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Geotechnical Investigation Report
Proposed Development
5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive
Ottawa, Ontario

GEMTEC Project: 104054.001

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Submitted to:

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Proposed Development
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Ottawa, Ontario

October 2, 2025
GEMTEC Project: 104054.001

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1.0 INTRODUCTION

This report presents the results of the geotechnical investigation carried out for the proposed multi-storey residential development to be located at the corner of Hazeldean Road and Savage Street, at municipal addresses 5872, 5880, and 5884 Hazeldean Road, and 7 Savage Drive in Ottawa, Ontario.

The purpose of the investigation was to identify the general subsurface conditions at the site by means of a limited number of boreholes and, based on the information obtained, to provide engineering guidelines and recommendations on the geotechnical design aspects of the project, including construction considerations that could influence design decisions.

GEMTEC has carried out a Phase One Environmental Site Assessment (ESA) and a Phase II ESA, which are reported under separate covers.

This report is subject to the Conditions and Limitations of This Report, which follows the text of this report, and which are considered an integral part of this report.

2.0 BACKGROUND

2.1 Project Description

The site of the proposed development is located at the southeast corner of Hazeldean Road and Savage Drive, at the municipal addresses provided above. The site is currently a used car dealership, consisting of a slab on grade building and asphalt paved parking, as well as a residential dwelling with a basement.

Details of the development are not known at this time; however, it is understood that a mid to high-rise residential building is under consideration. Further preliminary details of the development are:

- The building may range from five to nine storeys in height;
- One level of underground parking may be provided;
- The majority of the site will be excavated to construct the underground parking level;
- It is assumed that retaining walls may be required on site; and,
- Surficial access roadway and parking areas are proposed.

It is unknown whether a watertight or drained construction is planned for the underground parking level.

3.0 EXISTING INFORMATION ON SUBSURFACE CONDITIONS

3.1 Site Geology

Surficial geology maps indicate the presence of glacial till over shallow bedrock at the site. Bedrock geology maps indicate limestone of the Bobcaygeon Formation is present below the soil cover. Drift thickness mapping indicates that the bedrock surface is expected at depths ranging from about 1 to 3 metres, being deeper to the north.

The site is in an area of 'potential' karst on the Ontario Geological Survey Southern Ontario Karst Map, and as such, it is understood that karst formations (i.e. underground caves and/or voids occurring as a result of dissolution of bedrock due to water) are possibly present at and in the vicinity of the site.

3.2 Previous Investigations by Others

A Phase II ESA was carried out at the site by Pinchin Limited in June 2024. The results were provided in the report titled "Phase II Environmental Site Assessment, 5872, 5880 and 5884 Hazeldean Road, Ottawa, Ontario" dated June 25, 2024 (Project No. 341092.001). This investigation and report are referred to further herein as Pinchin (2024).

As part of Pinchin (2024) two boreholes named MW1 and MW2 were advanced to depths of about 7.0 and 9.7 metres, respectively. The subsurface conditions encountered in these boreholes consisted of topsoil over fill material in borehole MW1, and concrete and fill material over glacial till and silty sand in borehole MW2. Limestone bedrock was encountered at a depth of about 1.2 and 2.1 in boreholes MW1 and MW2, respectively. A single monitoring well was installed in each borehole.

The conditions encountered during Pinchin (2024) are reasonably similar to the mapped geological conditions, except for the uncontrolled fill material which is typically not identified on the geological maps.

4.0 METHODOLOGY

4.1 Geotechnical Investigation

The fieldwork for this investigation was carried out on April 30 and May 1, 2025. On those days, four boreholes, identified as 25-01 to 25-04, inclusive, were advanced at the approximate locations shown on the Site Plan, Figure 1. The borehole locations were selected and positioned at the site relative to existing site features by GEMTEC personnel, and were surveyed using high precision GPS survey instrumentation.

The boreholes were advanced using a track mounted drill rig supplied and operated by Strata Drilling Group of Ottawa, Ontario. Standard penetration tests were carried out in the boreholes within the overburden and samples of the soils encountered were recovered using split spoon

sampling equipment. The boreholes were advanced to practical auger refusal at depths ranging from about 0.2 to 0.9 metres. Upon reaching auger refusal in boreholes 25-01, 25-02, and 25-03 the boreholes were then advanced using rotary diamond drilling techniques while retrieving HQ sized core. Coring was carried out to a final depth ranging from about 5.2 to 9.8 metres.

The fieldwork was supervised throughout by a member of our engineering staff who directed drilling operations, observed the in-situ testing, and logged the sample recovery.

Following the fieldwork, the soil and bedrock samples were returned to our laboratory for examination by a geotechnical engineer. Selected samples of the soil were tested for grain size distribution and water content testing. Select samples of the bedrock cores were submitted for unconfined compressive strength testing. Two samples of water, one recovered from each of the monitoring wells in boreholes 25-01 and 25-02, were sent to AGAT laboratories and Paracel laboratories for basic chemical testing related to corrosion of buried concrete and steel.

4.2 Hydrogeological Investigation

4.2.1 Monitoring Well Installation

A single standpipe piezometer (monitoring well) was installed in each of boreholes 25-01, 25-02, and 25-03. Each monitoring well consisted of a 50-millimetre diameter screened PVC pipe installed within a surround of filter sand. Above the surround of filter sand, bentonite was used to seal the well screen from overlying materials and the wells were finished with flush mounted caps. Well depths and screen lengths were chosen based on the material types and inferred groundwater levels encountered during drilling.

4.2.2 Water Levels

Groundwater levels were measured on May 9 and June 4, 2025 in the in the three monitoring wells installed during GEMTEC's investigation, and in the two existing monitoring wells in boreholes MW1 and MW2 from Pinchin (2024).

Preceding groundwater level measurements, monitoring wells were developed using a foot valve and tubing to purge the water column volume three times or until the well was purged dry.

4.2.3 Hydraulic Conductivity Testing

Hydraulic conductivity testing consisting of falling and rising head tests (i.e., slug tests) was carried out in in the monitoring wells installed in boreholes 25-01, 25-02 and 25-03.

Falling head testing involved introducing an instantaneous pressure increase to the water column within the well screen (equal to the volume o the slug) and monitoring the dissipation of the water level over time using a groundwater data logging pressure transducer together with an electric water level tape.

Rising head testing involved introducing an instantaneous pressure decrease to the water column within the well screen (equal to the volume of the slug) and monitoring the recover of the water level over time using a groundwater data logging pressure transducer together with an electric water level tape. Manual measurements were also taken for 5 minutes following the introduction and removal of the slug.

4.2.4 Groundwater Quality Sampling

A groundwater quality sample was collected from the monitoring well in borehole 25-02 on June 4, 2025. The sample was collected following well purging using dedicated downhole tubing and foot valve and stored in laboratory supplied bottles. The sample was submitted to a CALA-accredited laboratory for the analysis of “Baseline Monitoring” parameters as outlined in the City of Ottawa’s *Request To Discharge Wastewater From Construction or Remediation Projects*.

5.0 SUBSURFACE CONDITIONS

Descriptions of the subsurface conditions logged in the boreholes are provided on the Record of Borehole Sheets in Appendix A. Details of the monitoring wells are also provided on the borehole logs. The results of the soil classification testing are provided in Appendix B and on the Record of Borehole Sheets. Photographs of the bedrock core and the results of bedrock compressive strength testing are provided in Appendix C. Borehole logs from the Pinchin (2024) investigation are provided in Appendix D. Hydraulic conductivity testing results are provided in Appendix E. The results of the chemical analysis are provided in Appendix F. The results of the water quality testing are provided in Appendix G.

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

5.1 Asphaltic Concrete

Boreholes 25-02 and 25-04 were advanced through the asphaltic concrete parking lot surfacing, which has a thickness of about 100 and 110 millimetres, respectively.

5.2 Fill material

Fill material was encountered at ground surface at boreholes 25-01 and 25-03 and underlying the asphaltic concrete in boreholes 25-02 and 25-04. The fill material consists of sandy gravel, with trace to some non-plastic fines.

At boreholes 25-01, 25-02, and 25-03, the fill material extends to depths ranging from about 0.9 to 1.1 metres. It is uncertain if the shallow auger refusal in 25-04 at 200 millimetres reflects the base of the fill material at this location.

Standard penetration tests carried out in the fill material gave N values ranging from 13 to greater than 50 blows per 0.3 metres of penetration, which reflect a compact to very dense relative density. The higher blow counts likely reflect the presence of the cobbles, boulders and other hard material within the fill material, noting that rotary coring was required to fully penetrate the layer at the locations of boreholes 25-01, 25-02 and 25-03.

The results of the grain size distribution testing on one sample of the fill are summarized in Table 4.1. The water content of one sample of one sample of the fill material was measured to be about 6 percent.

Table 4.1 – Summary of Grain Size Distribution Testing, Fill Material

Borehole ID	Sample Number	Gravel (%)	Sand (%)	Silt and Clay (%)
25-03	GS1	69	23	8

5.3 Limestone Bedrock

Grey limestone bedrock was proven below the level of auger refusal in boreholes 25-01, 25-02, and 25-03, at depths ranging from about 910 millimetres to 1.1 metres. The limestone bedrock was cored to depths ranging from about 5.2 to 9.8 metres below the existing ground surface. As comparison, bedrock was reported in Pinchin (2024) at depths of 1.2 to 2.1 metres.

The upper about 0.3 and 0.2 metres of the bedrock in the boreholes 25-02 and 25-03, respectively, is moderately to highly fractured, with solid core recovery values of about 0 to 50 percent and rock quality designation values of 0 percent.

Below the fractured zone, total core recover (TCR) values ranging from about 83 to 100 percent, solid core recovery (SCR) values ranging from about 25 to 100 percent, and rock quality designation (RQD) values ranging from about 18 to 100 percent were obtained. Based on these values, in accordance with the classification system set out in the Canadian Foundation Engineering Manual (5th Edition) the bedrock can be classified as Very Poor to Excellent Quality, possibly increasing with depth.

The result of unconfined compressive strength testing carried out on six samples of recovered bedrock core from boreholes 25-01, 25-02, and 25-03 and the results are presented in Table 4.3. The rock strength classification in the Canadian Foundation Engineering Manual (5th Edition) has been applied.

Table 4.3 – Results of Unconfined Compressive Testing of Rock Core

Borehole ID	Depth (metres)	Rock Compressive Strength (MPa)	Rock Strength Classification
25-01	3.2 to 3.4	109	Very Strong
25-01	5.0 to 5.3	110	Very Strong
25-02	2.0 to 2.2	86	Strong
25-03	2.7 to 3.0	152	Very Strong
25-03	5.9 to 6.2	124	Very Strong
25-03	8.8 to 9.0	129	Very Strong

5.4 Groundwater Level

The groundwater levels in the monitoring wells are provided in Table 4.4. The groundwater levels may be higher during wet periods of the year such as the early spring or following periods of precipitation.

Table 4.4 – Groundwater Level Depths and Elevations

Borehole ID	Ground Surface Elevation (metres)	Groundwater Depth (metres)	Groundwater Elevation (metres)	Date of Reading
25-01	109.5	2.5	107.0	May 9, 2025
		2.5	107.0	June 4, 2025
25-02	108.9	0.8	108.1	May 9, 2025
		0.8	108.1	June 4, 2025
25-03	110.0	1.4	108.6	May 9, 2025
		1.5	108.4	June 4, 2025
MW1	109.1[1]	1.9	107.2	May 9, 2025
		1.8	107.3	June 4, 2025
MW2	109.7[1]	1.2	108.5	May 9, 2025
		5.8	103.9	June 13, 2024
		1.4	108.3	June 4, 2025

Note: 1. The ground surface elevation of the Pinchin boreholes (MW1 and MW2) were surveyed by GEMTEC

5.5 Chemistry Relating to Corrosion

The results of the for basic chemical testing relating to corrosion of buried concrete and steel are summarized in Table 4.5.

Table 4.5 – Chemistry Relating to Corrosion

Parameter	Borehole 25-01 Groundwater	Borehole 25-02 Groundwater
pH	7.2	7.7
Electrical Conductivity (µS/cm)	1,440	1,880
Sulphate (mg/L)	341	117
Chloride (mg/L)	202	416

5.6 Hydraulic Conductivity

A summary of the hydraulic testing results is provided in Table 4.6. Water level displacement is based on slug size of about 0.6 metres. The recovery curves are provided in Appendix E. Estimates of hydraulic conductivity were calculated from the results of the recovery test using the Bouwer-Rice method of analysis and are presented in Table 4.7 below.

