via the use of an OBC BMEC-approved Eljen combined treatment/leaching bed sewage system. Although Level IV sewage system in Ontario provided enhanced treatment of sewage effluent prior to subsurface discharge. It is therefore recommended that the proposed redevelopment be serviced by the existing Class 4 sewage system.

- Any changes to the on-site sewage system must be constructed with all appropriate setbacks, treatment units and stipulations as per applicable Ontario Regulations.

Servicing Layout

- The proposed development and associated existing Class 4 sewage system should follow the layout included in the Site Plan application.

6.0 LIMITATIONS

This report has been prepared, and the work referred to in this report has been undertaken by Egis for the Client. It is intended for the sole, and exclusive use of the Client with respect to the stated purpose of the work carried out by Egis.

The report may not be relied upon by any other person or entity without the express written consent of Egis. Any use which a third party makes of this report, or any reliance on decisions made based on it, without a Reliance Letter, are the responsibility of such third parties. Egis accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report or the information contained within it.

The investigation undertaken by Egis with respect to this report and any conclusions or recommendations made in this report reflect Egis's judgment based on the Site conditions observed at the time of the Site investigations, inspections, and/or sampling on the date(s) set out in this report, and on information available at the time of the preparation of this report. Conditions such as ground cover, weather, physical obstructions, etc. may influence conclusions or recommendations made in this report. Egis does not certify or warrant the environmental status of the property.

This report has been prepared for specific application to this Site and it may be based, in part, upon visual observation of the Site, subsurface investigation at discrete locations and depths, and/or specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions, portions of the Site which were unavailable for direct investigation, Site locations, subsurface or otherwise, which were not investigated directly, or chemical parameters, materials, or analysis which were not addressed or performed. Substances other than those addressed by the investigation described in this report may exist at the Site, substances addressed by the investigation may exist in areas of the Site not investigated, and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If Site conditions or applicable standards change, or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

7.0 CLOSURE

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,
Egis

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Oct. 24, 2025
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TABLES

Table 1
Summary of Test Pit Data
Metcalfe Fairgrounds, Office and Event Hall, 2821 8th Line Road, Ottawa, Ontario

Test Pit	Soil Description	Depth (m bgs)	Refusal (Y/N)	Depth to Water (m bgs)
TP1	Topsoil	0 - 0.25	Y	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.25 -1.30		
TP2	Topsoil	0 - 0.30	Y	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.3 - 0.94		
TP3	Topsoil	0 - 0.25	Y	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.25 - 1.22		
	Silty Sand/Sand with some Silt	1.22 - 1.62		
TP4	Topsoil	0 - 0.35	N	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.35 - 1.60		
TP5	Topsoil	0 - 0.40	N	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.40 - 1.95		
TP6	Topsoil	0 - 0.30	Y	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.30 - 1.60		
TP7	Topsoil	0 - 0.24	Y	Dry
TP8	Topsoil	0 - 0.30	Y	Dry
	Silt with some Sand, Clay and Gravel with Cobbles	0.30 - 0.60		

NOTES:

m bgs Metres below ground surface

FIGURES

115 Walgreen Road, R.R.3
Carp, ON K0A 1L0
Tel: 613-836-2184
Fax: 613-836-3742
www.egis-group.com

Stamp:

Client:

DEIMLING ARCHITECTURE & INTERIOR DESIGN
1010 POLYTEK STREET, UNIT #16
OTTAWA, ON K1H 9H9

Project:

METCALFE FAIRGROUNDS - FAIR OFFICE
2821 8TH LINE ROAD

Drawing Title:

SITE LAYOUT AND TEST PIT PLAN

Scale: N.T.S.

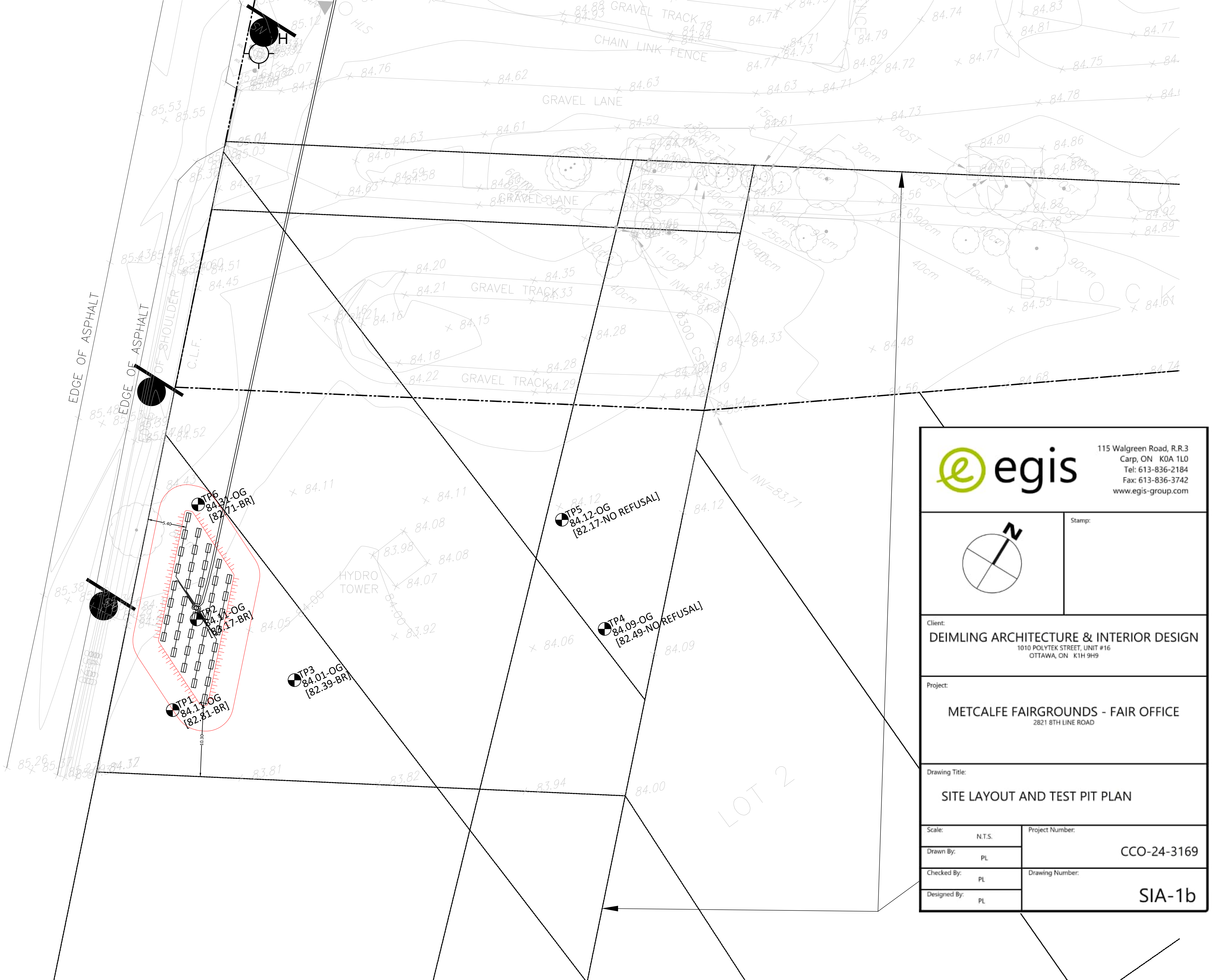
Drawn By: PL

Checked By: PL

Designed By: PL

Project Number: CCO-24-3169

Drawing Number: SIA-1a



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Project:
METCALFE FAIRGROUNDS - FAIR OFFICE
2821 8TH LINE ROAD

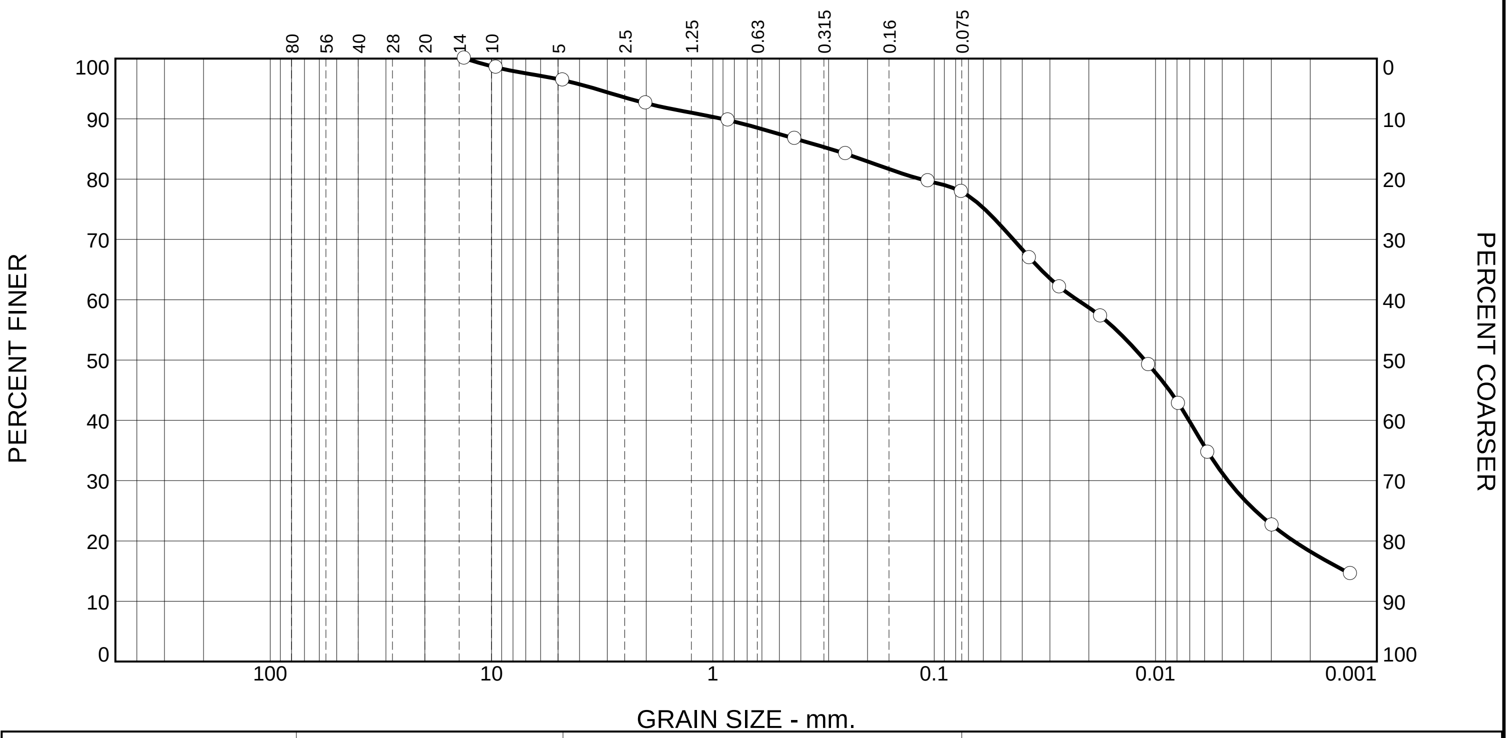
Drawing Title:
SITE LAYOUT AND TEST PIT PLAN

Scale: N.T.S.
Drawn By: PL
Checked By: PL
Designed By: PL
Project Number: CCO-24-3169
Drawing Number: SIA-1b

APPENDICES

APPENDIX A - SOIL LABORATORY TEST RESULTS FROM TEST PITTING PROGRAM

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	3.8	5.9	8.8	59.7	18.2

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
13.2mm	100.0		
9.5mm	98.5		
4.75mm	96.4		
2.00mm	92.6		
0.850mm	89.8		
0.425mm	86.7		
0.250mm	84.2		
0.106mm	79.7		
0.075mm	77.9		
0.0369 mm.	66.9		
0.0270 mm.	62.1		
0.0176 mm.	57.2		
0.0107 mm.	49.2		
0.0078 mm.	42.7		
0.0058 mm.	34.7		
0.0030 mm.	22.6		
0.0013 mm.	14.5		

* (no specification provided)

Material Description

Silt some Sand some Clay trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}=	0.9074	D_{85}=	0.2947	D_{60}=	0.0226
D_{50}=	0.0112	D_{30}=	0.0047	D_{15}=	0.0014
D_{10}=		C_u=		C_c=	

Remarks

F.M.=0.66

Date Received: Sept 25,2025 **Date Tested:** Sept 26,2025

Tested By: N.T

Checked By: J.H-J

Title: Lab Manager

Location: TP1 - SS1

Sample Number: SS1 **Depth:** 0.8m

Date Sampled: Sept 19,2025

egis

Client: Deimling Architecture

Project: Metcalfe Fairground

Project No: CCO-243169-01 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2025-10-02

Client: Deimling Architecture
Project: Metcalfe Fairground
Project Number: CCO-243169-01
Location: TP1 - SS1
Depth: 0.8m **Sample Number:** SS1
Material Description: Silt some Sand some Clay trace fine Gravel
Sample Date: Sept 19,2025
Date Received: Sept 25,2025
Tested By: N.T **Test Date:** Sept 26,2025
Checked By: J.H-J **Title:** Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer	Percent Retained
432.12	0.00	0.00	13.2mm	0.00	100.0	0.0
			9.5mm	6.38	98.5	1.5
			4.75mm	15.54	96.4	3.6
			2.00mm	32.07	92.6	7.4
55.95	0.00	0.00	0.850mm	1.70	89.8	10.2
			0.425mm	3.55	86.7	13.3
			0.250mm	5.08	84.2	15.8
			0.106mm	7.81	79.7	20.3
			0.075mm	8.88	77.9	22.1

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 92.6
Weight of hydrometer sample =55.95
Table of composite correction values:

Temp., deg. C:	21.3	21.9	20.0
Comp. corr.:	-5.5	-6.0	-6.0

Meniscus correction only = -1.0
Specific gravity of solids = 2.770
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.9007 **-** 0.191 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer	Percent Retained
1.00	21.3	47.0	41.5	0.0130	46.0	8.1	0.0369	66.9	33.1
2.00	21.3	44.0	38.5	0.0130	43.0	8.7	0.0270	62.1	37.9
5.00	21.3	41.0	35.5	0.0130	40.0	9.3	0.0176	57.2	42.8
15.00	21.3	36.0	30.5	0.0130	35.0	10.2	0.0107	49.2	50.8
30.00	21.3	32.0	26.5	0.0130	31.0	11.0	0.0078	42.7	57.3
60.00	21.3	27.0	21.5	0.0130	26.0	11.9	0.0058	34.7	65.3
250.00	21.9	20.0	14.0	0.0129	19.0	13.3	0.0030	22.6	77.4
1440.00	20.0	15.0	9.0	0.0132	14.0	14.2	0.0013	14.5	85.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.6	3.6	3.8	5.9	8.8	18.5	59.7	18.2	77.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0014	0.0024	0.0047	0.0071	0.0112	0.0226	0.1151	0.2947	0.9074	3.4010

Fineness Modulus
0.66

APPENDIX B - GEOTECHNICAL INVESTIGATION REPORT

Geotechnical Investigation Report

Metcalfe Agricultural Society
2821 8th Line Road, Metcalfe, ON

Prepared for:
Metcalfe Agricultural Society

Prepared by:
Stantec Consulting Ltd.

Project No. 121625761

May 2025

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

It is understood that the Metcalfe Agricultural Society is planning to construct a new single-storey, slab on grade building with associated exterior infrastructure and parking lot. The site is located at 2821 8th Line Road, Metcalfe, ON and is currently occupied with a single storey building.

The report contains the information gathered and recommendations for the proposed work. This work was carried out in general accordance with the Stantec proposal dated April 15, 2024.

This report has been prepared specifically and solely for the proposed work described above.

Limitations associated with the contents of this report are provided in the Statement of General Conditions included in Appendix A.

1.2 EXISTING SITE CONDITIONS AND PROPOSED DEVELOPMENT

The subject site is located at 2821 8th Line Road, Metcalfe, ON and is currently occupied with a single storey building. The building has a grassed area to the north and paved parking and access roads on the other sides. The footprint of the proposed building is in the same location as the existing building with a larger building area totaling 768 m^2. It is understood that surrounding paved parking and access roads will be reinstated.