The calculated hydraulic conductivities are within the literature value range for limestone bedrock, which ranges from about 10^{-9} to 10^{-5} metres per second (Freeze and Cherry, 1979). Given the rapid response observed in boreholes 25-02 and MW2, the hydraulic conductivity is expected to be much higher at these locations, likely associated with highly fractured bedrock at those locations.

The results of the hydraulic testing represent the conditions in the vicinity of the well screen and as distance increases from the well screen the conditions may vary from those reported, particularly in a fractured bedrock setting. Conditions between wells have not been established, therefore variability in hydraulic conductivity within the site should be anticipated.

Table 4.6 – Summary of Hydraulic Testing Results

Borehole ID	Falling Head Test		Rising Head Test	
	Recovery Time (minutes)	Recovery (percent)	Recovery Time (minutes)	Recovery (percent)
25-01	10	100	10	100
25-02	0 [2]	100	0[1]	100
25-03	14	100	18	100
MW1	3	95	3	95
MW2	0 [2]	95	0[1]	95

Notes:

1. Near instantaneous recovery

Table 4.7 – Calculated Hydraulic Conductivities

Borehole ID	Screened Geological Unit	Calculated Hydraulic Conductivity (m/s)	
		Falling Head	Rising Head
25-01	Limestone Bedrock	4×10^{-6}	4×10^{-6}
25-02	Limestone Bedrock	-[1]	-[1]
25-03	Limestone Bedrock	2×10^{-6}	2×10^{-6}
MW1	Limestone Bedrock	8×10^{-6}	9×10^{-6}
MW2	Limestone Bedrock	-[1]	-[1]

Notes:

1. Insufficient observed displacement (i.e., rapid response) for analysis of aquifer properties.

5.7 Groundwater Quality

The groundwater quality analytical results were compared against the Ottawa Sewer Use By-law (No. 2003-514), exceedances of which are summarised as follows:

Ottawa Sewer Use By-law – Storm Sewers:

- Total suspended solids of 90 milligrams per litre exceeded the limit of 15 milligrams per litre;

- Total manganese of 0.066 milligrams per litre exceeded the limit of 0.05 milligrams per litre.

Ottawa Sewer Use By-law – Sanitary and Combined Sewers:

- No exceedances were identified when compared to Sanitary and Combined Sewers.

Based on groundwater quality results, discharge to storm sewer and sanitary/combined sewer may be possible following proper treatment including sediment removal.

6.0 GEOTECHNICAL GUIDELINES AND RECOMMENDATIONS

6.1 Suitability of Site for Proposed Development

Based on the information available at the time of preparing this report it is considered that the site is suitable for the proposed development, from a geotechnical perspective, noting that the design of the development appears to be at a very early stage and once further details of the proposed development are known, GEMTEC should review the design to verify the below recommendations.

6.2 Grade Raise Restrictions

We do not anticipate any grade raise restrictions at this site, from a geotechnical perspective. Notwithstanding, any filling above 3 metres of the original ground level should be assessed by GEMTEC.

6.3 Excavation

6.3.1 Overburden Excavation

The fill material outside the existing structures is anticipated to be readily excavatable using conventional hydraulic excavation equipment, in general, noting that fill material can contain boulders and other hard materials. Excavation of any debris associated with clearing the site of existing structures will be slower and require increased effort, if for example removal of large fragments of reinforced concrete, former slabs or building foundation be necessary.

The sides of the excavations should be sloped in accordance with the requirements in Ontario Regulation 213/91 under the Occupational Health and Safety Act. For excavations in Type 3 soils allowance should be made for excavation side slopes of one horizontal to one vertical extending upwards from the base of the excavation above the groundwater level. Below the groundwater level flatter side slopes of 3 horizontal to 1 vertical may be required. Re-evaluation of the applicable Soil Type should be carried out by a geotechnical practitioner once site clearing has been performed.

6.3.2 Bedrock Excavation

Bedrock removal at this site could be carried out using drill and blasting, hoe ramming techniques in conjunction with line drilling on close centres, or a combination of both. Provided that good bedrock excavation techniques are used, the bedrock could be excavated using near vertical side walls. Any loose bedrock should be scaled from the sides of the excavation for worker safety.

As a guideline for blasting, the peak vibration limits suggested at the nearest structure or service are provided in Table 5.1, below. It is pointed out that the limits provided, although conservative, were established to prevent damage to existing buildings and services in good condition. More stringent criteria may be required to prevent damage to freshly placed (uncured) concrete or vibration sensitive equipment or utilities.

Table 5.1 – Peak Vibration Limits

Frequency of Virbration (Hz)	Vibration Limits (millimetres/second)
<10	5
10 to 40	5 to 50 (interpolated)
>40	50

Any blasting should be carried out under the supervision of a blasting specialist engineer and monitoring of the blasting should be carried out to ensure that the blasting meets the limiting vibration criteria. Pre-construction condition surveys of the nearby structures and existing buried services are considered essential. The effects due to vibration from blasting can be controlled by limiting the size and amount of charge, using delayed detonation techniques, and the like. A blasting specialist should be consulted on the effects of vibration on nearby services and separation distance between any blasting and existing underground services.

As an alternative to blasting, bedrock removal could be carried out using hoe ramming techniques in conjunction with line drilling on close centres. However, excavation rates will likely be slower by this method. For the bedrock at this site, it is suggested that allowance be made for line drilling 75 to 100 millimetre diameter holes on 200 to 300 millimetre centres. The vibration effects of hoe ramming are usually minor and localized. Monitoring of the hoe ramming could be carried out, at least initially, to measure the vibrations to ensure that they are below the acceptable threshold value.

The bedrock below founding level will likely break at a horizontal bedding plane below the design depth of the footings, which may necessitate thickening of the footings and/or lowering of the

footings. As such, significant overbreak and underbreak should be expected in any bedrock removal.

6.4 Groundwater Pumping and Management

The amount of water entering the excavation for the construction of the underground parking and services at this site will depend on the size of the excavation, the material through which the excavation will be advanced, as well as the groundwater elevation at the time of construction. Open bedrock joints and discontinuities, or a high density of bedrock fractures and/or discontinuities may result in significantly higher groundwater inflow from the rock mass. Bedrock blasting may increase the density of bedrock fracturing and cause discontinuities to open. Significant groundwater inflows should be anticipated where these conditions are encountered in the excavation.

For temporary dewatering during construction over 50,000 litres per day an Environmental Activity and Sector Registry (EASR) is required, to be supported by a Water Taking and Discharge Plan report prepared by a Qualified Professional. As of July 1, 2025, no maximum limits apply to dewatering.

As part of the upcoming changes to *Ontario Regulation 387/04* under the *Ontario Water Resources Act* (effective July 1, 2025) low-risk foundation drainage systems, used primarily for residential purposes, that take less than 379,000 litres of groundwater per day are exempt from environmental permissions (EASR or PTTW registration). If long-term groundwater takings are over 379,000 litres per day, a Category 3 PTTW will be required, to be supported by a hydrogeological investigation.

The short and long-term dewatering needs should be evaluated following review of detailed design drawings. Given the rapid hydraulic response observed in two monitoring wells, it is expected that any groundwater taking below the water table will require EASR registration (short-term) and may also require a Category 3 PTTW for long-term foundation drainage.

6.5 Foundation Design

The factored net geotechnical resistance at Ultimate Limit States (ULS) for spread footing foundations founded on or within the bedrock may be taken as 1,000 kilopascals. The factored geotechnical resistances at ULS includes a geotechnical resistance factor of 0.5.

Provided the bedrock surface is acceptably cleaned of soil or loose and fractured bedrock (i.e., any bedrock that can easily be removed with a hydraulic excavator), the settlement of footings at the corresponding service (unfactored) load levels will be less than 25 millimetres and therefore Serviceability Limit States (SLS) need not be considered in the foundation design. Accordingly, the post construction settlement of structural elements which derive their support from footings bearing on bedrock should be negligible.

6.6 Frost Protection of Foundations

All exterior footings should be provided with at least 1.5 metres of earth cover for frost protection purposes. Isolated, unheated exterior footings adjacent to surfaces which are cleaned of snow cover during the winter months should be provided with a minimum of 1.8 metres of earth cover. It is assumed that the underground parking level will be heated and as such, it is likely that additional protection of the foundations from freezing conditions will not be required.

6.7 Seismic Site Class and Liquefaction Potential

Based on the results of the investigation, and the provided structural drawings for the proposed structures, the proposed foundations will be supported on or within the bedrock.

If direct measurement of the average shear wave velocity in the bedrock be carried out it is possible that Site Class A or B (Site Designation X_A or X_B) would apply. In the absence of such testing, the building should be designed for seismic Site Class C (Site Designation X_C). GEMTEC can carry out such testing as the design progresses, upon request.

There is no potential for liquefaction of the overburden deposits at this site.

6.8 Foundation Wall Backfill and Drainage

It is assumed that the base of the foundation walls will be up to about 3.0 metres below the existing ground surface which will likely extend below the bedrock. The following alternatives could be considered for the foundation walls that are below the bedrock surface:

1. Foundation walls formed on both sides, damp proofed and backfilled with free draining, non-frost susceptible granular materials; OR
2. Foundation walls formed on one side, with a proprietary drainage system placed directly against the bedrock.

Alternative 2 could be considered where space constraints dictate and/or to limit the amount of bedrock excavation.

In areas where the walls are formed on both sides, the exterior of the wall should be damp proofed and a perforated plastic foundation drain with a surround of clear crushed stone should be installed on the exterior of the walls. The drain should outlet by gravity to a sump from which the water is pumped.

In areas where the walls will be cast directly on the bedrock, drainage could be achieved by means of a prefabricated drainage system, such as Miradrain 5000, fastened to the bedrock. In this case, the drainage system could be connected to a perforated drain below the slab, as discussed in Section 6.10.

Above the bedrock surface, the walls could be formed on both sides. In this case, the walls should be damp proofed and drainage could be achieved by means of a prefabricated drainage system, such as Miradrain 5000, fastened to the exterior of the wall and hydraulically linked (spliced) to the drainage system fastened to the bedrock or by means of a free draining granular backfill material.

To avoid frost adhesion and possible heaving, the walls should be backfilled with imported, free-draining, non-frost susceptible granular material such as that meeting the requirements of Ontario Provincial Standard Specifications (OPSS) Granular A, or Granular B Type I or II. Alternatively, the existing granular fill material at this site may be used as backfill against the foundation walls, provided it is reviewed on site by a geotechnical engineer prior to placement.

Where the backfill will ultimately support areas of hard surfacing (pavement, sidewalks or other similar surfaces), the backfill should be placed in maximum 200 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment. Light walk behind compaction equipment should be used next to the foundation walls to avoid excessive compaction induced stress on the walls. A gradual transition should be provided between those areas of hard surfacing underlain by non-frost susceptible granular wall backfill and those areas underlain by existing frost susceptible fill material to reduce the effects of differential frost heaving. It is suggested that granular frost tapers be constructed from 1.5 metres below finished grade to the underside of the granular subbase material for the hard surfaced areas. The frost tapers should be sloped at 1 horizontal to 1 vertical, or flatter.

Where future landscaped areas will exist next to the proposed structure and if some settlement of the backfill is acceptable, the backfill could be compacted to at least 90 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment.

The frost susceptible native soils could be considered for foundation wall backfill purposes in landscaped areas provided that a suitable bond break is applied to the surface of the foundations to prevent frost jacking. A suitable bond break could consist of at least 2 layers of 6 MIL polyethylene sheeting or a proprietary plastic drainage medium. It is also pointed out that the native soils at this site can be impacted by changes in moisture content and this could affect the ability to compact this material to the required density.

In areas where the walls will be cast directly on the bedrock and will extend above the bedrock surface, a perforated plastic drain with a surround of clear crushed stone wrapped in a nonwoven geotextile should be installed on the exterior of the walls at the bedrock surface. The drain should outlet by gravity to a storm sewer or a sump from which the water is pumped.

6.9 Lateral Earth Pressure

The selection of the appropriate value of lateral earth pressure coefficient (i.e., active, or at rest) for design depends on the permissible movement in the retaining structures and the design approach adopted. For instance, relatively large wall movements are typically required to generate “Active” earth pressure conditions, and as such the use of “At Rest” earth pressure coefficients are recommended for preliminary design purposes unless the structures are specifically designed for such movements to occur. Further details can be provided as required.

In addition to the earth pressures, an appropriate value of uniform surcharge at ground surface should be considered to account for construction traffic and other applicable loads as appropriate. We suggest a minimum value of 15 kilopascals be considered.

Please note that the following sections assume that the foundation walls will be provided with drainage measures and will be installed with granular backfill against the walls (i.e., not formed against the bedrock). further details on lateral earth pressures for foundation walls against the bedrock can be provided as the design progresses. Should a water-tight basement be considered, the foundation walls should be designed to resist the additional pressures from groundwater.

Heavy construction traffic should not be allowed to operate adjacent to foundation walls for the proposed buildings (within about 2 metres horizontal) during construction, without the approval of the designers.

6.9.1 Static Geotechnical Design Parameters

Foundation walls that are backfilled with granular material such as that meeting OPSS Granular B Type I or II requirements should be designed to resist “at rest” earth pressures (unless larger movements can be accommodated) calculated using the following formula:

$$\sigma_h = K_o (\gamma\, d+q)$$

where;

- σ_h : lateral earth pressure at depth, d (kilopascals)
- γ: Moist material unit weight (kilonewtons per cubic metre);
- K_o: “At-rest” earth pressure coefficient;
- q: Surcharge at the top of the wall (kilopascals)

6.9.2 Dynamic Geotechnical Design Parameters

Seismic shaking can increase the forces on the foundation walls. The selection of the appropriate value of dynamic earth pressure coefficient (i.e., considering full or 50 percent PGA values) for design depends on the permissible movement in the retaining structures and the design approach

adopted. For instance, for non-yielding structures the use of full PGA is recommended, while for yielding structures the reduced PGA value may be applied.

The total pressure due to combined static and seismic loads acting at a specified depth, d, below the top of the wall may be calculated using the following equation:

$$\sigma_h = K_o \gamma d + (K_{ae} - K_a) \gamma (H - d)$$

where;

- σ_h : lateral earth pressure at depth d (kilopascals);
- γ: Moist backfill material unit weight (21 kilonewtons per cubic metre);
- K_{ae} : Dynamic “Active” earth pressure coefficient;
- H : Wall height (metres);
- K_a: “Active” Earth Pressure Coefficient

The static thrust component (P_o) acts at a point located H/3 above the base of the wall. During seismic shaking, the dynamic at rest thrust component (P_o) acts at a point located about 0.6H above the base of the wall.

According to the 2020 National Building Code of Canada Seismic Hazard Tool, the peak ground acceleration (PGA) for this site is about 0.32 g for Site Class C (Site Designation X_C). The dynamic at rest earth pressure coefficient was calculated using the method suggested by Mononobe and Okabe, assuming a horizontal seismic coefficient, k_h, of 0.248 and assuming that the vertical seismic coefficient, k_v, is zero (i.e. non-yielding walls). For design purposes, the parameters provided in Table 5.2 can be used to calculate the thrust acting on the walls during static and seismic loading conditions.

Table 5.2 – Summary of Design Parameters, Drained Building Foundation Walls

Parameter	OPSS Granular B Type I	OPSS Granular B Type II
Material Unit Weight, γ (kilonewtons per cubic metre)	22	22
Estimated Friction Angle (degrees)	34	38
“At Rest” Earth Pressure Coefficient, K_o, assuming horizontal backfill behind the structure	0.44	0.38
“Active” Earth Pressure Coefficient, K_a, assuming horizontal backfill behind the structure	0.28	0.24

Parameter	OPSS Granular B Type I	OPSS Granular B Type II
Dynamic Earth Pressure Coefficient, K_{ae}, assuming horizontal backfill behind the structure	0.51	0.44

It should be noted that the above table assumes that the ground above the wall will be flat (i.e., not sloping). If a sloping ground surface behind the wall is proposed the thrust acting on the wall will be increased. It should also be noted that the values in the table above assumes a Site Class C (Site Designation X_C), and if direct measurement of the shear wave velocity is carried out (and a high Site Class/Site Designation is provided) the values will be updated.

6.10 Floor Slabs

6.10.1 General

The floor slab should be wet cured to minimize shrinkage cracking and slab curling. The slab should be saw cut to about 1/3 the thickness of the slab as soon as curing of the concrete permits, in order to minimize shrinkage cracks.

Proper moisture protection with a vapour retarder should be used for any floor slab where the floor will be covered by moisture sensitive flooring material or where moisture sensitive equipment, products or environments will exist. The “Guide for Concrete Floor and Slab Construction”, ACI 302.1R-04 should be considered for the design and construction of vapour retarders below the floor slab.

If the floor slab is waterproofed, the floor slab should be designed to resist hydrostatic pressures.

6.10.2 Slab Support

To provide predictable settlement performance of the basement slab loose bedrock, that is easily removed by a hydraulic excavator, should be removed from below the proposed slab.

The base of the basement floor slab should consist of at least 200 millimetres of granular A or 19-millimetre clear crushed stone. Any necessary grade raise fill should consist of either OPSS Granular B Type II or 19 millimetre clear crushed stone. The use of clear stone is preferable for a drained basement condition. It is suggested that drainage be provided below the slab by means of plastic perforated pipes spaced at about 5 metres on centre or as required to link any hydraulically isolated areas. The drains should outlet to the sump from which the water is pumped.

The Granular A and B Type II should be compacted in maximum 150 millimetre thick lifts to at least 95 percent of the material’s standard Proctor maximum dry density value using suitable vibratory compaction equipment. The clear crushed stone should be nominally compacted with at least 2 passes of a diesel plate compactor.

OPSS documents allow recycled asphaltic concrete and concrete to be used in Granular B Type II material. Since the source of recycled material cannot be determined or controlled, it is suggested that any imported Granular B Type II materials be composed of 100 percent crushed rock only.

6.11 Corrosion of Buried Concrete and Steel

The measured sulphate concentration in the water samples recovered from monitoring wells in boreholes 25-01 and 25-02 were about 202 and 406 milligrams per litre, respectively. According to Canadian Standards Association (CSA) “Concrete Materials and Methods of Concrete Construction”, the concentration of sulphate can be classified as low. Therefore, any concrete in contact with the groundwater could be batched with general use (GU) cement. The effects of freeze thaw in the presence of de-icing chemical (sodium chloride) use on the roadway should be considered in selecting the air entrainment and the concrete mix proportions for any concrete.

Based on the resistivity and pH of the sample, the water in this area can be classified as slightly aggressive to aggressive towards unprotected steel. It should be noted that the corrosivity of the soil/groundwater could vary throughout the year due to the application sodium chloride for de-icing.

6.12 Retaining Walls

It is assumed that retaining walls may be required on the site, and below are preliminary guidelines for design of retaining walls. Further recommendations can be provided, if required.

The excavations for retaining walls should be carried out as per Section 6.3 of this report.

The foundations for the retaining wall can be constructed on a pad of compacted engineered fill on the bedrock surface.

The base for the retaining walls should consist of at least 150 millimetres of granular material meeting Ontario Provincial Standard Specification (OPSS) requirements for Granular A, compacted in maximum 200 millimetre thick lifts to at least 95 percent of the material’s standard Proctor maximum dry density value using suitably sized compaction equipment.

The spread footing foundations should be sized using a geotechnical reaction at serviceability limit states of 150 kilopascals and a factored geotechnical resistance at ultimate limit states of 300 kilopascals. The post construction total and differential settlement of footings at SLS should be less than 25 and 20 millimetres, respectively, provided that any loose or disturbed soil is removed from the bearing surfaces and that engineered fill is prepared as described above.

To provide drainage and avoid frost adhesion and possible horizontal frost heaving which could occur behind the wall causing the wall to be pushed or rotated outward, the wall should be backfilled with imported, free-draining, non-frost susceptible granular material meeting

OPSS Granular B Type I or II requirements. Lateral earth pressures for the retaining wall should be assessed as per Section 6.9 of this report.

6.13 Proposed Services

Information on the proposed services/underground utilities were not available at the time of preparing this report. As such, relatively generic guidelines are provided. More tailored guidelines can be provided as further information becomes available.

6.13.1 Excavation for the Site Services

It is anticipated that the proposed services will be installed at a depth of up to about 3.0 metres. Excavations will be carried out through the fill material and into the bedrock.

Excavations for the services should be carried out as per Section 6.3. As an alternative to sloped excavations in the overburden, the service installations could be carried out within a tightly fitting, braced steel trench box, which is specifically designed for this purpose, in combination with suitable groundwater management measures. The possible presence of boulders and other hard material within the fill material should be considered. In order to advance the trench box, even boulders and hard material that partially intrude into the sides of the excavation must be removed, which may result in a wider excavation than anticipated.

6.13.2 Pipe Bedding

The bedding for service pipes should consist of at least 150 millimetres of crushed stone meeting OPSS requirements for Granular A. In areas where the subsoil is disturbed or where unsuitable material exists below the pipe subgrade level, the disturbed/unsuitable material should be removed, the base of the trench should be compacted, and a subbedding layer of compacted granular material such as that meeting Granular B Type II. A 300 millimetre (minimum) thick layer of Granular B Type II subbedding material should be placed. The granular bedding and subbedding materials should be compacted in maximum 200 millimetre thick lifts to at least 95 percent of the material's standard Proctor dry density value using suitably sized vibratory compaction equipment.

Cover material, from spring line to at least 300 millimetres above the tops of the pipes, should consist of granular material, such as that meeting OPSS Granular A.

The use of clear crushed stone as a bedding, subbedding or cover material should not be permitted on this project.

6.13.3 Trench Backfill

In areas where the service trenches will be located below or in close proximity to existing or future areas of hard surfacing (pavement, sidewalk, etc.), acceptable excavated fill materials should be used as backfill between the roadway subgrade level and the depth of seasonal frost penetration in order to reduce the potential for differential frost heaving between the area over the trench and

the adjacent hard surfaced area. The depth of frost penetration in exposed areas can normally be taken as 1.8 metres below finished grade. Where previously excavated fill material is used, it should match the native materials exposed on the trench walls. Backfill below the zone of seasonal frost penetration could consist of either acceptable excavated material or imported granular material conforming to OPSS Granular B Type I.

To minimize future settlement of the backfill and achieve an acceptable subgrade for the roadways, sidewalks, etc., the trench backfill should be compacted in maximum 300 millimetre thick lifts to at least 95 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment. The specified density may be reduced to 90 percent of the standard Proctor maximum dry density value in areas where the trench backfill is not located below or in close proximity to existing or future roadways, parking areas, sidewalks, etc., and provided that some settlement above the trench is acceptable.

6.14 Exterior Pavement Design

Information on the pavement layout, zone of bulk excavation, and traffic loading levels are not available at the time of preparing this report. As such relatively generic guidelines are provided. More tailored guidelines can be provided as further information on parking lot/access roadways are available.

6.14.1 Subgrade Preparation

In preparation for the construction of roadways at this site, all surficial topsoil, and any loose/soft, wet, organic or deleterious materials should be removed from the proposed subgrade surface. This need not include removal of the existing fill material provided that some post construction settlement of the roadways can be tolerated.

Any subexcavated areas could be filled with compacted earth borrow. Similarly, should it be necessary to raise the roadway grades at this site, material which meets OPSS specifications for Select Subgrade Material or Earth Borrow may be used. The select subgrade material or earth borrow should be placed in maximum 300 millimetre thick lifts and compacted to at least 95 percent of the material's standard Proctor maximum dry density value using suitable vibratory compaction equipment. Prior to placing granular material for the roadways, the exposed subgrade should be heavily proof rolled under suitable (dry) conditions, and inspected and approved by geotechnical personnel. Any soft areas evident from the proof rolling should be subexcavated and replaced with suitable earth borrow approved by the geotechnical engineer.

The subgrade should be shaped and crowned to promote drainage of the roadway granular materials.