The proposed building layout is shown on Drawing No. 2 in Appendix B.

2.0 SCOPE OF WORK

The scope of work for this Geotechnical Investigation includes the following scope of work:

- Drill four (4) boreholes to a maximum depth of 6 m using a truck mounted drill rig.
- If refusal is encountered shallower than 6 m, a maximum of two boreholes may be cored up to 1.5 m for bedrock confirmation.
- Standard Penetration Tests (SPT) will be completed at intervals of 750 mm using a standard split-spoon sampler. Split-spoons will be alternated with shear vane tests where soft clays are encountered.
- A survey of the borehole in the field will be carried out by our on-site technician.
- Soil descriptions and identifications shall be based on the Unified Soil Classification System (USCS), logged in the field in accordance with ASTM Standard D2488 (Visual Manual Procedure).
- Prepare a geotechnical report and recommendations for the following:
  - A brief project and site description.
  - Factual description of the investigative procedure.

- Investigation borehole records and laboratory results.
- A summary of subsurface soil types and pertinent geotechnical properties encountered.
- Groundwater level estimated during drilling.
- Frost penetration depths, anticipated effects associated with frost, and recommended frost mitigation measures.
- Soil bearing resistance to be used for foundation design.
- Recommendations for slab-on-grade construction.
- Excavation / backfilling recommendations.
- Earthworks recommendations and recommendations for suitable material types for construction.
- Soil resistivity data and corrosion protection requirements.
- Recommend cement type.
- Sub-base and base design recommendations for roads and paved areas.
- Embedment, bedding, cover and backfill materials during pipe installation.

3.0 INVESTIGATION PROCEDURES

3.1 FIELD INVESTIGATION

Prior to carrying out the field investigation, Stantec contacted the public utility authorities to clear the borehole locations of public and private utilities.

A geotechnical field investigation consisting of four (4) boreholes was carried out for this assignment. The boreholes were designated BH24-1A', BH-2A', BH24-3 and BH24-4A'. The investigation locations are shown on Drawing No. 2 of Appendix B.

The field drilling program was carried out on May 9, 2024. The boreholes were advanced using a truck-mounted CME drill rig equipped for soil and bedrock sampling.

The subsurface stratigraphy encountered in each borehole was recorded in the field by an experienced field personnel. Split spoon samples were collected at regularly spaced intervals in all boreholes. Bedrock coring (NQ-size) was carried out in BH24-1A' and BH24-3 to confirm the presence of bedrock.

All samples recovered were returned to Stantec's Ottawa laboratory for detailed classification and testing. Rock core samples were logged and photographed, and the Rock Quality Designation (RQD) was estimated for recovered samples.

3.2 LOCATION AND ELEVATION SURVEY

The coordinates of the boreholes were determined using a GPS navigation device. The approximate borehole elevations were inferred from the topo survey provided. The elevations are shown on the borehole records.

3.3 LABORATORY TESTING

All samples were taken to Stantec's Ottawa laboratory where they were subjected to a detailed visual examination by a Geotechnical Engineer.

The geotechnical laboratory testing program for the borehole samples is summarized in Table 3.1.

Table 3.1: Geotechnical Laboratory Testing Program

Test Description	Number of Tests
Moisture Content	9
Grain Size Distribution	2
Unconfined Compressive Strength – Rock	1
Chemical Testing (pH, soluble sulphate content, chloride content & resistivity)	1

Samples remaining after testing will be placed in storage for a period of one month after issuance of the final report. After the storage period, the samples will be discarded.

4.0 SUMMARY OF SUBSURFACE CONDITIONS

The geotechnical investigation at the site indicated a stratigraphy that generally consists of fill over bedrock.

The locations of the boreholes are shown on Drawing No. 2 in Appendix B. The Borehole Records are provided in Appendix C.

4.1 SURFICIAL MATERIAL

Surficial materials at the four boreholes consisted of paved and landscaped surfaces.

4.1.1 Pavement Structure

Boreholes BH24-3 and BH24-4A' were advanced though a paved surface. The observed asphalt thickness ranged from 50 mm to 75 mm.

4.1.2 Topsoil

Boreholes BH24-1A' and BH24-2A' were advanced through landscaped surface. The observed topsoil thickness was 50 mm.

4.2 FILL

Fill was encountered beneath the surficial material. The depth of the fill extended to approximately 0.8 m to 1.1 m below ground surface. The fill consisted of silty sand with gravel and trace topsoil and organics.

The Standard Penetration Test (SPT) blow count (N-value) for the fill material was 0 to 50 blows per 0.2 m indicating a very loose to very dense state.

Grain size analysis testing carried out on two representative samples of the fill material yielded the following results:

Gravel:	20 to 42%
Sand:	39 to 45%
Fines (silt and clay):	13 to 41%
Moisture Content:	7 to 57%

The grain size analysis results are included in Figure 1 of Appendix D. The Unified Soil Classification (USCS) group symbol for the fill ranged is SM (silty sand with gravel).

4.3 BEDROCK

Bedrock was confirmed by coring in boreholes BH24-1A' and BH24-3 at depths 0.9 m and 0.8 m, respectively. Bedrock was inferred from split spoon refusal in boreholes BH24-2A' and BH24-4A' at depths 1.1 m and 0.8 m, respectively.

The sampled bedrock consisted of grey limestone with a thin layer of sandstone. The rock has been noted as being horizontally bedded and extremely close to close spaced joints. The Rock Quality Designation (RQD) value ranged from 6% to 33%, indicating a very poor to poor quality.

The strength of the intact rock core was determined by conducting Unconfined Compressive Strength (UCS) testing on a select rock core sample. A summary of the results of the laboratory testing carried out on the bedrock is presented below. Based on the UCS test findings, the bedrock was found to be very strong.

Table 4.1: Laboratory Results on Limestone Bedrock

BOREHOLE ID	SAMPLE	DEPTH (m)	RQD AT TEST DEPTH	UNCONFINED COMPRESSIVE STRENGTH (MPa)
BH24-1A'	NQ-3	1.7	6%	108.1

A detailed description of the rock core is provided in Field Core Logs in Appendix C. Rock core photographs are also provided in Appendix C.

4.4 GROUNDWATER

Groundwater was not encountered at the time of drilling.

It should be noted that groundwater levels can be expected to fluctuate during periods of heavy precipitation associated with seasonal weather trends, in response to specific rain events, site use, adjacent site use, and construction activity.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 GENERAL

It is understood that the Metcalfe Agricultural Society is planning to construct a new single-storey, slab on grade building with associated exterior infrastructure and parking lot. The site is currently occupied with a single storey building.

The results of the geotechnical investigation indicate that the overburden material within the building footprint generally includes fill material extending to bedrock. The fill material generally consisted of silty sand with gravel. The bedrock consisted of very poor to poor quality limestone with sandstone at depths ranging from 0.8 m to 1.1 m below ground surface. Prior to construction of the proposed building, the existing building will be demolished and the existing footings and fill material will be excavated to expose the bedrock.

The existing subsurface condition is not expected to pose significant constraints to the proposed structures.

5.2 FROST PENETRATION

The typical design frost penetration depth for Ottawa is 1.8 m. It is recommended that all foundation elements that are sensitive to movement (i.e. heave and subsequent settlement) be provided with a minimum of 1.8 m of earth cover. Equivalent insulation to 1.8 m of soil cover is required to protect the soil beneath the footings from frost penetration if the full soil cover is not provided.

If the footing is founded directly on sound bedrock, protection against frost action is not anticipated.

5.3 SITE GRADING AND PREPARATION

There is currently an existing building within the proposed footprint of the building. Underground services have been located around the building. All existing utilities will have to be removed or relocated from the footprint of the proposed building. The extent of foundations for the existing structure and the thickness of fill materials that may have been placed prior to construction is unknown. The existing building and foundations will have to be removed from the footprint of the proposed building.

All existing topsoil, asphalt, concrete foundations, services, fill and any deleterious materials should be removed from beneath the footprint of the building, the footings, and the zone of influence of all footings. The zone of influence is defined by a line drawn at 1 horizontal to 1 vertical, outward and downward from the edge of the footings.

Prepared subgrade surfaces should be inspected by experienced geotechnical personnel prior to the placement of either Structural Fill or concrete. All soft or disturbed areas revealed during subgrade excavation or inspection should be removed and replaced with approved Structural Fill, as defined below.

Structural Fill should conform to the requirements of OPSS Granular B Type II or OPSS Granular A. Structural Fill placed beneath buildings should contain no recycled materials such as concrete or asphalt. It should be compacted in lifts no thicker than 300 mm to at least 100% Standard Proctor Maximum Dry Density (SPMDD), as per ASTM D698. This material should be tested and approved by a Geotechnical Engineer prior to delivery to the site.

Earth removals should be inspected by a geotechnical engineer to ensure that all unsuitable materials are removed prior to placement of fill or concrete.

Imported fill materials should be tested and approved by a Geotechnical Engineering firm prior to delivery/use. Monitoring of fill placement and in situ compaction testing should be carried out to confirm that all fill is placed and compacted to the required degree.

Temporary frost protection should be provided for all footings if construction is carried out under winter conditions.

5.4 FOUNDATIONS

The foundations for the proposed building are anticipated to be founded on shallow foundations.

Shallow Foundations

Works supported on shallow foundations should follow the foundation preparation work described in Section 5.3 above. Spread footings should be placed directly on bedrock.

The recommended factored Ultimate Limit State (ULS) resistance for footing foundations founded on bedrock are presented below.

Table 5.1: Geotechnical Bearing Resistance for Shallow Foundations

Foundation Type	Footing Width (m)	Geotechnical Resistance, ULS, (kPa)	Geotechnical Resistance, SLS, (kPa)
Strip Footing	0.5 to 2.0	1000	-
Square Footing	1.0 to 3.0	1000	-

The factored geotechnical bearing resistance at ultimate limit states (ULS) incorporates a resistance factor of 0.5. The settlement of foundations founded on bedrock is expected to be negligible and therefore, the geotechnical reaction at Serviceability Limit States (SLS) is not provided for footings on bedrock.

There are no documented faults at the building site. In the event that a fault impacted area is observed during inspection of the footing excavations, the requirement for special treatment, if any, would be assessed at the time of inspection. Although not anticipated, treatment could include excavation of the fault breccia fragments and backfilling with mass concrete.

Where construction is undertaken during winter conditions, all footing subgrades should be protected from freezing. Foundation walls and columns should be protected against heave due to soil adfreeze at the interface of the foundation backfill and foundation surfaces.

5.4.1 Coefficient of Sliding Friction

The coefficient of friction between concrete and sound bedrock, estimated in accordance with the Canadian Foundation Engineering Manual is provided below.

Sliding resistance can be calculated using the following unfactored friction coefficients:

Condition	Unfactored Friction Coefficient
Between Concrete and clean sound rock	0.7
Between Concrete and Structural Fill	0.55

A resistance factor of 0.8 should be used when calculating the ULS resistance to sliding.

5.5 CONCRETE FLOOR SLABS

A slab-on-grade construction is anticipated for the proposed building. Conventional slab-on-grade units are suitable for use for the proposed structures provided the floor slab areas are prepared as outlined in Section 5.3. A layer of free-draining granular material such as OPSS Granular A, at least 200 mm in thickness should be placed immediately beneath the floor slab for leveling and support purposes. This material should be compacted to at least 100% SPMDD. The installation of a vapor barrier below the floor slab is recommended.

The floor slabs constructed as recommended above may be designed using a soil modulus of subgrade reaction, k, of 75 MPa/m, based on a loaded area of 0.3 m by 0.3 m. The slab-on-grade units should float independently of all load-bearing walls and columns.

5.6 EXCAVATION AND BACKFILLING

5.6.1 Excavations in Soil

Temporary excavations should be carried out in accordance with the Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects.

Based on OHSA, the FILL encountered at the borehole location can be classified as a Type 3 soil. Unsupported side slopes for excavations developed entirely within Type 3 soils, if applicable, may be sloped at 1 horizontal to 1 vertical (1H:1V) from the base of the excavation.

Although not observed at the borehole location, soils excavated below the groundwater table and in loose/soft conditions, must be considered Type 4. OHSA requires that excavations in Type 4 soils be excavated to a maximum slope of 3 horizontal to 1 vertical (3H:1V) where workers enter the trench.

Where Type 3 and Type 4 soils are encountered, the maximum excavation side slope should be consistent with that of a Type 4 soil, in accordance with OHSA, or appropriate temporary support systems could be used.

The side slopes of excavations should be protected from exposure to precipitation and associated ground surface runoff, to prevent further softening and loss of strength of the soils that could lead to additional sloughing and caving. No free groundwater was observed within the overburden soils at the time of drilling; however, if encountered, control of groundwater will be required to allow the placement of concrete and/or structural fill under dry conditions. If seepage, infiltration, or surface run-off water is encountered during excavation and construction, the water should be manageable using conventional sump pits and pumps, provided that the excavations do not remain open beyond 1 to 2 days and precipitation does not occur during this period.

Soil removed from the excavation should not be stockpiled (even temporarily) at and/or near the crest of the excavations as the weight of the stockpiled soil could lead to slope instability of unsupported excavations.

Temporary shoring/protection systems are required where there is insufficient space to develop the excavations in open cut. The temporary support/shoring systems should be designed and installed in accordance with the OHSA and Ontario Provincial Standard Specification (OPSS) OPSS.PROV 539.

5.6.2 Excavations in Bedrock

If required, the temporary excavations should be carried out in accordance with the Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects. Unsupported side slopes for excavations developed within sound bedrock may be sloped at 1 horizontal to 10 vertical (1H:10V) from the bottom of the excavation.

5.6.3 Groundwater

Groundwater was not encountered in the boreholes. If water is encountered during construction, it is anticipated that dewatering will be possible using conventional sump and pump techniques. However, it should be noted that these groundwater elevations may fluctuate seasonally.

Dewatering activities may require either registration of the Ministry of Environment and Climate Change (MOECC) Environmental Activity and Sector Registry (EASR) or obtaining a Permit to Take Water (PTTW) from the MOECC depending on the anticipated groundwater removal rates.

Groundwater that is pumped from excavations during construction must be handled and disposed of appropriately. In order for pumped water to be discharged to a City sewer, it needs to meet the City of Ottawa Sewer Use By-law criteria, and a separate sewer discharge permit must be obtained. The construction contractor has the responsibility to obtain a permit under the City of Ottawa Sewer Program and testing/discharge of water to sanitary or storm sewer.

5.6.4 Pre-Construction Survey and Vibration Control

The construction of the proposed building is not anticipated to cause any significant vibration related impact to surrounding buildings. No vibration monitoring measures are required.

If bedrock excavation is carried out, vibrations will be generated. It is recommended that a pre-construction survey of all the existing structures and utilities be carried out. It is recommended that construction vibrations generally be limited to a maximum peak particle velocity as outlined in OPSS 120 “General Specifications for the Use of Explosives”.

5.6.5 Foundation Backfill

Interior foundation backfill should be placed and compacted in lifts and should consist of Structural Fill placed as described in Section 5.3. Care should be taken immediately adjacent to walls to avoid over compaction of the soil which could result in damage to the walls.

Exterior foundation backfill should be consistent with the foundation drainage design requirements; it is anticipated that a granular drainage zone (clear stone), or synthetic drainage sheets, connected to a perimeter drainage system will be placed directly adjacent to the foundation walls. Beyond the granular drainage zone or drainage sheets, backfill should consist of a material meeting the requirements of OPSS Granular B Type I and should be placed in lifts no thicker than 300 mm and compacted using light compaction equipment to at least 95% of SPMDD.

5.6.6 Pipe Bedding and Backfill

Bedding for utilities should be placed in accordance with the pipe design requirements. It is recommended that a minimum of 150 mm to 200 mm of OPSS Granular A be placed below the pipe invert as bedding material. Granular pipe backfill placed above the invert should consist of Granular A material. A minimum of 300 mm vertical and side cover should be provided. Above and below the springline, these materials should be compacted to at least 95% of SPMDD (as defined in Section 5.3).

Backfill for service trenches in landscaped areas may consist of excavated material replaced and compacted in lifts. Where the service trenches extend below paved areas, the trench should be backfilled with subgrade fill material, meeting the requirements for OPSS Select Subgrade Material, from the top of the pipe cover to within 1.2 m of the proposed pavement surface, placed in lifts and compacted to at least 95% of SPMDD. The material used within the upper 1.2 m and below the subgrade line should be similar to that exposed in the trench walls to prevent differential frost heave, placed in lifts and compacted to at least 95% of SPMDD. Different abutting materials within this zone will require a 3H:1V frost taper in order to minimize the effects of differential frost heaving.

Excavations for manholes (if applicable) should be backfilled with compacted granular material. A 3H:1V frost taper should be built within the upper 1.2 m.

Backfill should be compacted in lifts not exceeding 300 mm.

5.6.7 Material Reuse

Excavations for this project are anticipated to extend through fill. The fill material present at the site is granular in nature and may be reused as subgrade fill beneath landscaped areas. The fill may be variable from location to location and therefore will require a more extensive laboratory program to support the on-site compaction control and testing.

All recommendations regarding material reuse are specific to the geotechnical feasibility of the reuse of the existing site fill and do not consider environmental restrictions. The excess soil anticipated to be generated at the site should be characterized in accordance with the Ontario Regulation.

5.7 LATERAL EARTH PRESSURES

Support methods may be required for service trenches excavated as part of the cut and cover operations and should be designed using the lateral earth parameters provided in Table 5.2.

Table 5.2: Recommended Static Earth Pressure Parameters (Horizontal Backfill)

Material	K_o (at rest)	K_a (active)	K_p (passive)	ϕ (friction angle)	Unit Weight
OPSS Granular A	0.43	0.27	3.69	35°	22 kN/m^3
OPSS Granular B Type II	0.47	0.31	3.25	32°	22 kN/m^3
Existing Fills	0.5	0.33	3.00	30°	21 kN/m^3

The design of the shoring systems or walls should be carried out by a Professional Engineer specialized in shoring design. The design should consider load effects from the adjacent embankments, existing structures, and construction equipment.

5.8 SEISMIC SITE CLASS AND LIQUEFACTION

As outlined in Table 4.1.8.1-A of the Ontario Building Code (OBC, 2020), buildings and their foundations must be designed to resist a minimum earthquake force for the site. Based on the results of the investigation, a Seismic Site Class C can be considered for this site.

To change the site classification from C to either A or B, a shear-wave velocity profile within the overburden and bedrock to a depth of 30 m below foundation elevation will be required.

The soils at this site are not considered liquefiable.

5.9 PAVEMENTS

The existing pavement will be affected by the proposed building and will require pavement reinstatement.

When reinstating pavements, it is common practice to match existing pavement thicknesses. The boreholes advanced through the pavement surrounding the existing building encountered an asphalt thickness of 50 mm to 75 mm.

The traffic levels for the existing roadway is not known but has been assumed to consist of light traffic (primarily light delivery vehicles).

The pavement structures presented in Table 5.3 should be used for pavement reinstatement within the parking lot and construction of access roads that will be used by heavy duty vehicles.

Table 5.3: Recommended Pavement Design

Parameter	Access Road	Pavement Reinstatement
Asphalt Surface	50 mm SP 12.5	50 mm SP 12.5
Asphalt Binder	50 mm SP 19	
Base	150 mm OPSS Granular A	150 mm OPSS Granular A
Subbase	450 mm OPSS Granular B Type II	450 mm OPSS Granular B Type II

The following material types are recommended for this project:

- Asphalt performance grade PG 58-34.
- The Superpave mix designs and properties should be in accordance with OPSS. Muni 1151 Material Specifications for Superpave and Stone Mastic Asphalt Mixtures.
- All granular materials should be in accordance with the requirements of OPSS. Muni 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Materials. Both base and subbase layers should be compacted to 100% SPMDD.
- Tack coat is recommended between all asphalt layers and should meet OPSS 308 Construction Specifications for Tack Coating and Joint Painting.

Proper drainage of the pavement structure must be provided in order to ensure satisfactory performance. The subgrade and granular base/subbase should be graded to ensure positive drainage. Precipitation event should be anticipated.

5.10 CHEMICAL TESTING

One (1) representative soil sample was submitted to Paracel Laboratories in Ottawa, Ontario, for analysis of pH, water soluble sulphate, chloride concentrations and resistivity. The testing was completed to determine the potential for degradation of the concrete in the presence of soluble sulphates and the potential for corrosion of exposed steel used in foundations and buried infrastructure.

The analysis results are summarized in the following table.

Table 5.4: Chemical Testing Results

Borehole No.	Sample No.	Depth (m)	pH	Chloride (µg/g)	Sulphate (µg/g)	Resistivity (Ohm-m)
BH24-2A	BS-1	0 - 0.8 m	6.93	33	65	29.6

The results of the tests are provided in Appendix D.

The pH, resistivity, and chloride concentration provide an indication of the degree of corrosiveness of the subsurface environment.

The neutral pH value is 7.0 and the normal range of soils is from 4.0 to 8.5. The pH value of 6.93 measured on the soil sample is within the normal range.

The chloride concentration threshold value of 500 µg/g is typically used to designate soil or water as being corrosive. The chloride concentration for the sample is 33 µg/g, indicating low corrosivity.

A general scale of soil corrosiveness based on resistivity is as follows:

• Mildly Corrosive	Resistivity > 100 Ω-m
• Moderately Corrosive	50 < Resistivity < 100 Ω-m
• Corrosive	30 < Resistivity < 50 Ω-m
• Highly Corrosive	10 < Resistivity < 30 Ω-m
• Extremely Corrosive	Resistivity < 10 Ω-m

The resistivity of the soil as measured at the borehole location was found to be 29.6 Ω-m indicating a highly corrosive soil.

The pH, chloride and resistivity values presented may be used by structural designers in assessing the potential for chemical attacks on buried steel and as an aid in selecting coating and corrosion protection systems for buried steel objects.

The concentration of soluble sulfate provides an indication of the degree of sulfate attack that is expected for concrete in contact with soil and groundwater. Soluble sulfate concentrations less than 1000 µg/g generally indicates that a low degree of sulfate attack is expected for concrete in contact with soil and groundwater. The results of the tests for soluble sulfate in the sample referenced in the preceding section yielded a concentration of less than 65 µg/g.

Based on the test results, there is a low degree of potential sulfate attack for concrete in contact with the soil. Type GU Portland Cement can therefore be considered suitable for use in buried concrete.

5.11 GENERAL PRECAUTIONS FOR WINTER CONSTRUCTION

5.11.1 General

If earthwork is conducted during freezing conditions, special procedures and precautions must be exercised to minimize the risk of future problems.

If construction timelines are to be projected into the winter season, a site meeting should be held in the fall to discuss the schedules of the various contractors in relation to the winter-specific geotechnical recommendations provided herein.

5.11.2 Excavation

Should construction be completed during the winter months, care should be taken to confirm that bearing soils remain free of frost penetration prior to, and following, the casting of concrete. The foundation subgrade must be protected from freezing.

Excavations and exposed subgrade should be maintained in a dry and unfrozen condition throughout construction. Soils that become disturbed/softened during construction should be over-excavated and replaced with structural fill as described.

The topsoil layer and overlying snow will reduce the frost penetration. Conducting only the excavation work required for each day of work is recommended to minimize freezing of the soil in the foundation areas.

Excavated material to be used as subgrade fill should not be stockpiled but should be placed and compacted immediately after excavation.

5.11.3 Fill Placement

Based on our experience, it is generally impractical to place well-graded gravel, sand, or fine-grained soils in temperatures lower than about -5 degrees Celsius. On very cold days, loose material starts to freeze within about 15 minutes. At temperatures below -5 degrees Celsius, placement of engineered fill should be halted, and the existing fill materials must be protected from frost penetration.

The following procedures for structural fill types are recommended:

- Structural fill placement should be conducted in small areas. Depending on the temperature, this may allow for continuous placement of fill lifts during the workday without the requirement for excavation of frozen material prior to the placement of the next lift.
- For intermediate fill lifts, frost protection (e.g., straw, insulated tarp, etc.) should be provided at the end of the workday, or alternatively, fill that freezes overnight should be removed in the morning. Also, any snow or ice should also be removed. Fill surfaces should be sloped to prevent ponding of water during milder weather.
- The final fill surface, the base of footing excavations and slab subgrade should be protected from freezing. If the final fill surface is exposed to freezing temperatures, heat will be required to thaw the soil. Test pits and temperature readings could be completed to determine if the soil is above freezing.
- Loose edges of the structural fill lifts should be avoided to reduce frost penetration. Edges of fill lifts should be tapered and compacted.
- Regular checks of the temperature of the fill should be made. The soil temperature should be greater than +2°C to allow for compaction to the specified degree.

5.11.4 Concrete Construction

The following procedures for concrete construction in winter conditions are recommended:

- The concrete foundations should not be placed on frozen material.

- Following construction of concrete, temporary frost protection must be provided for protection of the concrete during curing.
- Foundations should be backfilled with a free-draining granular material and drainage provided to prevent adfreeze of foundations, particularly during construction.
- Freshly deposited cast-in-place concrete should be protected from freezing during colder weather conditions as per CSA A23.1.

Concrete curing requirements are based on the exposure class of the concrete, as presented in Table 2 of CSA A23.1. As outlined in Table 20 (CSA A23.1), for basic curing, Type 1, the concrete is to be cured for a minimum of 3 days at >10 degrees Celsius, or the time necessary to attain 40% of the specified strength. For other exposure classes, additional curing is required as outlined in Table 20 (CSA A23.1).

During cold weather, adequate protection of the concrete shall be provided for the duration of the curing period by means of heated enclosures, coverings, insulation, or a suitable combination of these methods. Cold weather is defined as when the air temperature is at or below 5 degrees Celsius within 24 hours of placement.

5.11.5 Geotechnical Inspection and Testing

Full-time inspection and testing by experienced geotechnical personnel is important during earthworks in winter conditions, due to the importance of validating the quality and state of the exposed subgrade, construction materials, and procedures during placement and/or excavation, and immediately prior to insulating.

6.0 CLOSURE

Use of this report is subject to the Statement of General Conditions provided in Appendix A. This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected geotechnical conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities, or claims, howsoever arising, from third party use of this report.

Should additional information become available which differs significantly from our understanding of conditions presented in this report, Stantec requests that this information be brought to our attention so that we may reassess the conclusions provided herein.

We trust that the information contained in this report is adequate for your present purposes. If you have any questions about the contents of the report or if we can be of any other assistance, please contact us at your convenience.

Respectfully submitted;

Stantec Consulting Ltd.

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2025/05/15
PROVINCE OF ONTARIO

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APPENDIX A

A.1 STATEMENT OF GENERAL CONDITIONS

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This professional work product (“hereinafter referred to as the Report”) has been prepared for the sole benefit of the Client in accordance with Stantec’s contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance, or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

BASIS OF THIS REPORT: This Report relates solely to the site-specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The information, opinions, conclusions and/or recommendations made in this Report are in accordance with Stantec’s present understanding of the site-specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time the scope of work was conducted and do not take into account any subsequent changes. If the proposed site-specific project differs or is modified from what is described in this Report or if the site conditions are altered, this Report is no longer valid unless Stantec is requested by the Client to review and revise the Report to reflect the differing or modified project specifics and/or the altered site conditions. This Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose or site, and any unauthorized use or reliance is at the recipient’s own risk.

STANDARD OF CARE: Preparation of this Report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

PROVIDED INFORMATION: Stantec has assumed all information received from the Client and third parties in the preparation of this Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this Report are based on site conditions encountered by Stantec at the time of the scope of work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behaviour. Extrapolation of in-situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this Report or encountered at the test and/or sample locations, Stantec must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the Report conclusions or recommendations are required. Stantec will not be responsible to any party for damages incurred as a result of failing to notify Stantec that differing site or subsurface conditions are present upon becoming aware of such conditions.

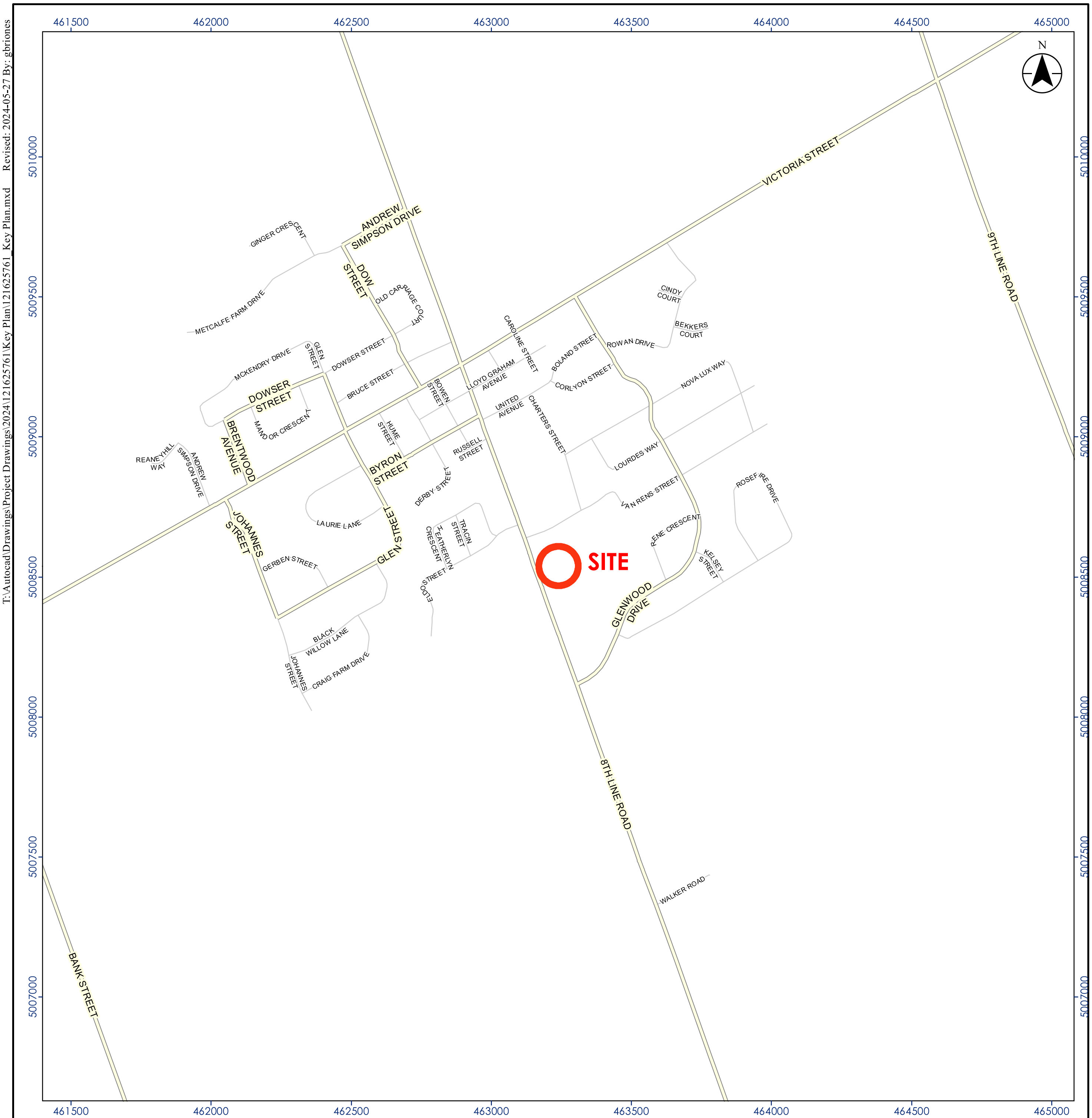
PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec geotechnical engineers, sufficiently ahead of initiating the next project stage (e.g., property acquisition, tender, construction, etc.), to confirm that this Report completely addresses the elaborated project specifics and that the contents of this Report have been properly interpreted. Specialty quality assurance services (e.g., field observations and testing) during construction are a necessary part of the evaluation of subsurface conditions and site work. Site work relating to the recommendations included in this Report should only be carried out in the presence of a qualified geotechnical engineer; Stantec cannot be responsible for site work carried out without being present.