6.14.2 Pavement Structure

The following minimum pavement structure is suggested for exterior roadways and parking areas that will be for light traffic only (i.e., no heavy truck traffic):

- 90 millimetre thick layer of asphaltic concrete (40 millimetres of Superpave 12.5 Traffic Level B over 50 millimetres of Superpave 12.5 Traffic Level B); over
- 150 millimetre thick layer of OPSS Granular A; over
- 300 millimetre thick layer of OPSS Granular B Type II;

The following minimum pavement structure is suggested for exterior roadways for heavy traffic (i.e., fire truck, garbage trucks etc. routes):

- 120 millimetre thick layer of asphaltic concrete (50 millimetres of Superpave 12.5 FC1 Traffic Level D over 70 millimetres of Superpave 19.0 Traffic Level D); over
- 150 millimetre thick layer OPSS Granular A; over
- 450 millimetre thick layer of OPSS Granular B Type II;

The above pavement structures assumes that the roadway subgrade surface is prepared as described in this report. If the roadway subgrade surface is disturbed or wetted due to construction operations or precipitation, the granular thickness given above may not be adequate and it may be necessary to increase the thickness of the Granular B Type II subbase and/or to incorporate a woven geotextile separator between the roadway subgrade surface and the granular subbase material. The adequacy of the design pavement thickness should be assessed by geotechnical personnel at the time of construction. In our experience, a geotextile will likely be required in most cases where the subgrade consists of overburden, if the roadway construction is planned during the wet period of the year (such as the spring or fall).

Similarly, if the granular pavement materials are to be used by construction traffic, it may be necessary to increase the thickness of the Granular B Type II, install a woven geotextile separator between the roadway subgrade surface and the granular subbase material, or a combination of both, to prevent pumping and disturbance to the subbase material. The contractor should be made responsible for their construction access.

6.14.3 Granular Material Compaction

The pavement granular materials should be compacted in maximum 300 millimetre thick lifts to at least 99 percent of material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

6.14.4 Asphaltic Cement

Performance graded PG 58-34 asphaltic cement is recommended for light duty roadways and parking areas while performance graded PG 64-34 asphalt is recommended for heavy duty roadways.

6.14.5 Transition Treatments

In areas where the new pavement structure will abut existing pavements, the depths of the granular materials should taper up or down at 5 horizontal to 1 vertical, or flatter, to match the depths of the granular material(s) exposed in the existing pavement.

6.14.6 Pavement Drainage

Adequate drainage of the pavement granular materials and subgrade is important for the long-term performance of the pavement at this site. It is suggested that storm sewer catch basins be equipped with 3 metre stub drains extending in at least 2 directions. The stub drains should be installed at the subgrade level.

Further details on pavement drainage can be provided as the design progresses.

6.15 Interior Pavement Design

It is unknown at this time if the underground parking garage slab will be trafficked on the concrete slab, or if an asphaltic concrete surface will be constructed. Further guidelines on the interior pavement structure can be provided as the design progresses.

7.0 ADDITIONAL CONSIDERATIONS

7.1 Rock Anchors

Rock anchors may be required for the proposed structure to resist overturning and lateral loads, etc. Recommendations on the design on rock anchors can be provided as the design progresses.

7.2 Winter Construction

If construction is required during freezing temperatures, the soil below the proposed houses should be protected immediately from freezing using straw, propane heaters and insulated tarpaulins, or other suitable means.

Any open excavations should be opened for as short a time as practicable. The materials on the sides of the excavation should not be allowed to freeze. In addition, the backfill should be excavated, stored and replaced without being disturbed by frost or contaminated by snow or ice.

Provision must be made to prevent freezing of any soil below the level of any existing structures or services. Freezing of the soil could result in heaving related damage to structures or services.

7.3 Effects of Construction Induced Vibration

Some of the construction operations (such as granular material compaction, bedrock excavation, etc.) will cause ground vibration on and off of the site. The vibrations will attenuate with distance from the source, but may be felt at nearby structures. The magnitude of the vibrations will be much less than that required to cause damage to the nearby structures or services in good condition.

7.4 Monitoring Well Abandonment

All monitoring wells installed as part of this investigation should be decommissioned by a licensed well technician. The well abandonment could be carried out in advance of or during construction.

7.5 Disposal of Excess Soil and Re-Use of Existing Fill

It is noted that the professional services retained for this project include only the geotechnical aspects of the subsurface conditions at this site. The presence or implications of possible surface and/or subsurface contamination, including naturally occurring source of contamination, are outside the terms of reference for this report. This report does not constitute a Phase II Environmental Site Assessment (ESA) nor does it constitute a contaminated material management plan.

As indicated above, the existing granular base and subbase could be used for grade raise fill below the new parking areas, or depending on the quality of the material, possibly within the new pavement structure or as grade raise material below the floor slabs (other than in areas where the use of clear stone has been specified). The material should be carefully separated and stockpiled for evaluation by GEMTEC at the time of construction. Existing, non-deleterious earth fill could likely be used as grade raise material in soft landscaped areas, subject to approval by GEMTEC at the time of construction.

7.6 Design Review and Construction Observation

The engagement of the services of the geotechnical consultant during construction is recommended to confirm that the subsurface conditions throughout the proposed excavations do not materially differ from those given in the report and that the construction activities do not adversely affect the intent of the design. The subgrade surfaces for the buildings, services, and access roadway/parking areas should be inspected by experienced geotechnical personnel to ensure that suitable materials have been reached and properly prepared. The placing and compaction of earth fill and imported granular materials should be inspected to ensure that the materials used conform to the grading and compaction specifications.

8.0 CLOSURE

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

Chris Clarkson, P.Eng.
Junior Geotechnical Engineer

Alex Meacoe, P.Eng.
Senior Geotechnical Engineer

Enclosures
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GEOTECHNICAL REPORT CONDITIONS & LIMITATIONS

STANDARD OF CARE: GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty, expressed or implied is made.

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COMPLETE REPORT: This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC can not be responsible for use of portions of the report without reference to the entire report.

BASIS OF REPORT: This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.

TIME DEPENDENCE: If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.

USE OF THIS REPORT: The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

NO LEGAL REPRESENTATIONS: GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

DECREASE IN PROPERTY VALUE: GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.

RELIANCE ON PROVIDED INFORMATION: The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations. information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations. or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

INVESTIGATION LIMITATIONS: Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

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

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

In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

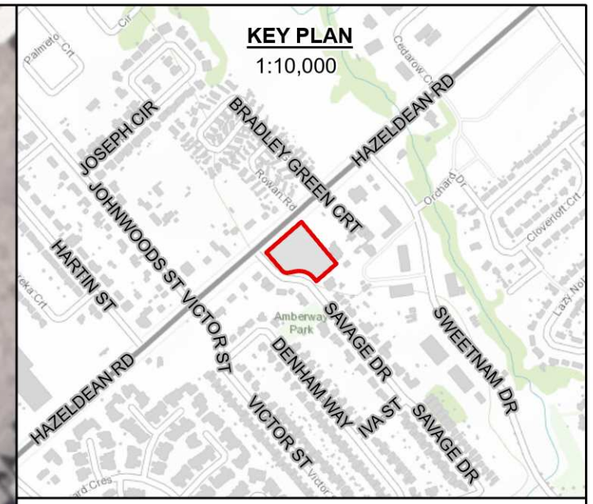
SAMPLE DISPOSAL: GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

FOLLOW-UP AND CONSTRUCTION SERVICES: All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.

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

CHANGED CONDITIONS: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

DRAINAGE: Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



LEGEND

- BH# — BOREHOLE ID
- XX.XX — GROUND SURFACE ELEVATIONS, IN METRES GEODETIC DATUM
- BOREHOLE LOCATION (GEMTEC 2025)
- MONITORING WELL LOCATION (ELEVATIONS RECORDED BY GEMTEC, PINCHIN 2024)
- APPROXIMATE SITE BOUNDARY

GENERAL NOTES:

1. Coordinate system: NAD83 UTM zone 18N.
2. Geographic dataset source: Ontario GeoHub.
3. Contains information licensed under the Open Government Licence – Ontario.
4. Service Layer Credits: Ottawa 2022 Imagery , World Topographic Map City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, AAFC, NRCan

Scale:

1:500 Meters

0 6 12 24 36

Drawing: SITE PLAN

Client: E-LANDSCAPING

Project: GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT
5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE
OTTAWA, ONTARIO

Drwn By:	SL	Chkd By:	WAM
Project No.	104054.001	Revision No.	0
Date	JUNE 2025		**FIGURE 1**

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APPENDIX A

Record of Borehole Logs
List of Abbreviations and Symbols
Boreholes 25-01 to 25-04

ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_S	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

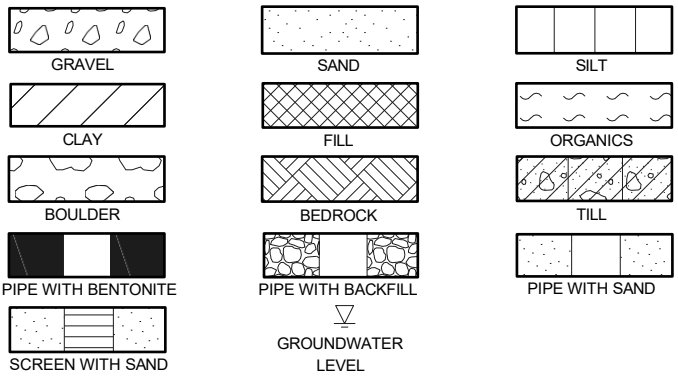
PENETRATION RESISTANCE

Standard Penetration Resistance, N
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

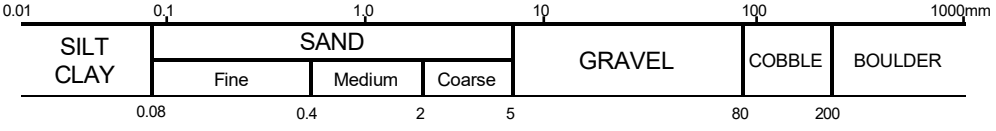
Dynamic Penetration Resistance
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).

WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

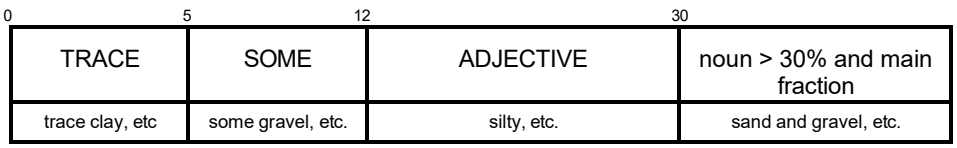
COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	**Description**	**Cu, kPa**	**Description**
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



GRAIN SIZE



DESCRIPTIVE TERMINOLOGY

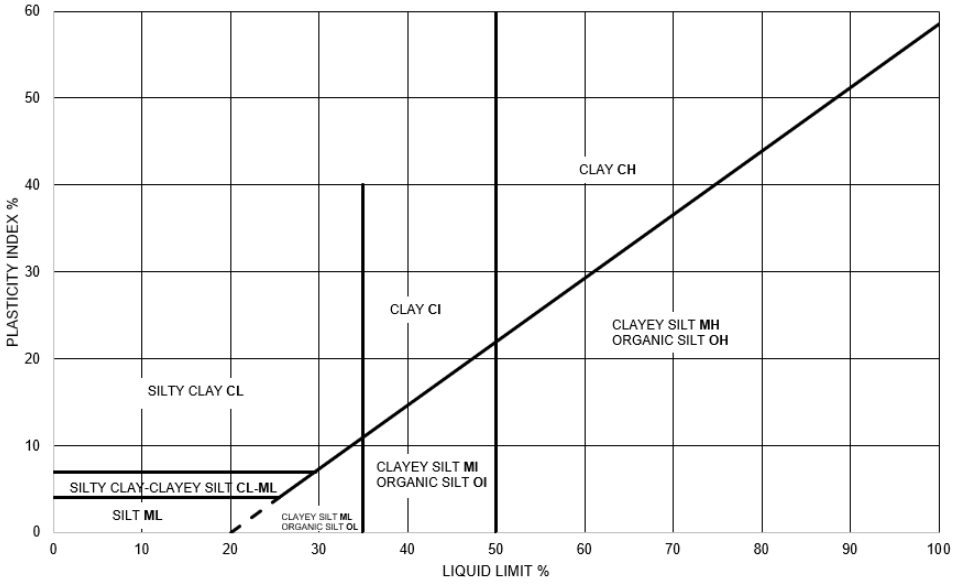


Method of Soil Classification

GEMTEC's Soil Classification is based on the MTC Soil Classification Manual (January 1980)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} X D_{60}}$	USCS Group Symbol	Group Name
Inorganic (Organic Content less than 30%)	Coarse Grained Soils (>50% is larger than 0.075 mm)	Gravel (>50% of coarse fraction is > 4.75 mm)	Gravel with ≤12% fines	Poorly Graded	<4	≤1 or ≥3	GP	Gravel
				Well Graded	≥4	1 to 3	GW	Gravel
			Gravel with >12% fines	Below A Line	N/A		GM	Silty Gravel
				Above A Line	N/A		GC	Clayey Gravel
		Sand (≥50% coarse fraction is > 4.75 mm)	Sand with ≤12% fines	Poorly Graded	<6	≤1 or ≥3	SP	Sand
				Well Graded	≥6	1 to 3	SW	Sand
			Sand with >12% fines	Below A Line	N/A		SM	Silty Sand
				Above A Line	N/A		SC	Clayey Sand

Soil Group	Type of Soil	Liquid Limit	Field Tests			USCS Group Symbol	Group Name
			Dilatancy	Thread Diameter	Toughness		
Fine Grained Soils (≥50% is smaller than 0.075 mm)	Silts (Non-Plastic or PI and LL plot below A-Line)	<50	Rapid	>6 mm	N/A	ML	Silt
			Slow	3 to 6 mm	None to low	ML	Clayey Silt
			Slow to V. Slow	3 to 6 mm	Low	OL	Organic Silt
		≥50	Slow to V. Slow	3 to 6 mm	Low to Medium	MH	Clayey Silt
			None	1 to 3 mm	Medium to High	OH	Organic Silt
	Clays (PI and LL plot above A-Line)	Liquid Limit <35	None	~3 mm	Low to Medium	CL	Silty Clay
		Liquid Limit 35 to 50	None	1 to 3 mm	Medium	CI	Silty Clay
		Liquid Limit >50	None	<1 mm	High	CH	Clay
Highly Organic (> 30%)	Peat (Amorphous or Fibrous)					PT	Peat



Dual Symbol – Is used to indicate when soils are transitional. For coarse grained soils, it is used when the soil has between 5 and 12% fines (e.g., SP-SC, Sand to Silty Sand). For fine-grained soils it is used when the plasticity index and liquid limit values plot in the area shown in the plasticity chart on this page.