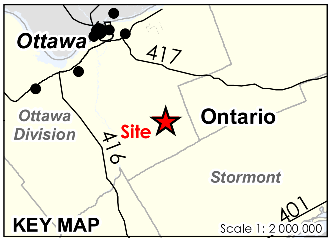
APPENDIX B

B.1 KEY PLAN

B.2 BOREHOLE LOCATION PLAN

T:\Autocad\Drawings\Project Drawings\2024\121625761\Key Plan\121625761_Key Plan.mxd Revised: 2024-05-27 By: gbriones





KEY MAP

Scale 1: 2 000 000

Legend

▭ Expressway / Highway

▭ Major Road

— Minor Road

0 200 400 600 800 metres

1:20,000 (at original document size of 8.5x11)

Stantec

Project Location
2821 8th Line Road
Metcalfe, Ontario

Project No. 121625761
Prepared by G. Briones
on 2024-05-27

Client/Project
METCALFE AGRICULTURAL SOCIETY
GEOTECHNICAL INVESTIGATION

Drawing No.
1

Title
KEY PLAN

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2023.
3. Imagery provided by Esri ©2023.

T:\Autocad\Drawings\Project Drawings\2024\121625761\121625761_2821 Metcalfe_Borehole Locations.dwg
Printed: May 27, 2024 By: G. Briones

Stantec

300 - 1331 Clyde Avenue
Ottawa, ON, Canada K2C 3G4
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LEGEND

⌖ BOREHOLE (STANTEC, 2024)

NOTES

1. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18.
2. BASEPLAN: PDF COPY OF A PLAN ENTITLED PROPOSED SITE PLAN BY DEIMLING, DWG. No. SP-A01, DATED MARH 11, 2024.
3. IMAGERY: © 2024 MICROSOFT CORPORATION © 2024 MAXAR © CNES (2024) DISTRIBUTION AIRBUS DS.

10m 0 10 20m
1 : 1000

MAY 2024
Project No. 121625761

Client/Project

METCALFE AGRICULTURAL SOCIETY
GEOTECHNICAL INVESTIGATION
2821 8TH LINE ROAD, METCALFE, ONTARIO

Drawing No.
2

Title

BOREHOLE LOCATION PLAN

APPENDIX C

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4-8
Stiff	1.0 - 2.0	50 – 100	8-15
Very Stiff	2.0 - 4.0	100 - 200	15-30
Hard	>4.0	>200	>30

ROCK DESCRIPTION

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor Quality*
25-50	*Poor Quality*
50-75	*Fair Quality*
75-90	*Good Quality*
90-100	*Excellent Quality*

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	*Crushed*
Severely Fractured	*Shattered or Very Blocky*
Fractured	*Blocky*
Moderately Jointed	*Sound*
Intact	*Very Sound*

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

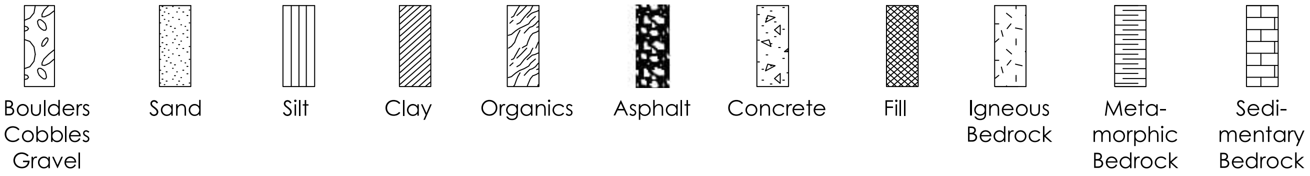
Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 – 5
Weak	R2	5 – 25
Medium Strong	R3	25 – 50
Strong	R4	50 – 100
Very Strong	R5	100 – 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

▼	measured in standpipe, piezometer, or well
▽	inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_U	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

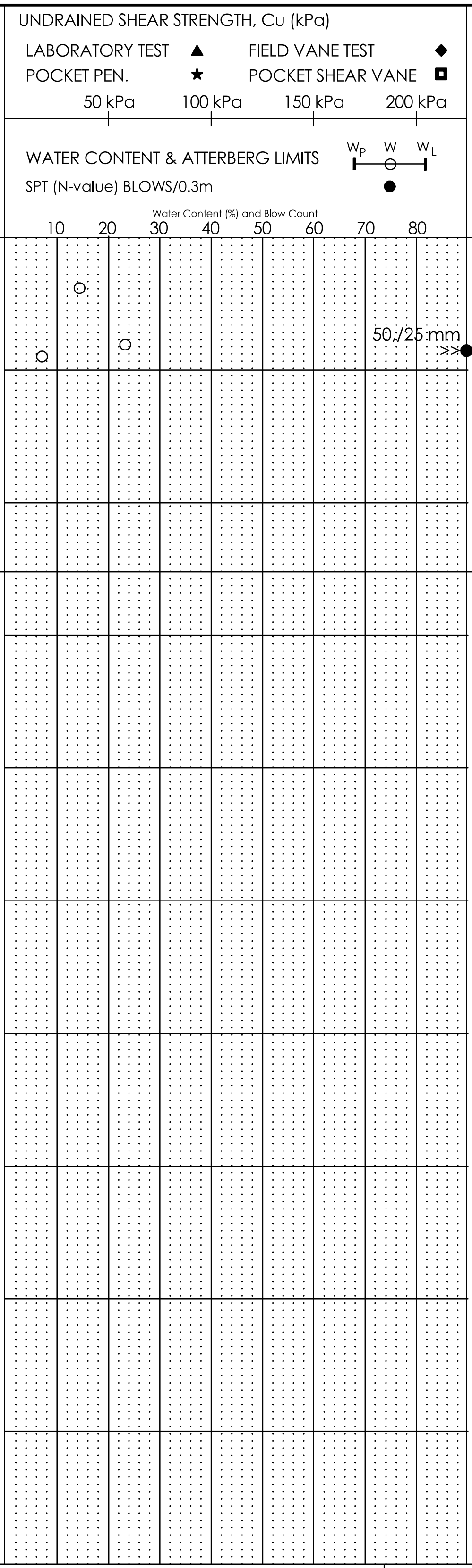
↧	Single packer permeability test; test interval from depth shown to bottom of borehole
⌶	Double packer permeability test; test interval as indicated
⫯	Falling head permeability test using casing
▿	Falling head permeability test using well point or piezometer

BOREHOLE RECORD

BH24-1A'

CLIENT: **Metcalfe Agricultural Society**
PROJECT: **Metcalfe Agricultural Society - New Building**
LOCATION: **2821 8th Line Road, Ottawa, ON**
DATE BORED: **May 9, 2024 to May 9, 2024**
WATER LEVEL: **N/A**
PROJECT NO. : **121625761**
BH ELEVATION: **86.4m**
DATUM: **Geodetic**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	SAMPLES TYPE	SAMPLES NUMBER	RECOVERY (mm) or TCR %	N-VALUE or RQD %	OTHER TESTS / REMARKS
0	86.4						
	86.4	50 mm TOPSOIL					
		FILL: silty sand (SM) with gravel, dark to light brown, moist - trace roots	BS	1			
	85.5		SS	2	205	50	
1		LIMESTONE with a thin bed (roughly 100 mm) of sandstone with sandy filling. - Light grey - Slightly to moderately weathered - Poor quality - Very strong (UCS = 108 MPa) (Refer to Field Bedrock Core Log)	NQ	3	100%	33%	Sieve at 0.9 m G 20% S 39% Fines 41%
	83.9	End of borehole					



BACKFILL/ MONITOR WELL/ PIEZOMETER

DEPTH (m)	ELEVATION (m)
0	
	86
1	
	85
2	
	84
3	
	83
4	
	82
5	
	81
6	
	80
7	
	79
8	
	78
9	
	77
10	

Drilling Contractor: Downing
Drilling Method: Hollow stem
Completion Depth: 2.52 m
Logged By: OE
Reviewed By: KF

BACKFILL SYMBOL
■ BENTONITE
▩ ASPHALT
☒ DRILL CUTTINGS
▨ GROUT
⁘ SAND
◺ CONCRETE
▩ SLOUGH

Printed Jun 20 2024 11:31:9 STANTEC GEO 2016 121625761_METCALFE_AGRICULTURAL_SOCIETY.GPJ GINT_1233_SOIL_2018_DATA_TEMP_REV2.GDT 6/20/24

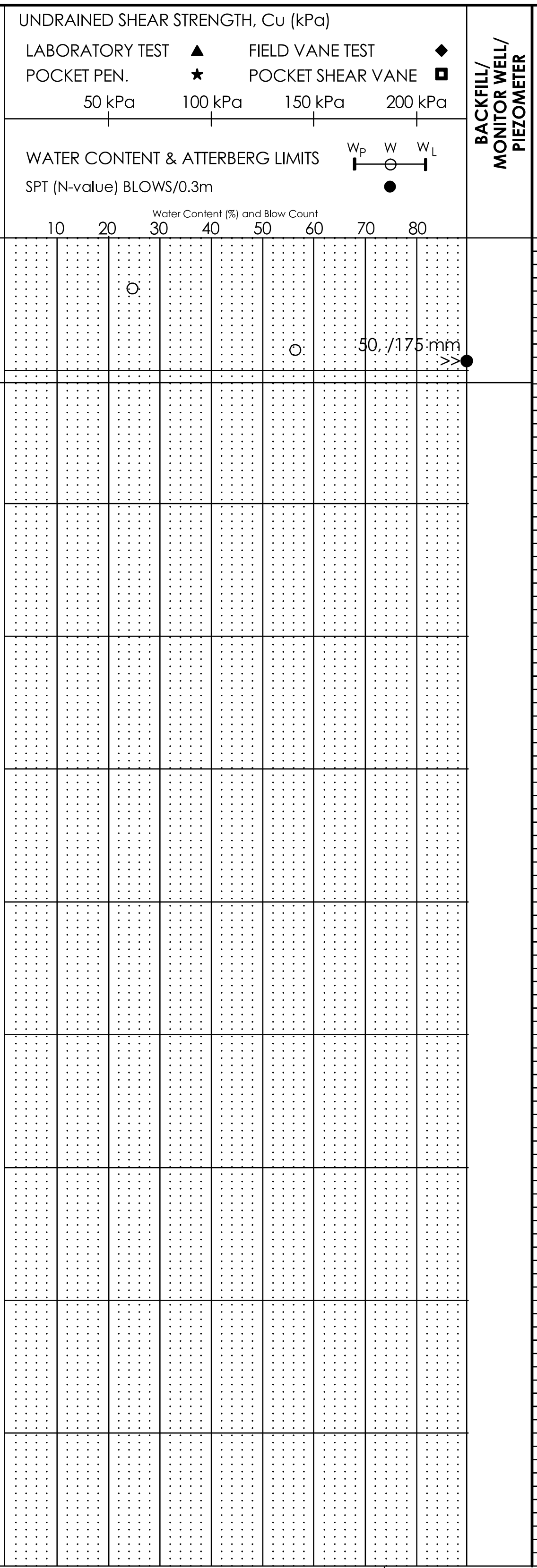
BOREHOLE RECORD

BH24-2A'

CLIENT: **Metcalfe Agricultural Society**
PROJECT: **Metcalfe Agricultural Society - New Building**
LOCATION: **2821 8th Line Road, Ottawa, ON**
DATE BORED: **May 9, 2024 to May 9, 2024**
WATER LEVEL: **N/A**

PROJECT NO. : **121625761**
BH ELEVATION: **86.3m**
DATUM: **Geodetic**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0	86.3	50 mm TOPSOIL						
	86.3	FILL: silty sand (SM) with gravel, dark brown, moist - trace organic material		BS	1			
				SS	2	180	50	
1	85.2	End of Borehole Refusal on Inferred Bedrock						



Printed Jun 20 2024 11:31:10 STANTEC GEO 2016 121625761_METCALFE_AGRICULTURAL_SOCIETY.GPJ GINT_1233_SOIL_2018_DATA_TEMP_REV2.GDT 6/20/24

BACKFILL SYMBOL ▨ ASPHALT ▨ GROUT ▨ CONCRETE
■ BENTONITE ☒ DRILL CUTTINGS ▨ SAND ▩ SLOUGH

Drilling Contractor: Downing	Logged By: OE
Drilling Method: Hollow stem	Reviewed By: KF
Completion Depth: 1.09 m	Page 1 of 1

BOREHOLE RECORD

BH24-3

CLIENT: **Metcalfe Agricultural Society**

PROJECT: **Metcalfe Agricultural Society - New Building**

LOCATION: **2821 8th Line Road, Ottawa, ON**

DATE BORED: **May 9, 2024 to May 9, 2024**

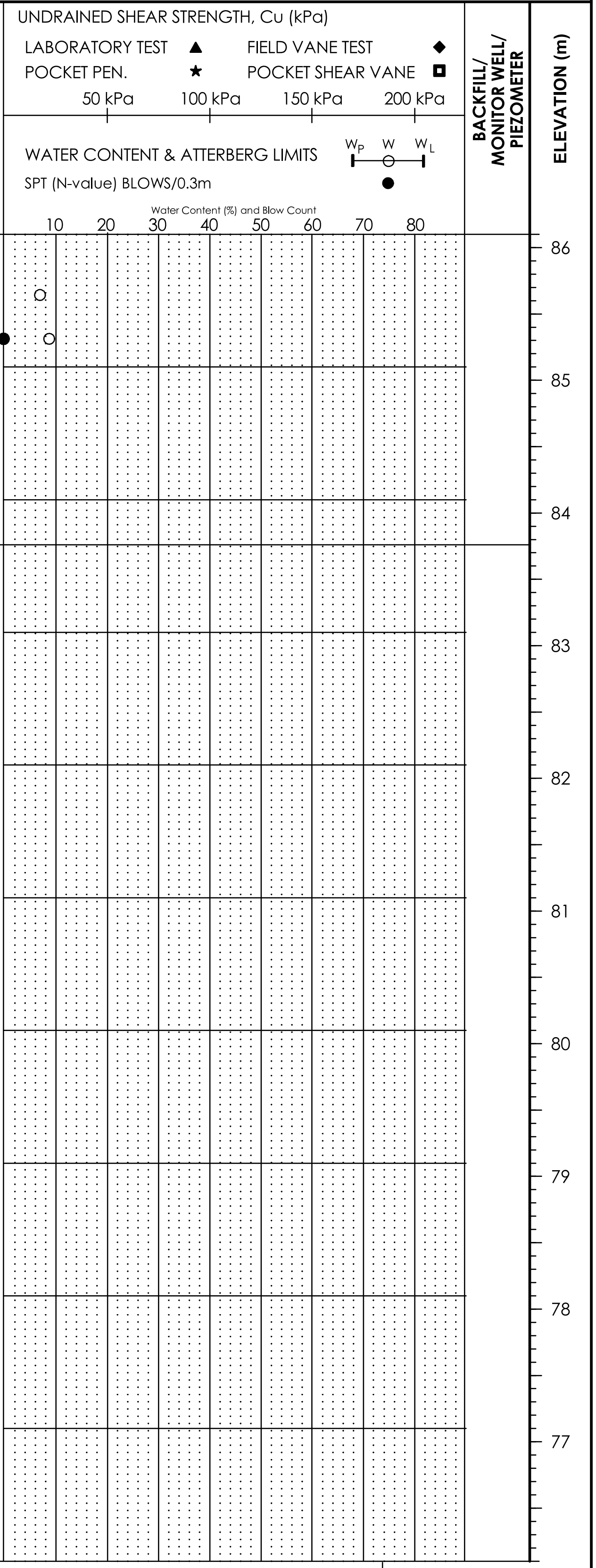
WATER LEVEL: **N/A**

PROJECT NO.: **121625761**

BH ELEVATION: **86.1m**

DATUM: **Geodetic**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	TYPE	NUMBER	RECOVERY (mm) or TCR %	N-VALUE or RQD %	OTHER TESTS / REMARKS
0	86.1	75 mm Ashphalt					
	86.0	FILL: Light brown to brown silty sand (SM) with gravel, moist	BS	1			Sieve at 0.5 m G 42% S 45% Fines 13%
			SS	2		0	
	85.3	LIMESTONE with a thin bed (roughly 100 mm) of sandstone with sandy filling. - Grey to light grey - Slightly to moderately weathered - Very poor quality - Very strong (Refer to Field Bedrock Core Log)	NQ	3	100%	6%	
	83.8	End of borehole					