Borderline Symbol – Is used to indicate soils that are not clearly in one soil type but have similar behaviour and properties as similar materials (e.g., CL/CI or GM/SM).

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERING STATE	
Fresh	No visible sign of rock material weathering
Faintly weathered	Weathering limited to the surface of major discontinuities
Slightly weathered	Penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material
Moderately weathered	Weathering extends throughout the rock mass but the rock material is not friable
Completely weathered	Rock is wholly decomposed and in a friable condition but the rock and structure are preserved

CORE CONDITION
Total Core Recovery (TCR) The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run
Solid Core Recovery (SCR) The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.
Rock Quality Designation (RQD) The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completed broken core to 100% for core in solid segments.

BEDDING THICKNESS	
Description	**Thickness**
Thinly laminated	< 6 mm
Laminated	6 - 20 mm
Very thinly bedded	20 - 60 mm
Thinly bedded	60 - 200 mm
Medium bedded	200 - 600 mm
Thickly bedded	600 - 2000 mm
Very thickly bedded	2000 - 6000 mm

DISCONTINUITY SPACING	
Description	**Spacing**
Very close	20 - 60 mm
Close	60 - 200 mm
Moderate	200 - 600 mm
Wide	600 -2000 mm
Very wide	2000 - 6000 mm

ROCK QUALITY	
RQD	**Overall Quality**
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

ROCK COMPRESSIVE STRENGTH	
Comp. Strength, MPa	**Description**
1 - 5	Very weak
5 - 25	Weak
25 - 50	Moderate
50 - 100	Strong
100 - 250	Very strong

RECORD OF BOREHOLE 25-01

CLIENT: E-Landscaping
PROJECT: Geotechnical Investigation, Proposed Development, 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive, Ottawa, Ontario
JOB#: 104054.001
LOCATION: See Figure 1, Site Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Apr 30 2025

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA (+ NATURAL, ⊕ REMOULDED) / WATER CONTENT, % (W_P, W, W_L)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger (210mm OD)	Ground Surface		109.51								
		FILL - (GP-GM) sandy gravel, some non-plastic fines; grey brown; non-cohesive, moist, compact			1	SS	100	13	●			Flush mount protective casing
					2	SS	0	>50				
				108.60	3	RC		TCR=	100% SCR= 100%, RQD= 100%			
1	Hollow Stem Auger (210mm OD)	Moderately weathered to fresh, thinly bedded, very strong LIMESTONE BEDROCK		0.91	4	RC						Bentonite Seal
					5	RC		TCR=	100% SCR= 52%, RQD= 33%			Filter Sand
2												
					6	RC		TCR=	100% SCR= 93%, RQD= 73%			50mm diameter PVC screen
3											UCS	
4	Diamond Rotary Core HQ (89mm OD)				7	RC		TCR=	100% SCR= 96%, RQD= 94%			
5											UCS	
					8	RC		TCR=	100% SCR= 100%, RQD= 100%			Bentonite Seal
6				102.93								
		End of Borehole		6.58								
7												
8												
9												
10												

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
25/05/09	2.48 ▽	107.0
25/06/04	2.46 ▼	107.1

GEMTEC
Consulting Engineers and Scientists

LOGGED: CD
CHECKED: C.C./W.A.M.

GEO - BOREHOLE LOG 104054.001 BH LOGS 2025-05-14 REVA_PS.GPJ GEMTEC 2018.GDT 6/27/25

RECORD OF BOREHOLE 25-02

CLIENT: E-Landscaping
PROJECT: Geotechnical Investigation, Proposed Development, 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive, Ottawa, Ontario
JOB#: 104054.001
LOCATION: See Figure 1, Site Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Apr 30 2025

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger	Ground Surface		108.92							
		ASPHALTIC CONCRETE		108.82							
		FILL - (GM-GM) sandy gravel, some non-plastic fines; grey; non-cohesive, moist, compact		0.10	1	SS	205	25	●		Flush mount protective casing
					2	SS	0	>50			
1	Hollow Stem Auger (210mm OD)				3	RC					Bentonite Seal
		Highly fractured, grey, LIMESTONE BEDROCK		107.80 1.12	4	RC		TCR=	100%, SCR= 0%, RQD= 0%		Filter Sand
				107.28	5	RC		TCR=	90%, SCR= 45%, RQD= 18%		
2	Diamond Rotary Core HQ (89mm OD)	Slightly weathered to fresh, grey, thinly bedded to medium, strong, LIMESTONE BEDROCK		1.64	6	RC		TCR=	100%, SCR= 100%, RQD= 62%	UCS	
3					7	RC		TCR=	96%, SCR= 25%, RQD= 25%		50mm diameter PVC screen
4					8	RC		TCR=	96%, SCR= 96%, RQD= 91%		
5				103.72							Bentonite Seal
		End of Borehole		5.20							
6											
7											
8											
9											
10											

SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
25/05/09	0.78 ▽	108.1
25/06/04	0.77 ▼	108.2

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LOGGED: CD
CHECKED: C.C./W.A.M.

GEO - BOREHOLE LOG 104054.001 BH LOGS 2025-05-14 REVA_PS.GPJ GEMTEC 2018.GDT 6/27/25

RECORD OF BOREHOLE 25-03

CLIENT: E-Landscaping
PROJECT: Geotechnical Investigation, Proposed Development, 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive, Ottawa, Ontario
JOB#: 104054.001
LOCATION: See Figure 1, Site Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: May 1 2025

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA (NATURAL, REMOULDED) / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger	Ground Surface		109.97							
		FILL - (SP/GM) sandy gravel, some non-plastic fines; grey brown; non-cohesive, moist, compact			1	SS	150	19		M	Flush mount protective casing
					2	RC					Bentonite Seal
1	Hollow Stem Auger (210mm OD)			108.90							
		Moderately fractured, grey LIMESTONE BEDROCK		1.07	3	RC		TCR=	83%, SCR= 50%, RQD= 0%		Filter Sand
		Moderately weathered to fresh, grey, thinly bedded to medium, very strong, LIMESTONE BEDROCK		108.62 1.35	4	RC		TCR=	100%, SCR= 60%, RQD= 32%		
2											
					5	RC		TCR=	100%, SCR= 47%, RQD= 47%	UCS	50mm diameter PVC screen
3											
4	Diamond Rotary Core HQ (89mm OD)				6	RC		TCR=	100%, SCR= 100%, RQD= 100%		
5											Filter Sand
					7	RC		TCR=	100%, SCR= 100%, RQD= 100%	UCS	
6											
7					8	RC		TCR=	100%, SCR= 100%, RQD= 100%		Bentonite Seal
8											
9					9	RC		TCR=	100%, SCR= 93%, RQD= 87%	UCS	
				100.14							
10		End of Borehole		9.83							

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
25/05/09	1.40 ▽	108.6
25/06/04	1.53 ▼	108.4

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LOGGED: CD
CHECKED: C.C./W.A.M.

GEO - BOREHOLE LOG 104054.001 BH LOGS 2025-05-14 REVA_PS.GPJ GEMTEC 2018.GDT 6/27/25

RECORD OF BOREHOLE 25-04

CLIENT: E-Landscaping
PROJECT: Geotechnical Investigation, Proposed Development, 5872, 5880, and 5884 Hazeldean Road and 7 Savage Drive, Ottawa, Ontario
JOB#: 104054.001
LOCATION: See Figure 1, Site Plan

SHEET: 1 OF 1
DATUM: CGVD28
BORING DATE: Apr 30 2025

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA (NATURAL / REMOULDED) / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger; Hollow Stem Auger (210mm OD)	Ground Surface		109.11								
		ASPHALTIC CONCRETE		109.00 / 0.11								
		FILL- (GP-GM) sandy gravel, trace non-plastic fines; grey; non-cohesive, moist, very dense		108.91 / 0.20	1	SS	0	>50				Auger Cuttings
		End of Borehole Auger Refusal										
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

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LOGGED: CD
CHECKED: C.C./W.A.M.

GEO - BOREHOLE LOG 104054.001 BH LOGS 2025-05-14 REVA_PS.GPJ GEMTEC 2018.GDT 6/27/25

APPENDIX B

Laboratory Testing Results
Grain Size Distribution Chart

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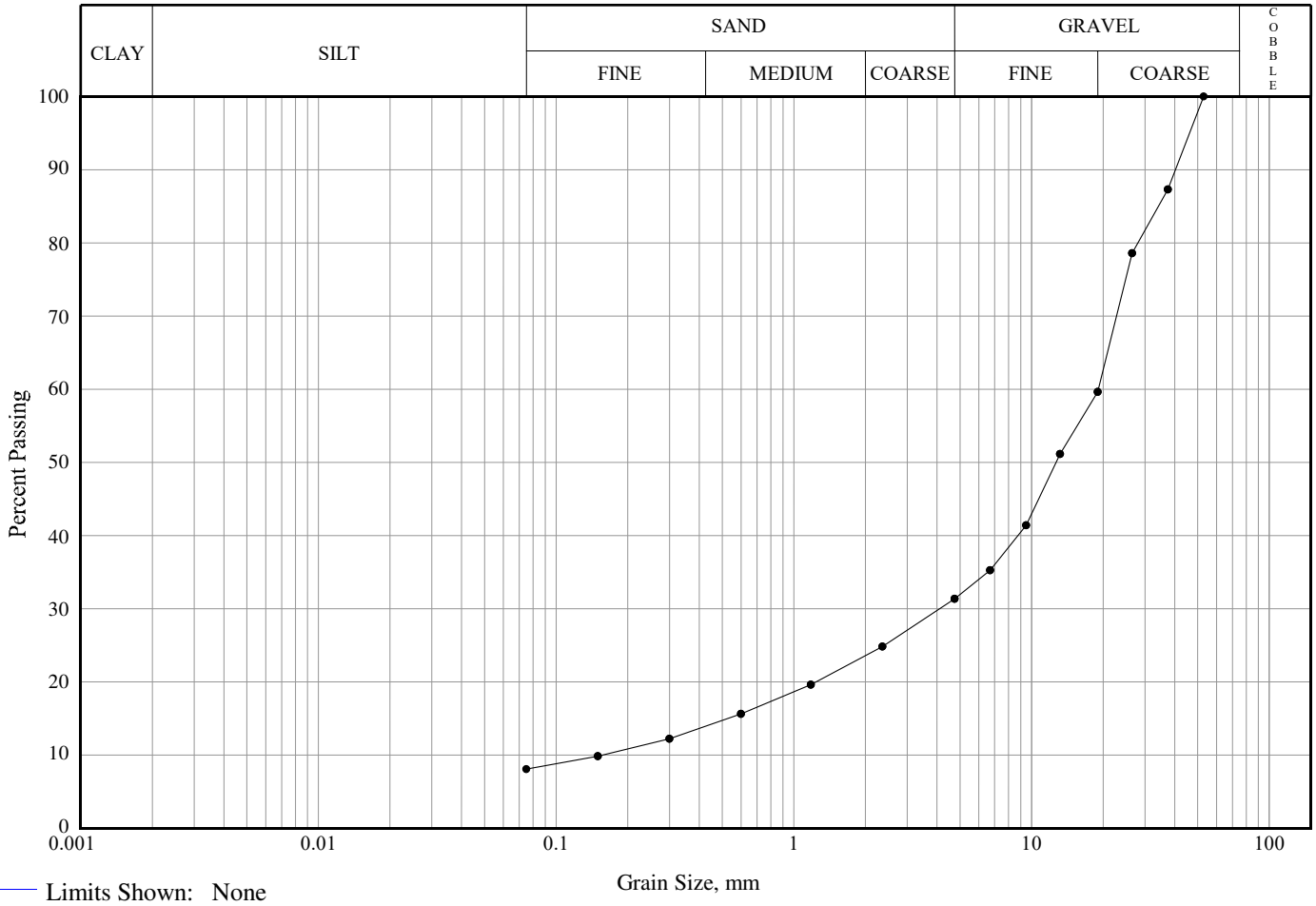
Client:	E-Landscaping
Project:	Hazeldean Heights Inc
Project #:	104054001