BACKFILL SYMBOL ▨ ASPHALT ▨ GROUT ▨ CONCRETE
■ BENTONITE ▨ DRILL CUTTINGS ▨ SAND ▨ SLOUGH

Drilling Contractor: Downing

Drilling Method: Hollow stem

Completion Depth: 2.34 m

Logged By: OE

Reviewed By: KF

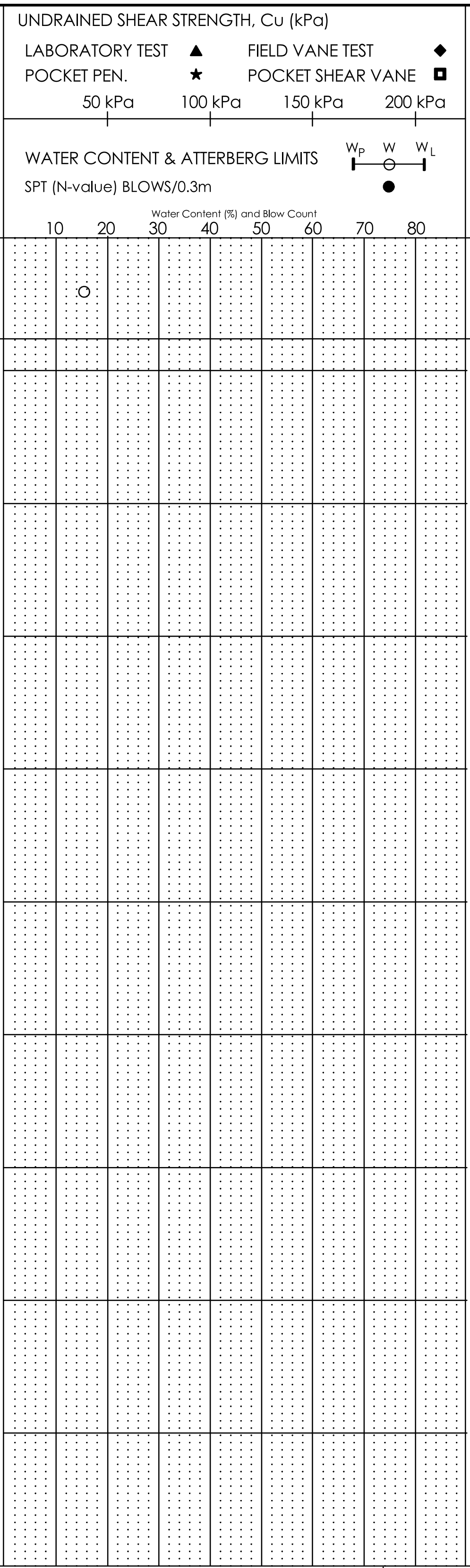
Printed Jun 20 2024 11:31:10 STANTEC GEO 2016 121625761_METCALFE_AGRICULTURAL_SOCIETY.GPJ GINT_1233_SOIL_2018_DATA_TEMP_REV2.GDT 6/20/24

BOREHOLE RECORD

BH24-4A'

CLIENT: **Metcalfe Agricultural Society**
PROJECT: **Metcalfe Agricultural Society - New Building**
LOCATION: **2821 8th Line Road, Ottawa, ON**
DATE BORED: **May 9, 2024 to May 9, 2024**
PROJECT NO. : **121625761**
BH ELEVATION: **86.3m**
DATUM: **Geodetic**
WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0	86.3	50 mm Ashphalt								
	86.2	FILL: Brown silty sand (SM) with gravel, moist		BS	1					86
	85.5	End of Borehole Refusal on Inferred Bedrock								



Depth (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Elevation (m): 86, 85, 84, 83, 82, 81, 80, 79, 78, 77

BACKFILL SYMBOL
▨ ASPHALT
▨ GROUT
▨ CONCRETE
■ BENTONITE
☒ DRILL CUTTINGS
▨ SAND
▩ SLOUGH

Drilling Contractor: Downing
Drilling Method: Hollow stem
Completion Depth: 0.76 m
Logged By: OE
Reviewed By: KF

Bedrock Core Log

Client: Metcalfe Agricultural Society
Project: Metcalfe Agricultural Society
Contractor: George Downing Estate Drilling Ltd

Project No.: 121624761
Date: May 9, 2024
Borehole No.: BH24-1A'
Logger: Omar El-Ghazal

DEPTH FROM	RUN NO.	% CORE RECOVERY	% RQD	DEPTH TO	GENERAL DESCRIPTION (Rock Type/s, %, Colour, Texture, etc.)	STRENGTH	WEATHERING	DISCONTINUITIES							OCCASIONAL FEATURES	DRILLING OBSERVATIONS
								NO. OF SETS	TYPE/S	ORIENTATION	SPACING	ROUGHNESS	APERTURE	FILLING		
0.94 m	NQ2	100%	33%	2.52 m	LIMESTONE with a thin bed (roughly 100 mm) of sandstone with sandy filling. Slightly to moderately weathered, poor quality, very strong, light grey (UCS = 108 MPa)	R5	W2 - W3	1	BD	F	EC-VC-C	RP-RU	C-G	T-O-S	- Sandy filling observed	No issues encountered

STRENGTH (MPa)

Grade/Classification	Est. Strength (MPa)
R0 Extremely Week	0.25 - 1.0
R1 Very Weak	1.0 - 5.0
R2 Weak	5.0 - 25.0
R3 Medium Strong	25.0 - 50.0
R4 Strong	50.0 - 100.0
R5 Very Strong	100.0 - 250.0
R6 Extremely Strong	>250.0

JOINT TYPE

BD = Bedding
JN = Joint
FOL = Foliation
CON = Contact
FLT = Fault
VN = Vein

ORIENTATION

F = Flat = 0-20^0
D = Dipping = 20-50^0
V = n-Vertical = >50^0

JOINT APERTURE

C = Closed = < 0.5 mm
G = Gapped = 0.5 to 10 mm
O = Open = > 10 mm

FILLING

T = Tight, Hard
O = Oxidized
SA = Slightly Altered, Clay Free
S = Sandy, Clay Free
Si = Sandy, Silty, Minor Clay
NC = Non-softening Clay
SC = Swelling, Soft Clay

WEATHERING

Grade/Classification	Description
W1 Fresh	No Visible Signs of Weathering
W2 Slightly	Discoloration, Weathering on Discontinuities
W3 Moderately	<50% of Rock Material is Decomposed, Fresh Core Stones
W4 Highly	>50% Decomposed to soil: Fresh Core Stones
W5 Completely	100% Decomposed to Soil: Original Structure Intact
W6 Residual Soil	All Rock Converted to Soil, Structure and Fabric Destroyed

DISCONTINUITY SPACING

Spacing (mm)	
EW = >6000	Extremely Wide
VW = 2000 - 6000	Very Wide
W = 600 - 2000	Wide
M = 200 - 600	Moderate
C = 60 - 200	Close
VC = 20 - 60	Very Close
EC = <20	Extremely Close

JOINT ROUGHNESS

Jr	Description
4	DJ = Discontinuous Joints
3	RU = Rough, Irregular, Undulating
1.5	SU = Smooth, Undulating
1.5	LU = Slickensided, Undulating
1.0	RP = Rough or Irregular, Planar
0.5	SP = Smooth, Planar
2	LP = Slickensided, Planar

Bedrock Core Log

Client: Metcalfe Agricultural Society
Project: Metcalfe Agricultural Society
Contractor: George Downing Estate Drilling Ltd

Project No.: 121624761
Date: May 9, 2024
Borehole No.: BH24-3
Logger: Omar El-Ghazal

DEPTH FROM	RUN NO.	% CORE RECOVERY	% RQD	DEPTH TO	GENERAL DESCRIPTION (Rock Type/s, %, Colour, Texture, etc.)	STRENGTH	WEATHERING	DISCONTINUITIES							OCCASIONAL FEATURES	DRILLING OBSERVATIONS
								NO. OF SETS	TYPE/S	ORIENTATION	SPACING	ROUGHNESS	APERTURE	FILLING		
0.81 m	NQ3	100%	6%	2.34 m	LIMESTONE with a thin bed (roughly 100 mm) of sandstone with sandy filling. Slightly to moderately weathered, very poor quality, very strong, grey to light grey	R5	W2 - W3	1	BD	F	VC-C	RP	G	T-O-S	- Sandy filling observed	No issues encountered

STRENGTH (MPa)

Grade/Classification	Est. Strength (MPa)
R0 Extremely Week	0.25 - 1.0
R1 Very Weak	1.0 - 5.0
R2 Weak	5.0 - 25.0
R3 Medium Strong	25.0 - 50.0
R4 Strong	50.0 - 100.0
R5 Very Strong	100.0 - 250.0
R6 Extremely Strong	>250.0

JOINT TYPE

BD = Bedding
JN = Joint
FOL = Foliation
CON = Contact
FLT = Fault
VN = Vein

ORIENTATION

F = Flat = 0-20^0
D = Dipping = 20-50^0
V = n-Vertical = >50^0

JOINT APERTURE

C = Closed = < 0.5 mm
G = Gapped = 0.5 to 10 mm
O = Open = > 10 mm

FILLING

T = Tight, Hard
O = Oxidized
SA = Slightly Altered, Clay Free
S = Sandy, Clay Free
Si = Sandy, Silty, Minor Clay
NC = Non-softening Clay
SC = Swelling, Soft Clay

WEATHERING

Grade/Classification	Description
W1 Fresh	No Visible Signs of Weathering
W2 Slightly	Discoloration, Weathering on Discontinuities
W3 Moderately	<50% of Rock Material is Decomposed, Fresh Core Stones
W4 Highly	>50% Decomposed to soil: Fresh Core Stones
W5 Completely	100% Decomposed to Soil: Original Structure Intact
W6 Residual Soil	All Rock Converted to Soil, Structure and Fabric Destroyed

DISCONTINUITY SPACING

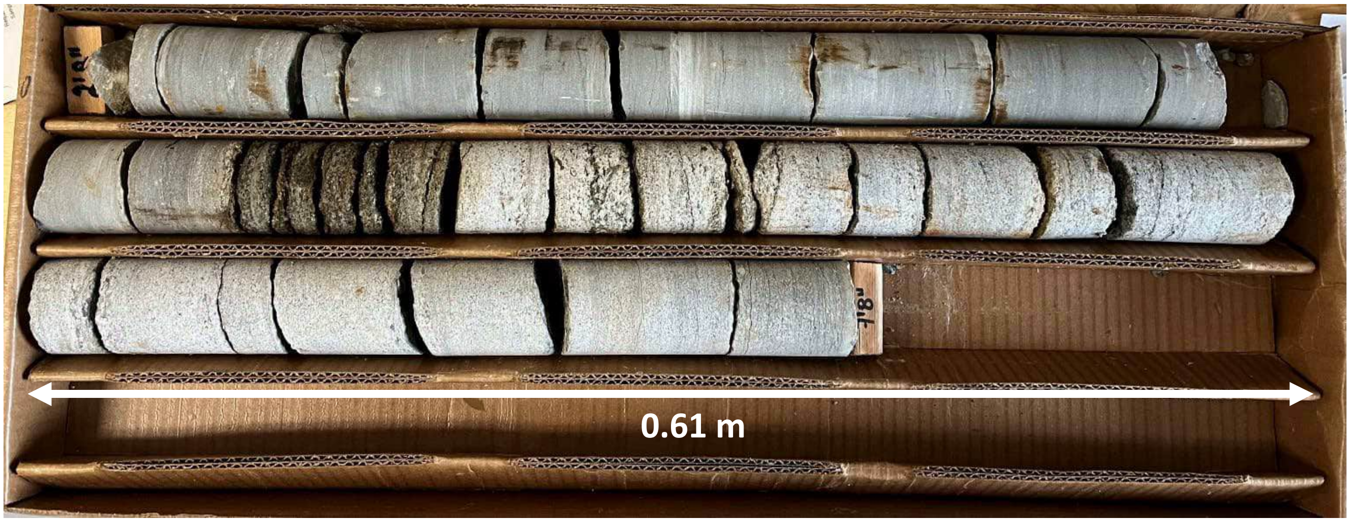
Spacing (mm)	
EW = >6000	Extremely Wide
VW = 2000 - 6000	Very Wide
W = 600 - 2000	Wide
M = 200 - 600	Moderate
C = 60 - 200	Close
VC = 20 - 60	Very Close
EC = <20	Extremely Close

JOINT ROUGHNESS

Jr	Description
4	DJ = Discontinuous Joints
3	RU = Rough, Irregular, Undulating
1.5	SU = Smooth, Undulating
1.5	LU = Slickensided, Undulating
1.0	RP = Rough or Irregular, Planar
0.5	SP = Smooth, Planar
2	LP = Slickensided, Planar

Stantec	Project No.: 121625761	Rock Core Photographs
	Project Name: Metcalfe Agricultural Society	

Rock Core Photo No.:	1	Borehole:	BH24-1A'	Depth:	0.9 m to 2.5 m

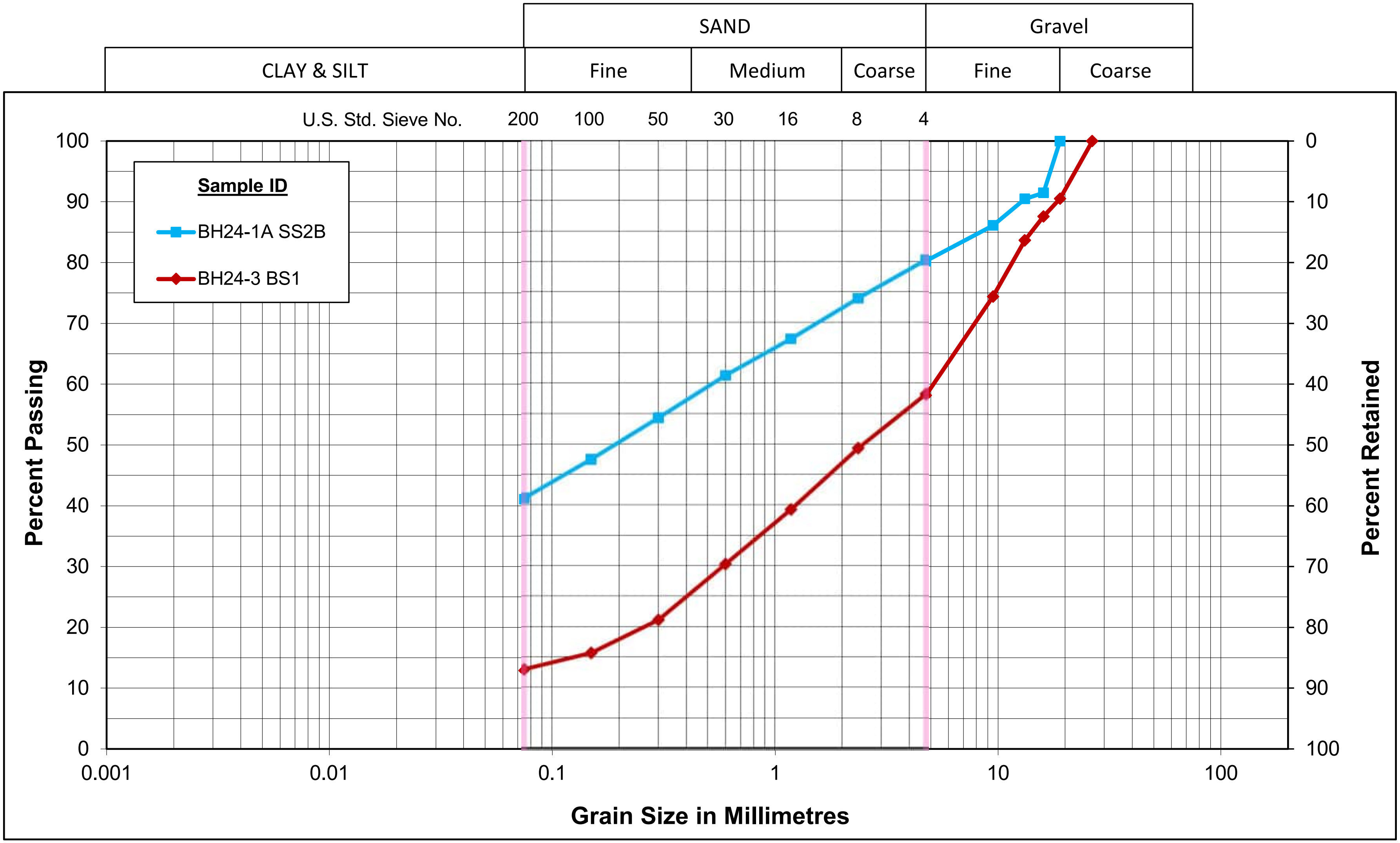


Rock Core Photo No.:	2	Borehole:	BH24-3	Depth:	0.8 m to 2.3 m

APPENDIX D

D.1 LABORATORY TEST RESULTS

Unified Soil Classification System



Stantec

GRAIN SIZE DISTRIBUTION

FILL: Silty Sand with Gravel (SM)