Soils Grading Chart



Limits Shown: None

Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
—●—	FILL MATERIAL	25-03	GS1	0.0-0.61	68.7	23.3	8.1	

Line Symbol	CanFEM Classification	USCS Symbol	D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}	% 5-75µm
—●—		N/A	0.158	0.531	4.11	12.71	19.13	34.22	---

Note: More information available upon request

APPENDIX C

Bedrock Core Photographs
Figures C1 to C4
Unconfined Compressive Strength Test Results

BOREHOLE: 25-01
BORING DATE: APRIL 30, 2025
DEPTH: 0.81 TO 6.58 METRES BELOW GROUND SURFACE

NOTE: MATERIAL IN CORE BOX FROM 0.81 TO 0.91 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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

Project	Drawing				
GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	ROCKCORE PHOTOGRAPH BOREHOLE 25-01 (DRY)				**FIGURE C1**
	Project No.	Drwn By	Chkd By	Rev No.	Date
	104054.001	SL	CC	0	JUNE 2025

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BOREHOLE: 25-01
BORING DATE: APRIL 30, 2025
DEPTH: 0.81 TO 6.58 METRES BELOW GROUND SURFACE

NOTE: MATERIAL IN CORE BOX FROM 0.81 TO 0.91 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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Project: GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	Drawing: ROCKCORE PHOTOGRAPH BOREHOLE 25-01 (WET)				**FIGURE C2**
	Project No. 104054.001	Drwn By SL	Chkd By CC	Rev No. 0	Date JUNE 2025

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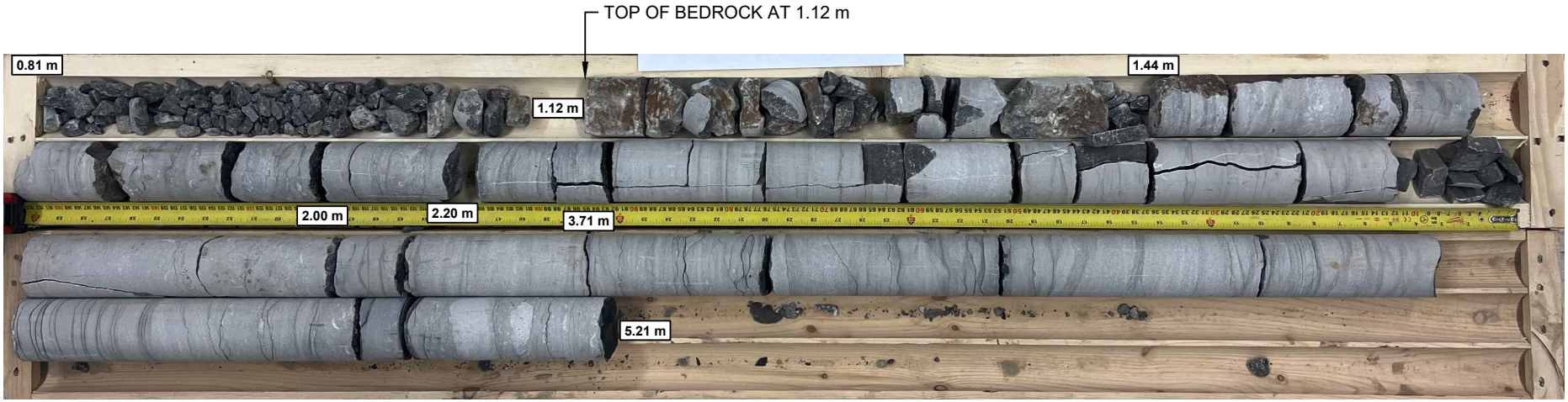
BOREHOLE: 25-02
BORING DATE: APRIL 30, 2025
DEPTH: 0.81 TO 5.21 METRES BELOW GROUND SURFACE



NOTE: MATERIAL IN CORE BOX FROM 0.81 TO 1.12 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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Project: GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	Drawing: ROCKCORE PHOTOGRAPH BOREHOLE 25-02 (DRY)				**FIGURE C3**
	Project No. 104054.001	Drwn By SL	Chkd By CC	Rev No. 0	Date JUNE 2025

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BOREHOLE: 25-02
BORING DATE: APRIL 30, 2025
DEPTH: 0.81 TO 5.21 METRES BELOW GROUND SURFACE

NOTE: MATERIAL IN CORE BOX FROM 0.81 TO 1.12 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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Project: GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	Drawing: ROCKCORE PHOTOGRAPH BOREHOLE 25-02 (WET)				**FIGURE C4**
	Project No. 104054.001	Drwn By SL	Chkd By CC	Rev No. 0	Date JUNE 2025

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BOREHOLE: 25-03
BORING DATE: MAY 1, 2025
DEPTH: 0.76 TO 9.83 METRES BELOW GROUND SURFACE

NOTE: MATERIAL IN CORE BOX FROM 0.76 TO 1.07 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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Project: GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	Drawing: ROCKCORE PHOTOGRAPH BOREHOLE 25-03 (DRY)				**FIGURE C5**
	Project No. 104054.001	Drwn By SL	Chkd By CC	Rev No. 0	Date JUNE 2025

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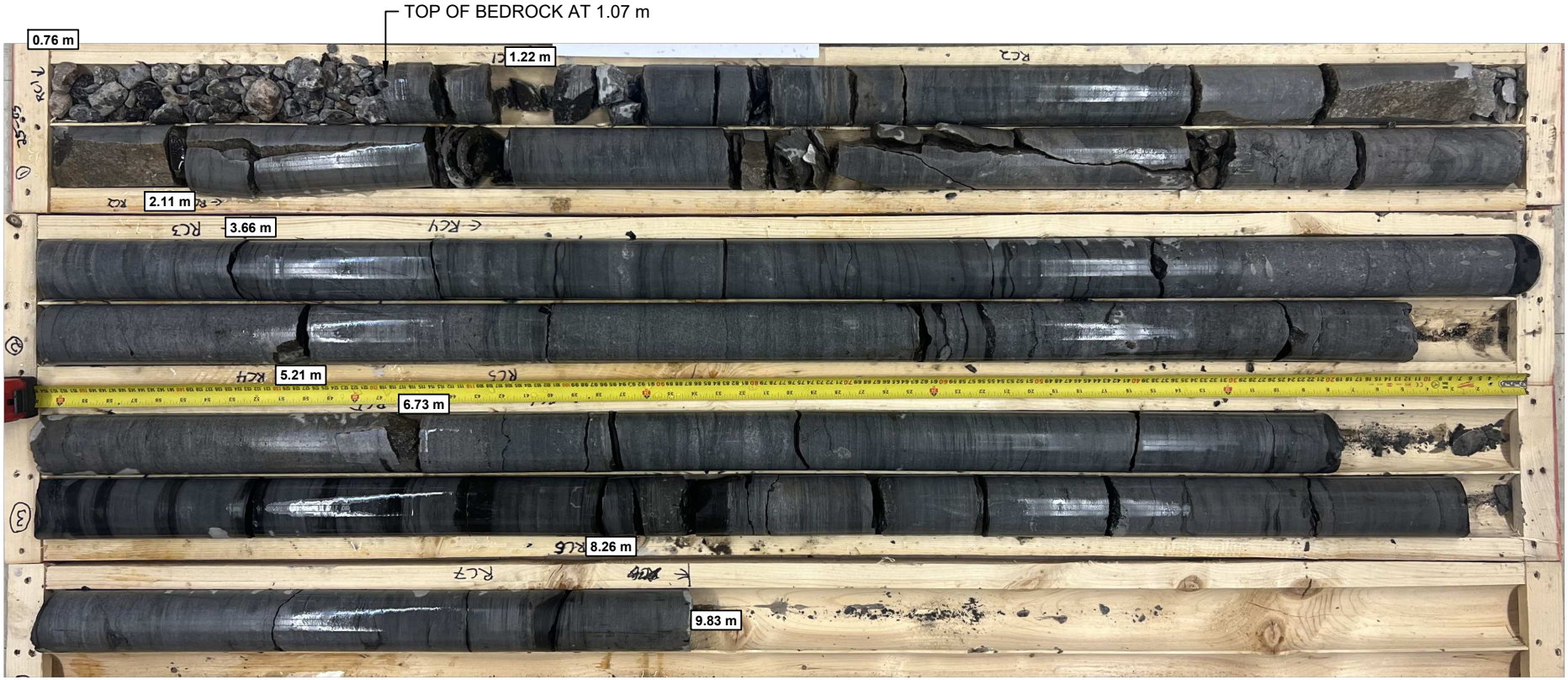
BOREHOLE: 25-03
BORING DATE: MAY 1, 2025
DEPTH: 0.76 TO 9.83 METRES BELOW GROUND SURFACE



NOTE: MATERIAL IN CORE BOX FROM 0.76 TO 1.07 METRES BELOW GROUND SURFACE IS GRAVEL WITHIN FILL MATERIAL

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

Project	Drawing				
GEOTECHNICAL INVESTIGATION PROPOSED DEVELOPMENT 5872, 5880, AND 5884 HAZELDEAN ROAD, AND 7 SAVAGE DRIVE OTTAWA, ONTARIO	ROCKCORE PHOTOGRAPH BOREHOLE 25-03 (WET)				**FIGURE C6**
	Project No.	Drwn By	Chkd By	Rev No.	Date
	104054.001	SL	CC	0	JUNE 2025

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GEMTEC
Consulting Engineers and Scientists

Client: E-Landscaping
Project: Hazeldean Heights Inc
Project #: 104054001

Rock Core Compressive Strength

Date/Time Sampled: 25/05/08 1:57:54 PM	Date/Time Tested: 25/05/08 1:57:54 PM

BH	Sample No	Depth	Description	Diameter, mm	Area, mm²	Length After Capping, mm	L/D	Load, kN	Comp. Str., MPa
25-01	RC3	3.20-3.38		63.2	3136	122	1.93	343.700	108.9
25-01	RC5	5.03-5.31		63.1	3130	126	1.99	346.450	110.0
25-02	RC6	2.00-2.18		63.3	3144	126	1.99	271.910	85.9
25-03	RC4	2.74-2.97		63.3	3150	121	1.92	481.500	151.9
25-03	RC6	5.86-6.22		63.3	3148	123	1.95	393.200	124.1
25-03	RC8	8.81-9.01		63.2	3140	125	1.98	408.680	129.3

APPENDIX D

Borehole Logs – Previous Investigation
Previous Investigation by Pinchin (341092.001)
Boreholes MW1 and MW2

Log of Borehole: MW1

Project #: 341092.001 **Logged By:** MW

Project: Phase II Environmental Site Assessment

Client: 1727897 Ontario Inc.

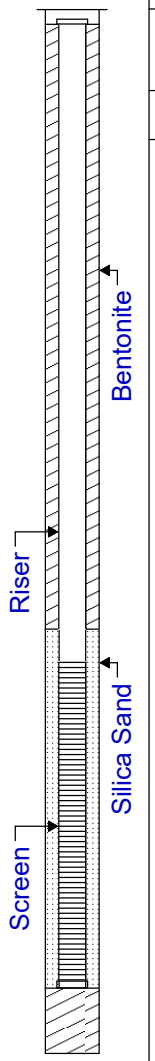
Location: 5872, 5874 and 5880, Hazeldean Road, Ottawa, Ontario

Drill Date: June 3, 2024

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Measured Depth (m)
0	0	Ground Surface	0.00
		Topsoil	0.00
2		***Fill: Gravelly Sand***	-0.76
3	1	Brown, trace silty clay	0.76
4		***Fill: Sand***	
5		Brown, some gravel and silty clay	
7	2	***Bedrock: Limestone***	
8		Grey	
10	3		
13	4		
16	5		
20	6		
23	7		
26	8		
29	9		
32			-9.75
33	10	End of Borehole	9.75
34			

Monitoring Well Details



SAMPLE

Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
40	S1	40/0	pH
30	S2	35/0	PAHs, PHCs(F1-F4), VOCs

Contractor: Strata Drilling Group

Drilling Method: Split Spoon

Well Casing Size: 5.08 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW2

Project #: 341092.001 **Logged By:** MW

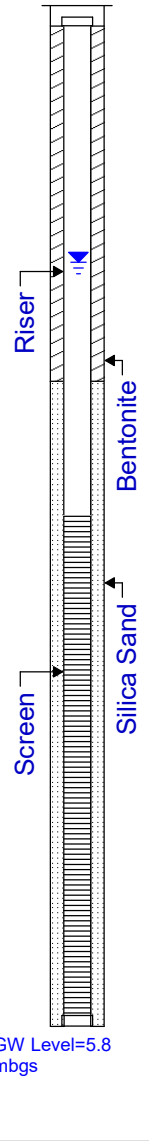
Project: Phase II Environmental Site Assessment

Client: 1727897 Ontario Inc.

Location: 5872, 5874 and 5880, Hazeldean Road, Ottawa, Ontario

Drill Date: June 3, 2024

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface	0.00					
		Concrete	0.00					
1		***Fill: Sand and Gravel***	-0.76		10	S1	25/0	
2 / 1		***Glacia Till*** Trace organics, moist	0.76		10	S2	10/0	PAHs, PHCs(F1-F4), VOCs
3			-1.52					
4 / 2		***Silty Sand*** Brown, some gravel, wet	1.52		40	S3	5/0	pH, Grain Size
5			-2.13					
6 / 3		***Bedrock: Limestone*** Grey	2.13					
7								
8 / 4								
9								
10 / 5								
11								
12 / 6								
13								
14 / 7			-7.01					
15		End of Borehole	7.01	GW Level=5.8 mbgs				
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								



Contractor: Strata Drilling Group

Drilling Method: Split Spoon

Well Casing Size: 5.08 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

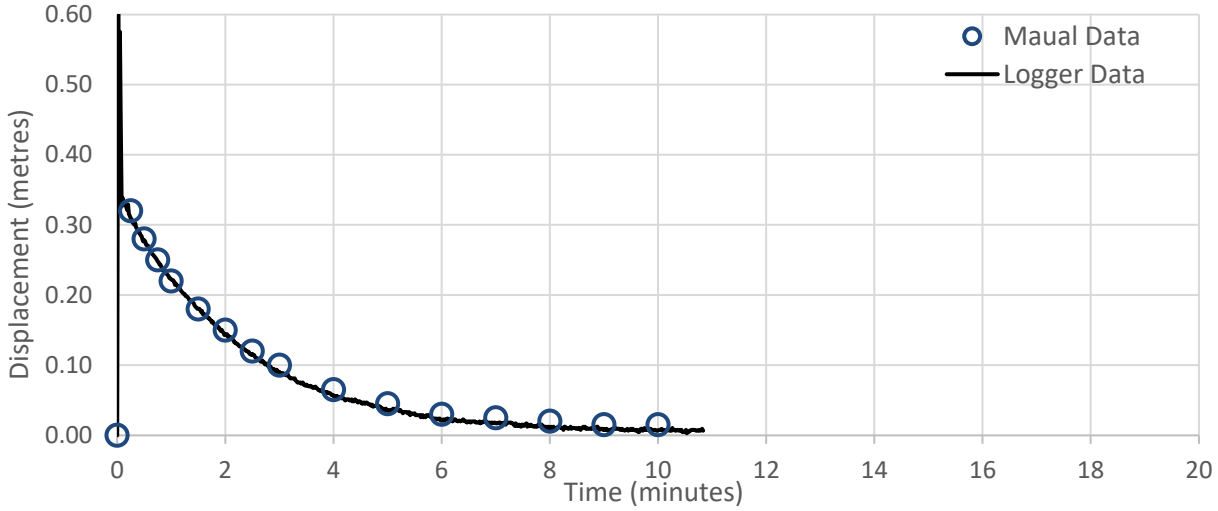
APPENDIX E

Hydraulic Conductivity Testing
Figures E1, E2, and E3

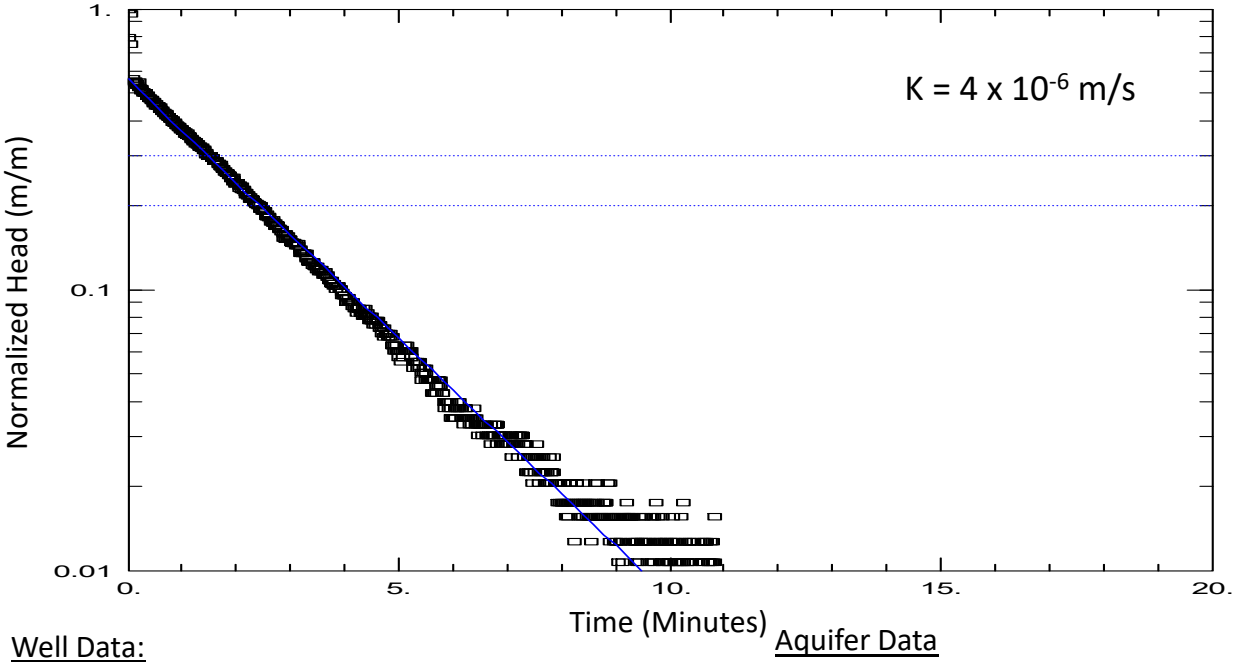
Slug Test Data

MW25-01 FH

Borehole 25-01 Falling Head (FH) Test



Borehole 25-01 FH: Bouwer-Rice Analysis



<u>Well Data:</u>

Displacement based on slug size: 0.60 metres
Well Depth: 4.45 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

<u>Aquifer Data</u>

Saturated Thickness: 2.01 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 2.44 metres bgs

GEMTEC
Consulting Engineers and Scientists

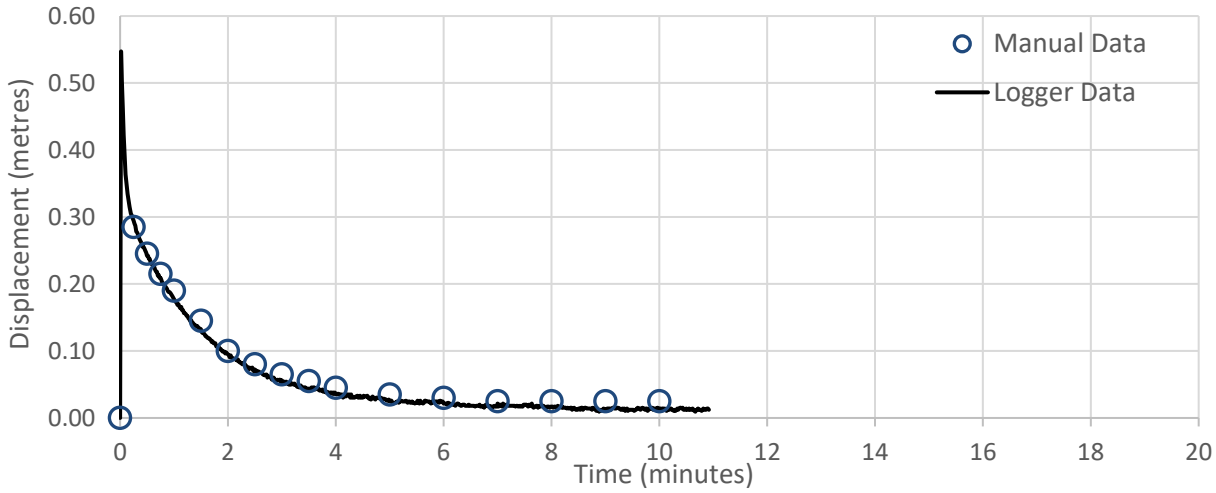
Date: June 2025

Project: 104054.001

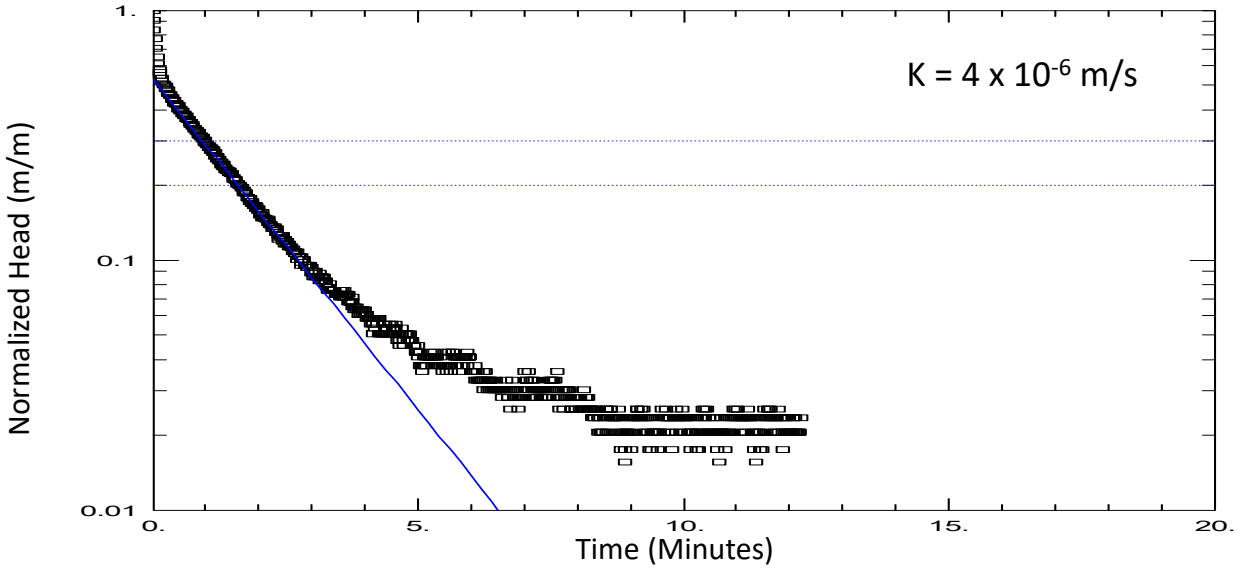
Slug Test Data

MW25-01 RH

Borehole 25-01 Rising Head (RH) Test



Borehole 25-01 RH: Bouwer-Rice Analysis



Well Data:

Displacement based on slug size: 0.60 metres
Well Depth: 4.45 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