Figure No. 1

Project No. 121625761

Stantec

Compressive Strength & Elastic Moduli of Intact Rock Core Speciments under Varying States of Stress and Temperatures
Method C
ASTM D7012 & D4543

Client:	NA	Project No.:	121625761/200
Project:	Metcalfe Agricultural Society		
Material Type:	Rock Core; Diameter ≥ 47.0 mm	Date Received:	May 10, 2024
Sampled By:	Omar El-Ghazal	Tested By:	Sagar Khatri
Date Sampled:	May 2, 2024	Date Tested:	May 17, 2024

Sample Information				
Borehole Location	**BH24-1A**	**0**	**0**	**0**
Sample Number	NQ3	0	0	0
Sample Depth	5'5"	0	0	0
Compressive Strength Test Data				
Physical Description	As per Geotechnical Report	As per Geotechnical Report	As per Geotechnical Report	As per Geotechnical Report
Average Sample Diameter (mm) (≥47.0)	47			
Average Sample Length (mm)	119			
Density (kg/m^3)	2570			
Unit Weight (kN/m^3)	**25.2**	**#VALUE!**	**#VALUE!**	**#VALUE!**
L/D Ratio (2.0-2.5)	2.51	#VALUE!	#VALUE!	#VALUE!
Failure Load (lbs)	42910	0	0	0
Compressive Strength (MPa)	**108.1**	**#VALUE!**	**#VALUE!**	**#VALUE!**
Straightness by Procedure S1 (≤0.02inch)	<0.02	<0.02	<0.02	<0.02
Flatness by Procedure FP2 (≤0.001inch)	<0.001	<0.001	<0.001	<0.001
Parallelism by Procedure FP2 (≤0.25°)	0.110	#N/A	#N/A	#N/A
Perpendicularity by Procedure P2 (≤0.0043)	<0.0043	<0.0043	<0.0043	<0.0043
Moisture Condition	As-Received	As-Received	As-Received	As-Received
Description of Break D7012/11.1.13	Reasonably well formed cones on both ends.	0	0	0.00
Note	Sample cracked from the middle while preparation.	0	0	0.00

Remarks:

Reviewed by:

Date: May 17, 2024

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Certificate of Analysis

Stantec Consulting Ltd. (Ottawa)
1331 Clyde Avenue Suite 400
Ottawa, ON K2C 3G4
Attn: Katurah Firdawsi

Report Date: 24-May-2024
Order Date: 17-May-2024

Client PO: Metcalfe Agriculture Society
Project: 121625761.200
Custody:

Order #: 2420446

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

Paracel ID	**Client ID**
2420446-01	BH24-2A, BS-1, 0-2.5'

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	22-May-24	22-May-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	22-May-24	22-May-24
Resistivity	EPA 120.1 - probe, water extraction	21-May-24	21-May-24
Solids, %	CWS Tier 1 - Gravimetric	23-May-24	24-May-24

	Client ID:	BH24-2A, BS-1, 0-2.5'	-	-	-		
	Sample Date:	09-May-24 09:00	-	-	-	**-**	**-**
	Sample ID:	2420446-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	75.4	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	6.93	-	-	-	-	-
Resistivity	0.1 Ohm.m	29.6	-	-	-	-	-
Anions							
Chloride	10 ug/g	33	-	-	-	-	-
Sulphate	10 ug/g	65	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	10	ug/g					
Sulphate	ND	10	ug/g					
General Inorganics								
Resistivity	ND	0.1	Ohm.m					

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	831	10	ug/g	837			0.7	35	
Sulphate	212	10	ug/g	209			1.6	35	
General Inorganics									
pH	7.12	0.05	pH Units	7.10			0.3	2.3	
Resistivity	31.0	0.1	Ohm.m	32.1			3.7	20	
Physical Characteristics									
% Solids	77.9	0.1	% by Wt.	75.4			3.3	25	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	927	10	ug/g	837	89.4	82-118			
Sulphate	304	10	ug/g	209	94.8	80-120			

Qualifier Notes:

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

Paracel ID: 2420446

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Chain of Custody
(Lab Use Only)

Page ___ of ___

Client Name: **Stantec Consulting Ltd.**

Contact Name: **Katurah Firdawsi**

Address: **2781 Lancaster Road., Suite 101. Ottawa ON. K1B-1A7**

Telephone: **613-738-6075**

Project Reference: **Metcalfe Agricultural Society**

Task #: **200**

PO # **121625761**

Email Address: katurah.firdawsi@stantec.com

TAT: **[ ] Regular** [ ] 3 Day [ ] 2 Day [ ] 1 Day

Date Required: ____________

Criteria: [ ] O. Reg. 153/04 Table __ [ ] O. Reg. 153/11 (Current) Table __ [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality:________ [ ] Other: ____

Matrix Type: S (Soil/Sed.) **GW** (Ground Water) **SW** (Surface Water) **SS** (Storm/Sanitary Sewer) **P** (Paint) **A** (Air) **O** (Other)

Paracel Order Number: 2420446

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		Required Analyses										
					Date	Time	Resistivity	PH	Sulphate & Chloride								
1	BH24-2A, BS-1, 0-2.5'				24/05/09		x	x	x								
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Swift

Relinquished By (Print & Sign):

Date/Time:

Received by Driver/Depot:

Date/Time:

Temperature: ____ °C

Received at Lab: SD

Date/Time: May 17, 2024 8:56am

Temperature: 22.6 °C

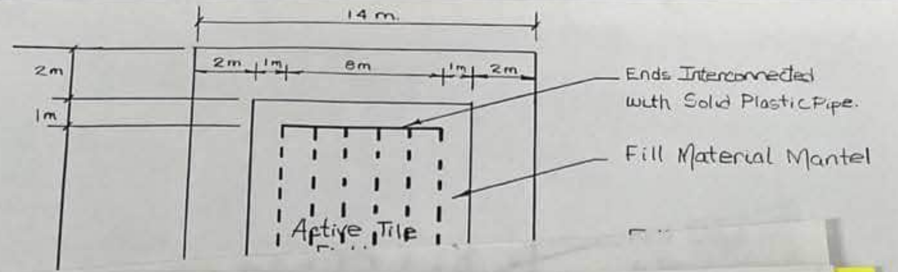
Verified By: SS

Date/Time: 17 May 24 1139

pH Verified [ ] By: NA

Paracel_Chemical Testing & Organic Content.xlsx

APPENDIX C - EXISTING SEWAGE SYSTEM PERMIT FOR CURLING CLUB FACILITY



SEWAGE DISPOSAL - METCALFE CURLING CLUB.

Ontario

Ministry
of the
Environment

Area Code 613
Telephone 521-3450

Municipal & Private Abatement,
2378 Holly Lane, Suite 204,
Ottawa, Ontario.
K1V 7P1

July 28, 1982.

Maurice D. Ross,
Metcalfe Curling Club,
Box 212
Metcalfe, Ontario.
K0A 2P0

Dear Sir:

Re: Certificate of Approval/Use
Permit for Class 4, 5, 6,
Sewage Systems.

Township of Osgoode

Lot 23 Conc. VIII

Please find enclosed the owner's copy of the above-noted document.

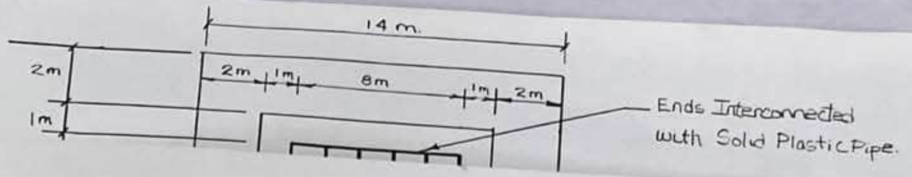
If you have any questions on the above, please do not hesitate to call.

Yours very truly,

K M Hanse

K.M. Hansen, C.E.T.
Director, Part VII
Environmental Protection Act.

KMH/hp
Encl.



lantel

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

Ministry of the Environment
Ontario

USE PERMIT FOR CLASS 4, 5, 6 SEWAGE SYSTEMS

APPLICATION NO. 82(23-VIII)46

INSPECTION DETAILS	TIME 2:32	DATE July 27 1982	WEATHER Sunny
REPRESENTING:	THE OWNER		THE INSTALLER

1. **Work authorized by the Certificate of Approval has been satisfactorily completed and includes:**
   a) Septic tank/holding tank of working capacity of 8000 L ~~Imp. Gals~~. constructed of steel ☐ concrete ☒ fibreglass ☐ on site ☐ or prefabricated ☒ to serve / (no. of bedrooms or units).

   MAKE AND MODEL, IF PREFABRICATED TANK Fulcher Bros.

   b) Leaching bed of total 180 m lineal ~~feet~~ m of 3 inch diameter distribution pipe of PVC (type and product description e.g. Canron CSA Approved PVC) laid in 6 runs and fed by (gravity, siphon, [✓ pump]).
   c) Proprietary Aerobic System: (Manufacturer) (Model)
   d) Other details

2. **Location**
   a) System components installed as shown on application supporting Certificate of Approval ☒
   b) If located other than in (a) use space below for sketch and dimensions from permanent points of reference sufficient to facilitate future location of tank and leaching bed including orientation of pipe runs.

3. **The following work remains to be completed:—**
   ☒ Backfill System and Complete
   ☐ Stabilize All Sloped Surfaces
   ☐ Finish Grading to Shed Run-off and Divert Water Around Leaching Bed
   ☒ Other ....pumps....to..be..put...in...pump.. chamber. and connected.

USE PERMIT

Under Section 59a of The Environmental Protection Act, 1971 and subject to the provisions of The Act and Regulations a Permit is hereby issued to (Owner) Metcalf Curling Club for the use and operation of the Class 4 sewage system constructed/installed/enlarged/extended/altered persuant to the Certificate of Approval issued under the above application number in accordance with the application and Certificate of Approval with any changes indicated above and located on Lot 23 Concession VIII Ward/[✓ Township]/Municipality Osgoode Plan No. Sub-Lot No.
Region/District/[✓ County] Ottawa-Carleton

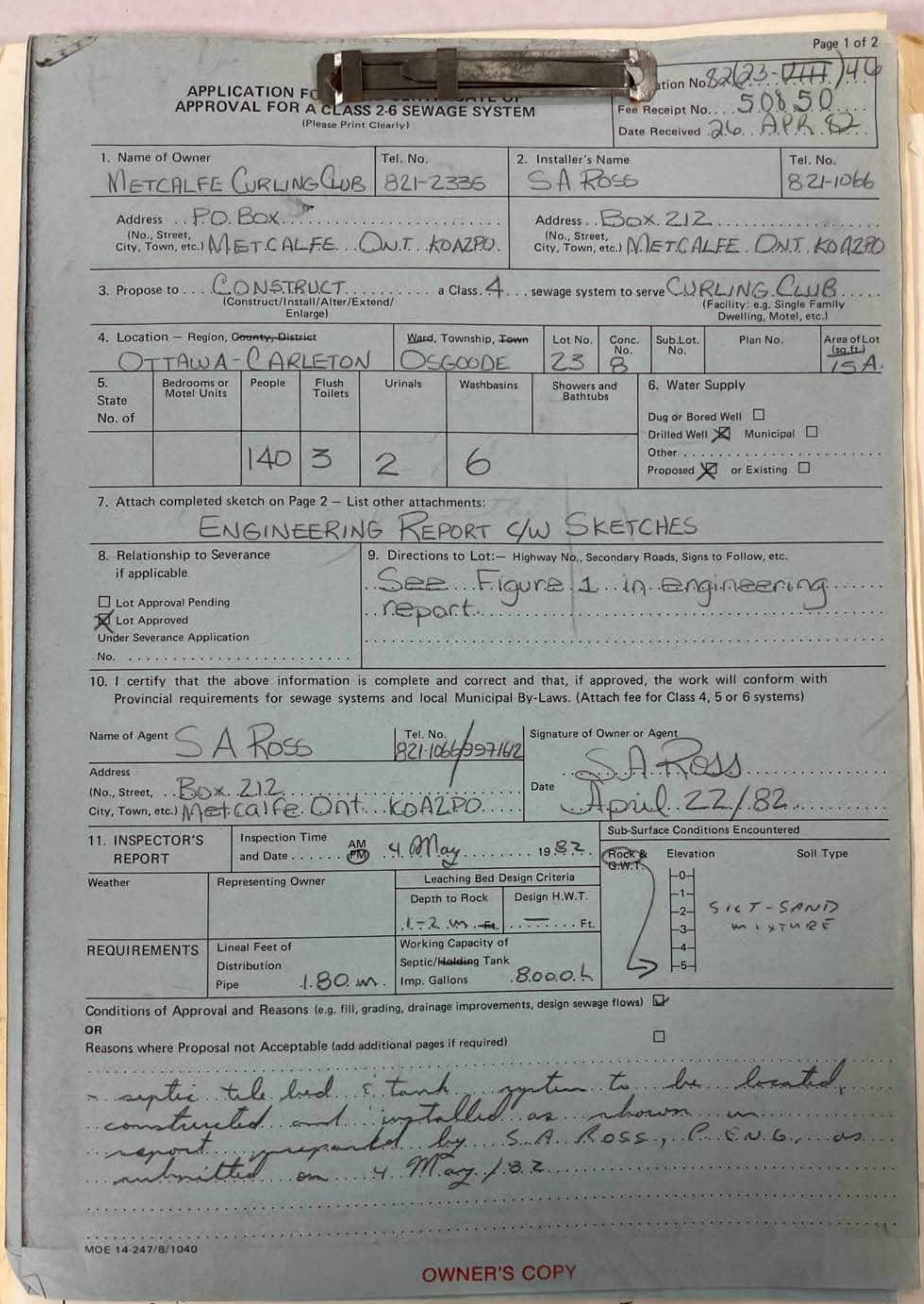
INSPECTED AND RECOMMENDED BY David Mott	PERMIT ISSUED BY K Hause DIRECTOR	DATE ISSUED 28 July 82

Note: Section 57(a) of The Act provides that no change can be made to any building(s) or structure(s) in connection with which this sewage system is used, if the operation or effectiveness of the sewage system will or is likely to be affected by the change, unless a new Certificate of Approval is obtained.
Section 78 of The Act provides that an applicant for a permit may appeal a decision to refuse to issue a permit. Written notice of appeal must be forwarded to the Director (who refused to issue the permit) and to the Environmental Appeal Board, 1 St. Clair Avenue West, Toronto, Ontario, M4V 1K7 within 15 days of receipt of a permit.

MOE 14-249/1042

OWNER

6'2"



Page 1 of 2

APPLICATION F
APPROVAL FOR A CLASS 2-6 SEWAGE SYSTEM

(Please Print Clearly)

tion No 82(23-~~VHH~~)46
Fee Receipt No. 50850
Date Received 26. APR. 82

1. Name of Owner METCALFE CURLING CLUB — Tel. No. 821-2336
Address P.O. BOX
(No., Street, City, Town, etc.) METCALFE. ONT. K0A2P0.

2. Installer's Name SA ROSS — Tel. No. 821-1066
Address Box. 212
(No., Street, City, Town, etc.) METCALFE. ONT. K0A2P0

3. Propose to CONSTRUCT (Construct/Install/Alter/Extend/Enlarge) a Class 4 sewage system to serve CURLING CLUB (Facility: e.g. Single Family Dwelling, Motel, etc.)

4. Location – Region, ~~County, District~~	~~Ward~~, Township, ~~Town~~	Lot No.	Conc. No.	Sub.Lot. No.	Plan No.	Area of Lot (sq.ft.)
OTTAWA-CARLETON	OSGOODE	23	8			15A.

5. State No. of	Bedrooms or Motel Units	People	Flush Toilets	Urinals	Washbasins	Showers and Bathtubs
		140	3	2	6	

6. Water Supply
Dug or Bored Well ☐
Drilled Well ☒ Municipal ☐
Other
Proposed ☒ or Existing ☐

7. Attach completed sketch on Page 2 – List other attachments:
ENGINEERING REPORT C/W SKETCHES

8. Relationship to Severance if applicable
☐ Lot Approval Pending
☒ Lot Approved
Under Severance Application No.

9. Directions to Lot:– Highway No., Secondary Roads, Signs to Follow, etc.
See Figure 1 in engineering report.

10. I certify that the above information is complete and correct and that, if approved, the work will conform with Provincial requirements for sewage systems and local Municipal By-Laws. (Attach fee for Class 4, 5 or 6 systems)

Name of Agent S A ROSS — Tel. No. 821-1066/997162
Address (No., Street, City, Town, etc.) Box. 212 Metcalfe Ont. K0A2P0
Signature of Owner or Agent S.A. Ross
Date April 22/82

11. INSPECTOR'S REPORT — Inspection Time and Date AM [✓ PM] 4. May 1982.

Weather	Representing Owner	Leaching Bed Design Criteria	
		Depth to Rock	Design H.W.T.
		1-2 m. ~~Ft.~~	— Ft.

REQUIREMENTS	Lineal Feet of Distribution Pipe	Working Capacity of Septic/~~Holding~~ Tank Imp. Gallons
	1.80 m.	8000.L

Sub-Surface Conditions Encountered

[✓ Rock & G.W.T.]	Elevation	Soil Type
	0–5	SILT-SAND MIXTURE

Conditions of Approval and Reasons (e.g. fill, grading, drainage improvements, design sewage flows) ☑
OR
Reasons where Proposal not Acceptable (add additional pages if required) ☐

- septic tile bed & tank system to be located, constructed and installed as shown in report prepared by S.A. Ross, P.ENG., as submitted on 4 May/82

MOE 14-247/8/1040

OWNER'S COPY

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

KING

ons Den.

PLAN

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

METCALFE CURLING CLUB
SEWAGE DISPOSAL SYSTEM

1.0 GENERAL

The Metcalfe Curling Club is located in the village of Metcalfe, Lot 23, Concession Road 8, Township of Osgoode. As a result of an Ontario Ministry of Labour building condemnation order, a plan to construct a new curling facility is being initiated. Thus, in accordance with Section 57 of the Environmental Protection Act of Ontario, the proposed construction program will include the replacement of the existing septic tank-tile field with a new, enlarged sewage disposal system.

2.0 SITE AND BUILDING DESCRIPTION

2.1 Site Description

Figure 1 illustrates the location of the proposed facility with respect to local co-ordinates within Osgoode Township. The new building will be located on the exact site of the old structure; the total area of Lot 23 is approximately 15 acres.

Figure 2 is the site plan for the new facility showing the existing and proposed buildings, wells and sewage disposal systems on the subject lot, as well as existing buildings and boundaries on adjacent land areas. The parcel of land on which the building will be located is owned by the Metcalfe Agricultural Society and this land is used primarily in the promotion of the annual fall fair. Future development of this land is not anticipated.

The topography of the area in the immediate vicinity of the proposed building site is rated as smooth and level, to gently sloping; local relief is virtually non-existent.

Surface drainage is to the front of the property, (ie. east to west) along the concession road, (southerly direction) and eventually into a local stream (Castor River), located approximately one-half mile south of the site.

The soil layer is approximately 1-2 meters in thickness, above layer of rock. The soil itself is a silt-sand mixture with some loam. Percolation rates in the area are in the order of 7.94 minutes per cm.

Groundwater levels in the area are relatively deep; the drilled well used by the Curling Club, (see Figure 2), is 38 meters in depth. A test pit dug on April 30, 1982, revealed no indication of groundwater above the bedrock stratum.

2.2 Building Layout

The new curling facility will consist of an ice area with exterior dimensions of 150 ft. x 50 ft. and a two-level assembly/change room area with exterior dimensions of 60 ft. x 42 ft. The entrance to the assembly portion of the facility will consist of a mezanine having exterior dimensions of 42 ft. x 18 ft. and incorporating all washrooms and handicap access for the facility. Floors in the lower level of the assembly area will be located approximately 4 feet below grade and will serve as a

change room/viewing area. The upper level floors will be 5 feet above grade and will contain a kitchen, bar, assembly and viewing areas.

Figure 3 is a plan view of the new curling club.

3.0 WASTEWATER DISPOSAL SYSTEM

3.1 Existing System

The existing wastewater disposal system at the Metcalfe Curling Club was installed in 1970 and consists of 850 gallon septic tank with 500 lineal feet of tile, (Department of Health records). The field is located 3 feet from the existing foundation wall of the rink area of the building.

Operation of the sewage disposal system at the Metcalfe Curling Club over the past 12 years has been problem free. Pumpage of septage from the septic tank has been undertaken as a maintenance measure each fall prior to start-up of the Club; signs of tile field deterioration such as leachate breakthrough or tile collapse are not evident in the existing bed. Overall, the existing system has proven to be quite adequate for the wastewater loadings generated within the Club. It is important to note that the number of fixtures (kitchen and washrooms) proposed for the new facility are exactly the same as the existing facility. In fact, because a wet bar (ie. a bar with hot and cold running water) is no longer mandatory, the calculated volume of wastewater generated in the new facility will be less than in the former building.

3.2 Sewage Generation

The proposed facility contains washrooms for each sex and a kitchen with a three-compartment sink and a washbasin; these components of the new building represent the only sources of wastewater loading within the Metcalfe Curling Club (see Figure 3). Sewage flow from the facility will be cyclic on a daily and weekly basis, with the heaviest loadings encountered on Saturdays, and will be intermittent on a yearly basis.

The estimated sewage loadings from the various fixtures located in the building are as follows:

A. Weekday loadings (operation between the hours of 19:00 and 24:00)

1. Washrooms:

3 water closets @ 125 gpd	=	375 gal.
2 urinals @ 80 gpd	=	160 gal.
4 wash basins @ 80 gpd	=	320 gal.
TOTAL		855 gal.

2. Kitchen

Not operational

B. Saturday loadings

1. Washrooms

3 water closets @ 125 gpd	=	375 gal.

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

3)
between
Club & Lions Den.
2: SITE PLAN

PARKING

2 urinals @ 80 gpd = 160 gal.
4 wash basins @ 80 gpd = 320 gal.

2. Kitchen

One 3-compartment sink @ 100 gpd = 100 gal.
1 wash basin @ 25 gpd = 25 gal.

TOTAL ESTIMATED FLOW = 980 gal. or 4455 L.

From these calculations, it is obvious that wastewaters generated during Saturday activities within the Club represent the maximum loadings to the wastewater disposal system and therefore are the conditions of concern in the selection of a septic tank and the design of a tile field.

3.3 System Design

A bulletin on the approval of a non-standard sewage system states the following design requirements (M.O.E., Feb. 1980):

i) Septic tank volume (ST)

$$ST = 3/4\ Q + 4500$$

where Q = Flow (L/d) ;

ii) Length of tile (L)

$$L = \frac{Qt}{200}\ (m)$$

where t = Percolation time (7.94 min/cm.) ;

iii) Pump chamber capacity (PC)

$$PC = .75\ q$$

q = volume of distribution pipe

and

iv) Pump capacity (P)

$$P = .75\ q/15\ (L)$$

Using these formulae, the sewage disposal system would be sized as follows:

ST = 8000 L
L = 180 m.
PC = 680 L
P = 45 L/min.

SEWAGE DISPOSAL - METCALFE CURLING CLUB

2: SITE PLAN
between Club & Lions Den.
PARKING

4.0 SYSTEM SPECIFICATIONS

Specifications for the septic tank, tile field, pump chamber and sewage pump are detailed as follows:

i) Septic Tank

A reinforced concrete septic tank, with a 8000 L. working capacity, rectangular in cross-section and conforming to the current applicable CSA standards be installed on the south side of the proposed curling facility at the location identified in Fugure 4a. The septic tank will be precast, have two compartments and approximate dimensions of 10 ft. x 5 ft. x 5 ft.

ii) Tile Field

A tile field consisting of 6 rows of 3-inch perforated plastic pipe, each row 30 m. in length with interconnected ends and extending from a solid header pipeline with watertight connections be located and installed as identified in Figure 4a. Centre to centre spacing, the slope of the pipe runs and other details are contained in Fugure 4a. Details on the design of the absorption bed are included in Figure 4b.

iii) Pumping Chamber

A pumping chamber be located as illustrated in Figure 4a. The pumping chamber will be commercial grade, rectangular and have a 680 L. capacity.

iv) Sewage Pump

A fully automatic sewage pump be installed in the chamber. The pump will have a capacity of 45L/min. against a TDH of 6 m., including static lift and pipe friction. The motor will be 1/2 HP, single phase, 60 cycle, 3450 RPM, for operation on 230 volts AC. The discharge line will be 5 cm. NPT. The pump shall be capable of handling solids 2.54 cm. in diameter. Each pump will be equipped with legs for 7.6 cm. setting above the bottom of the sump basin.

Automatic liquid level controls, in combination with a control Panel will be installed. The level controls will be mercury float switches in unbreakable steel shell encased in polyurathane, or equivalent. The control panel will consist of a high level warning light, circuit breaker with through-door operating handle and door mounted running light, reset and manual-off-automatic selector switch. A CEMA-1 door with slip hinges held closed by captive screws will enclose the panel.

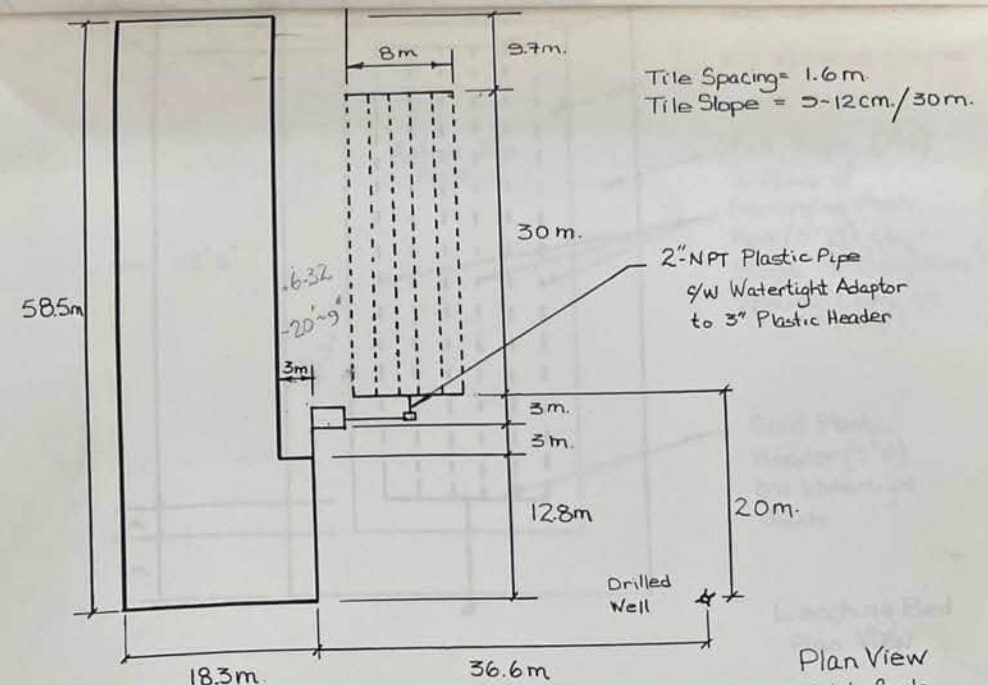
SEWAGE DISPOSAL - METCALFE CURLING CLUB

between
Club & Lions Den.

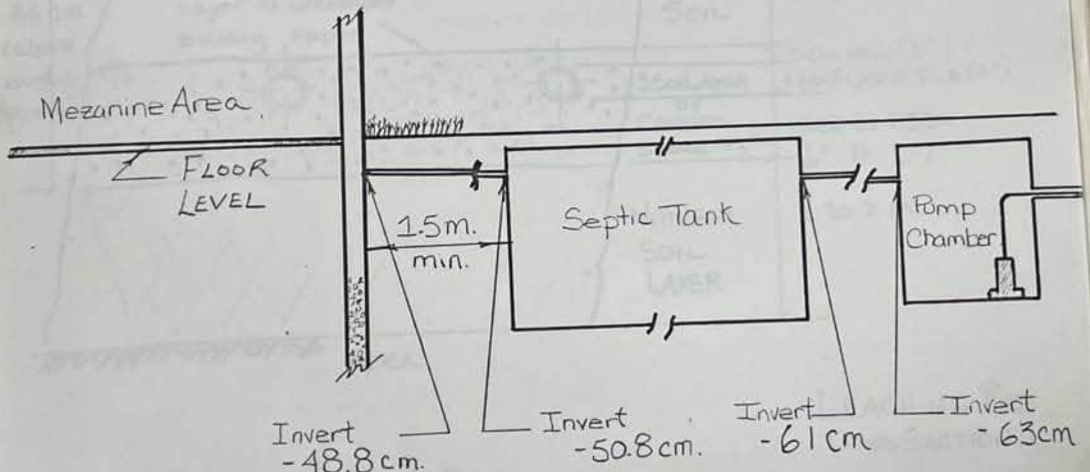
: SITE PLAN

PARKING

SEWAGE DISPOSAL - METCALFE CURLING CLUB.



Plan View
Not to Scale.



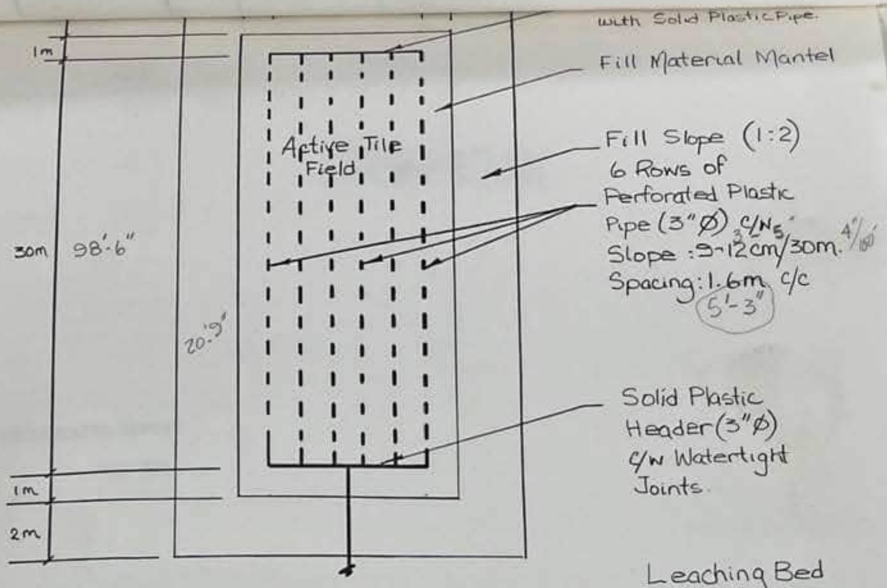
SEPTIC TANK-PUMP CHAMBER
CROSS-SECTION
NOT TO SCALE

FIGURE 4a:
SEPTIC TANK-TILE FIELD
LAYOUT.

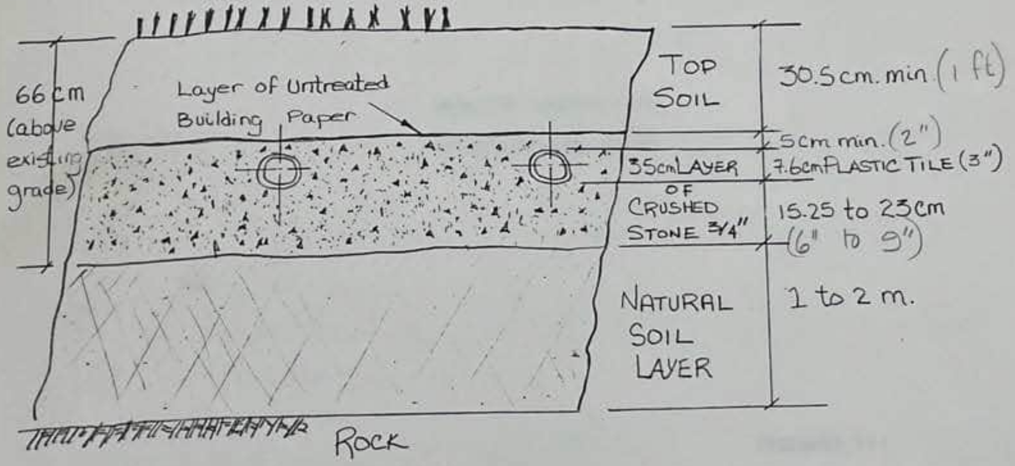
LAYOUT.

6'2"

SEWAGE DISPOSAL - METCALFE CURLING CLUB.



Leaching Bed
Plan View



LEACHING BED
CROSS-SECTION

1) 125 yd³ ~ 3/4" crushed stone

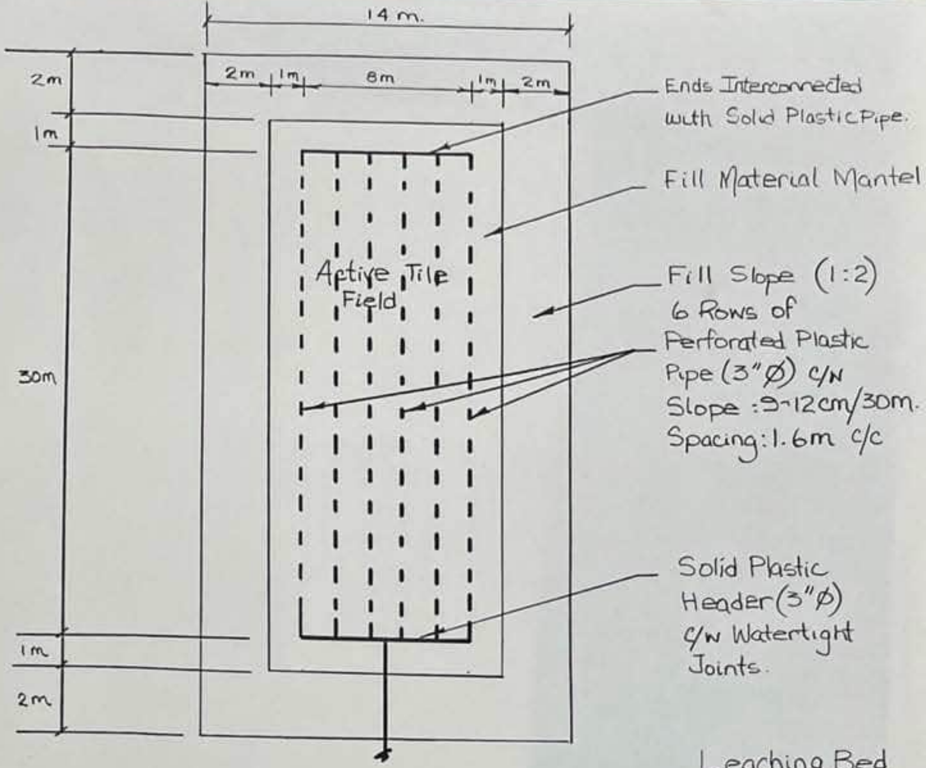
2) 210 yd³ ~ top dressing.

3) Building paper ~ 591 ft.

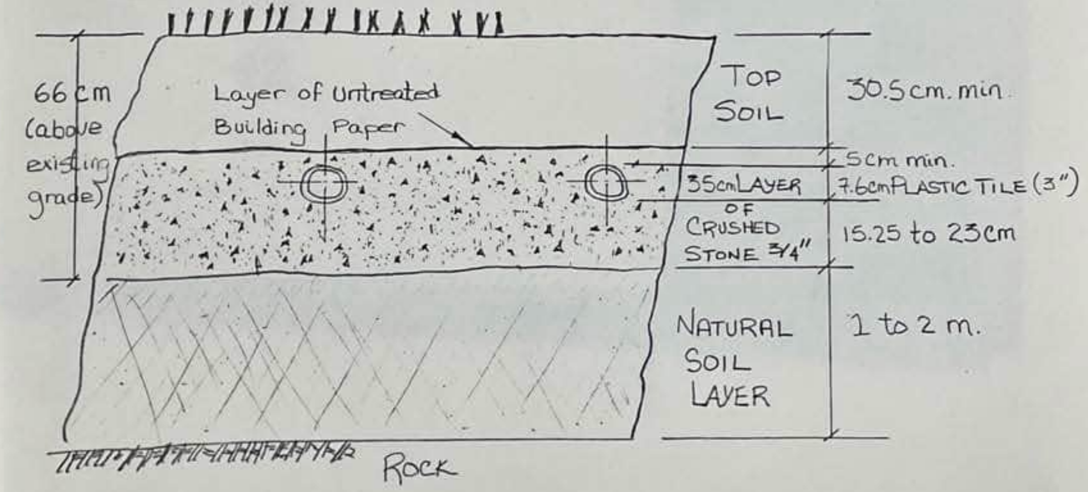
FIGURE 4b: LEACHING BED DETAILS
(NOT TO SCALE)

LAYOUT.

6'2"



Leaching Bed
Plan View



LEACHING BED
CROSS-SECTION

FIGURE 4b: LEACHING BED DETAILS
(NOT TO SCALE)

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

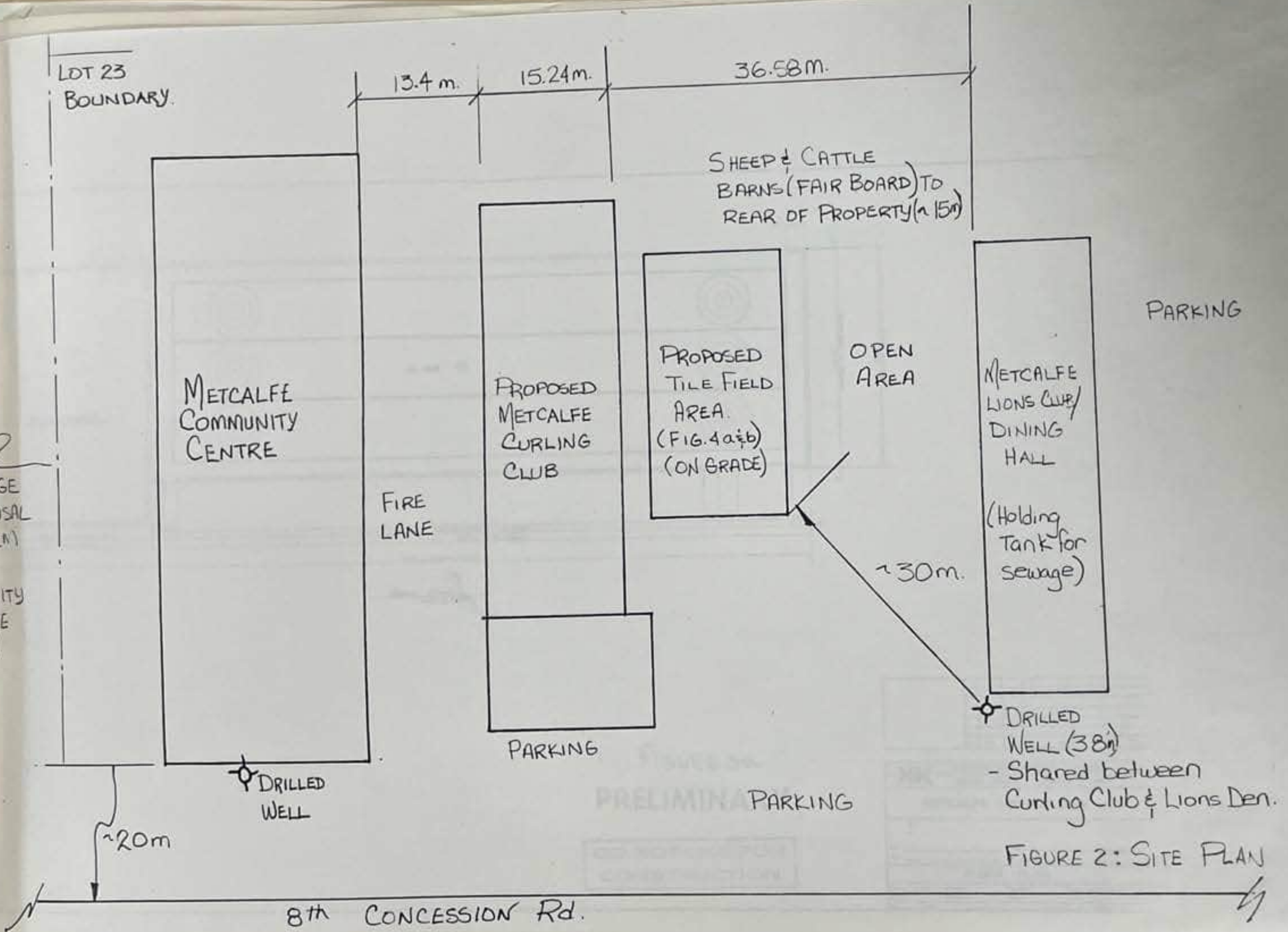
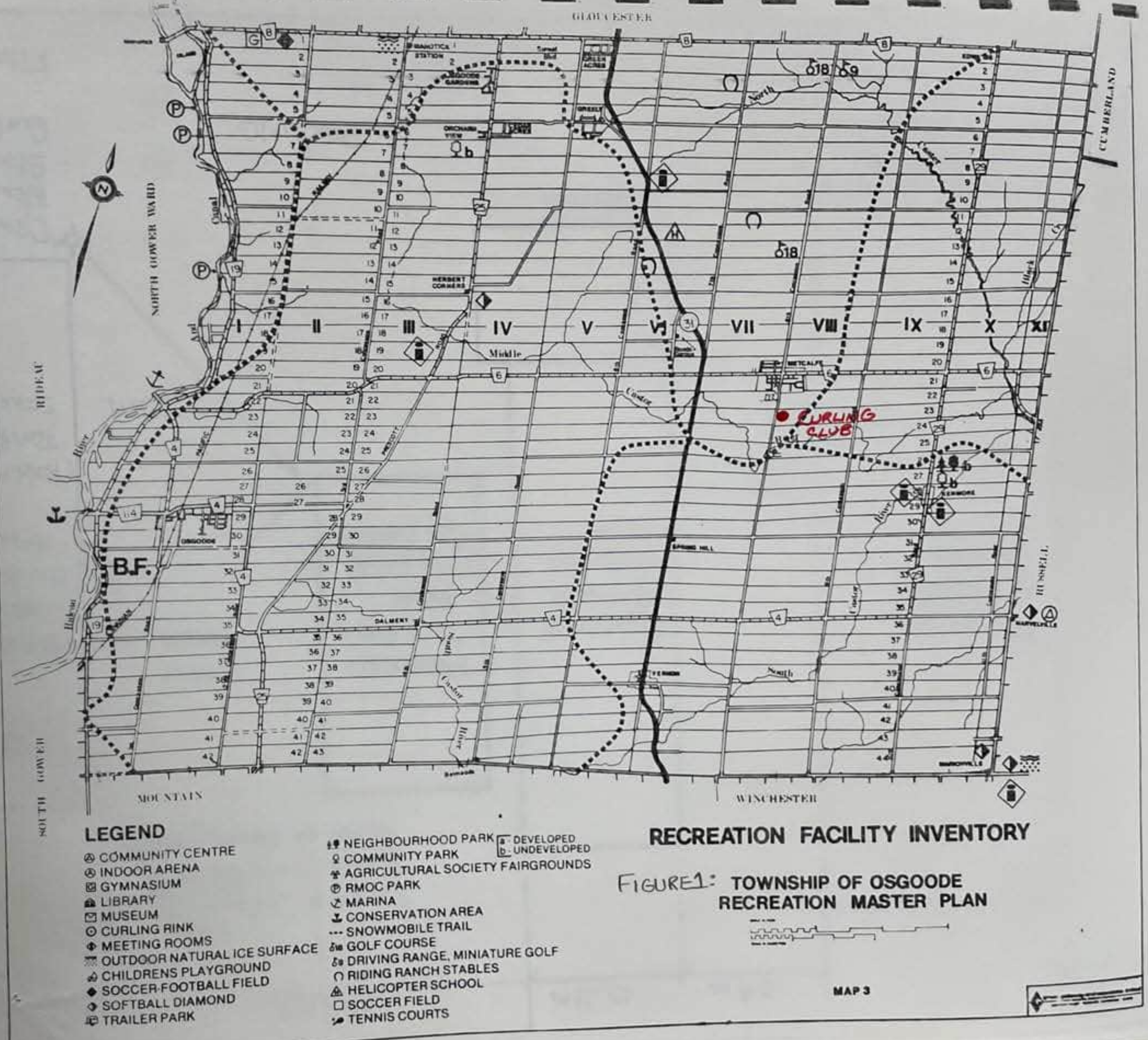


FIGURE 2: SITE PLAN



RECREATION FACILITY INVENTORY

FIGURE 1: TOWNSHIP OF OSGOODE RECREATION MASTER PLAN

2: SITE PLAN

between Club & Lions Den.

PARKING

SEWAGE DISPOSAL - METCALFE CURLING CLUB.

APPENDIX D - NITRATE ATTENUATION CALCULATIONS

CCO-24-3169 - Metcalfe Fairgrounds
Nitrate Loading Calculations - Oct.1.2025

Land Area	A_{total}	87,636.13	m2
	A_{imperv}	9,806.09	m2
	Infiltrating Area	88.8%	
	A_{perv}	77,830.03	m2
Water Surplus (W_s)			
Precipitation(1)	Precipitation	906	mm/yr
Water Surplus(1)	W_s	378	mm/yr
		0.378000	m/yr
Infiltration Factor (I_f) per MOEE 1995			
Topo Rolling Land (1.49% slope)		0.16	
Soil Medium Combination of Clay and Loam		0.20	
Cover Cultivated lands		0.1	
	I_f =	0.455	
Infiltration (I)			
$I=W_s * I_f$	I =	0.171990	m/yr
Runoff = W_s - I	Runoff =	0.206010	m/yr
Dilution Water Available (D_w)			
$D_{w,perv} = A_{perv} * I$	D_w =	13385.99	m3/yr
		36673.94	L/day
$Runoff_{perv} = A_{perv}*W_s*(1-I_f)$	$Runoff_{perv}$ =	16033.77	m3/yr
$Runoff_{imperv} = A_{imper}*Ws$	$Runoff_{imperv}$ =	3706.70	m3/yr
$Runoff_{total} = Runoff_{perv} + Runoff_{imper}$	$Runoff_{total}$ =	19740.47	m3/yr
If using LID for stormwater management	Runoff Reduction % =	0%	
	Runoff Reduction =	0.00	m3/yr
$D_{w\ (final)} = D_{w,perv}$ + Runoff Reduction	$D_{w\ (final)}$ =	13385.99	m3/yr
	$D_{w\ (final)}$ =	36673.94	L/day
Nitrate Concentrations			
Background Nitrate Concentration (C_b)	C_b =	1.260	mg/L
Max Boundary Nitrate Concentration (C_{boun})	C_{boun} =	10	mg/L
Effluent Nitrate Concentration (C_e)	C_e =	40	mg/L
If CAN/BNQ 3680-600 N-I or NSF/ANSI 245 applies	Nitrate Reduction	0%	
	$C_{e\ (final)}$ =	40	mg/L
Effluent Loading (Q_e)	Q_e =	7791	L/day

or

Calculated Nitrate Concentration (C_w)

N=	1	lots
$C_w = [(C_e*Q_e*N) / ((Q_e*N) + D_w)] + C_b$		
C_w =	8.269	

$C_w <= C_{boun}$, therefore proposed development will not exceed ODWO at property limit

🟨	Input data from user
🟧	Set value
🟦	Calculated by worksheet

(1) Environment Canada - Water Budget Means for 1985-2023 at Ottawa International Airport (Lat. 45.32, Long. 75.67)
Water Holding Capacity of 75mm for Shallow Rooted Crops/Urban Lawns, fine sandy loam
Based on Johnstone, K. and Louie, P. Y. T.: 1983, Water Balance Tabulations for Canadian Climate Stations, Report DS-8-83