Aquifer Data

Saturated Thickness: 2.01 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 2.44 metres bgs

GEMTEC
Consulting Engineers and Scientists

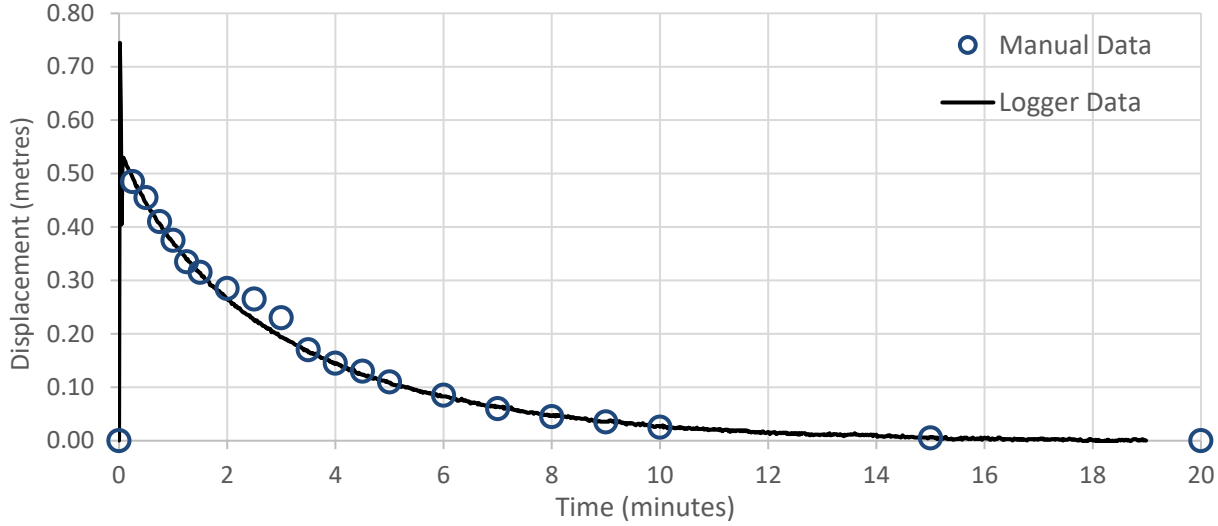
Date: June 2025

Project: 104054.001

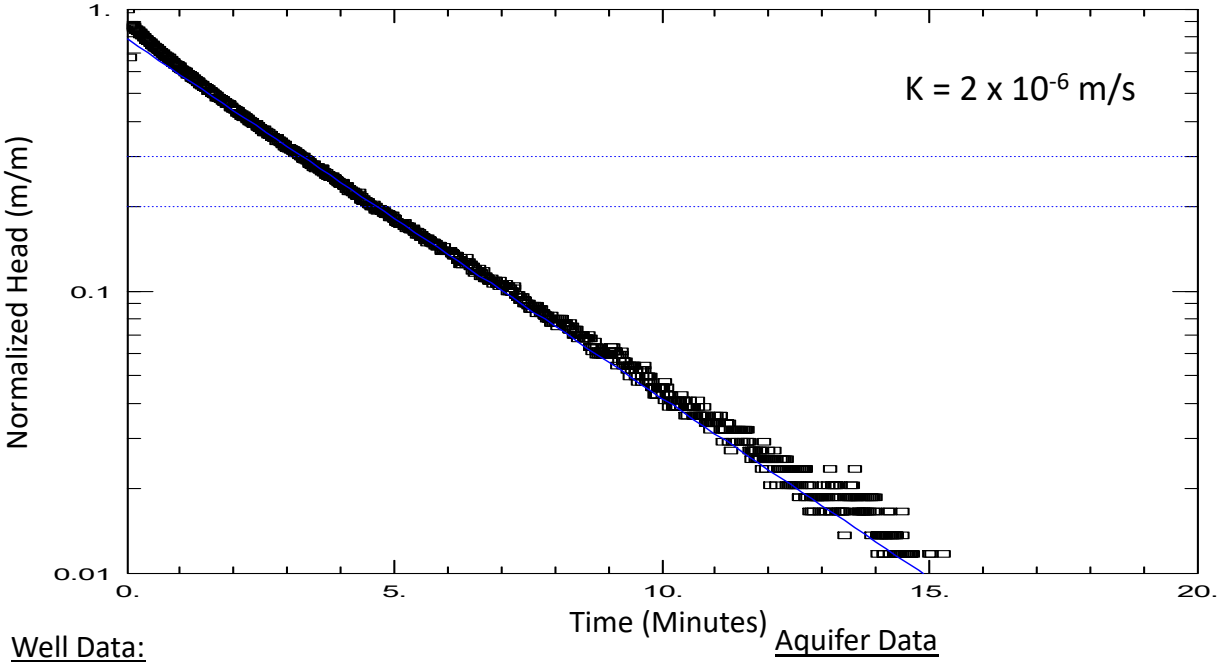
Slug Test Data

MW25-03 FH

Borehole 25-03 Falling Head (FH) Test



Borehole 25-03 FH: Bouwer-Rice Analysis



Well Data:

Displacement based on slug size: 0.60 metres
Well Depth: 5.21 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

Aquifer Data

Saturated Thickness: 3.82 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 1.39 metres bgs

GEMTEC
Consulting Engineers and Scientists

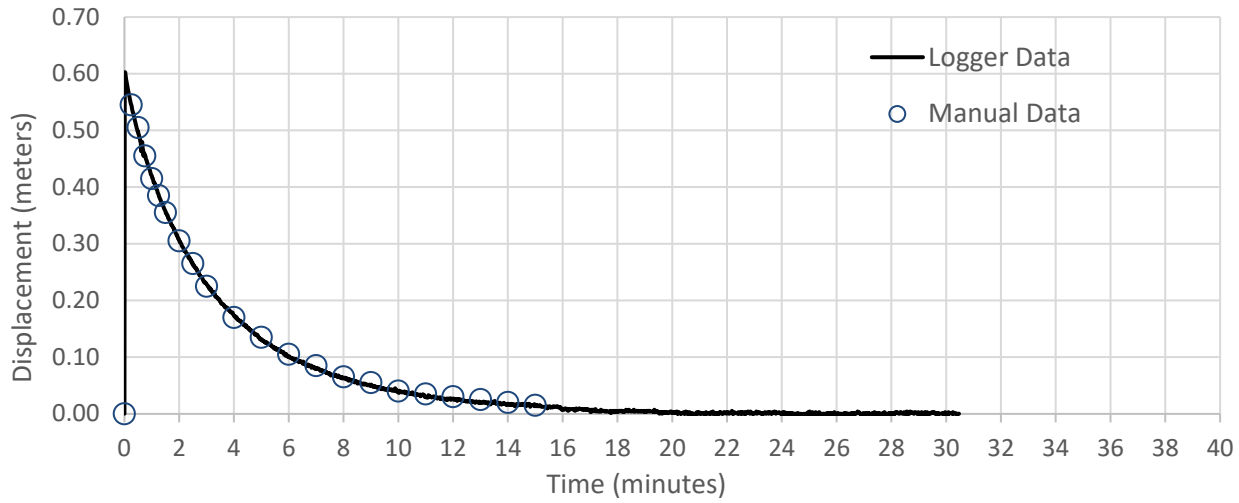
Date: June 2025

Project: 104054.001

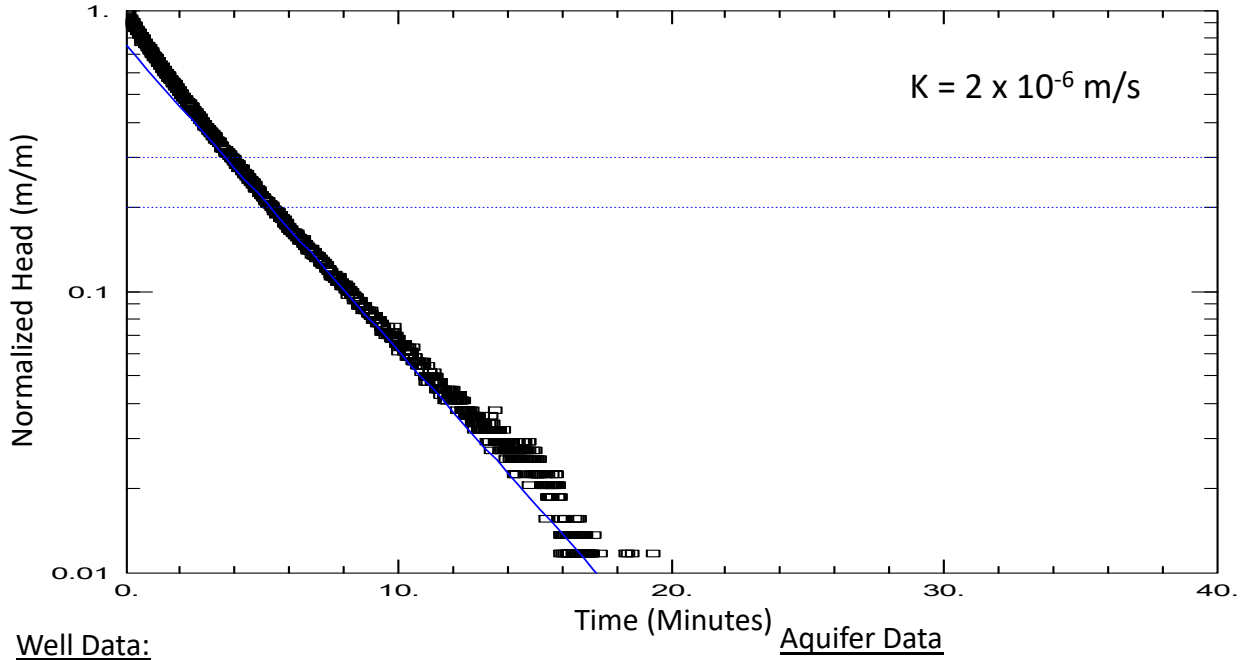
Slug Test Data

MW25-03 RH

Borehole 25-03 Rising Head (RH) Test



Borehole 25-03 RH: Bouwer-Rice Analysis



Well Data:

Displacement based on slug size: 0.60 metres
Well Depth: 5.21 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

Aquifer Data

Saturated Thickness: 3.82 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 1.39 metres bgs

GEMTEC
Consulting Engineers and Scientists

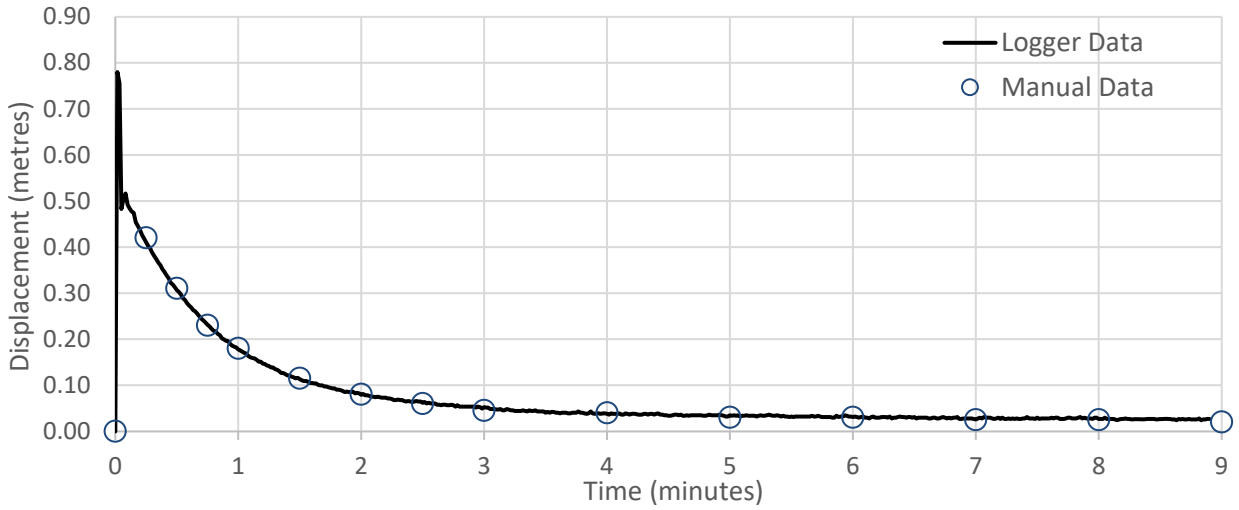
Date: June 2025

Project: 104054.001

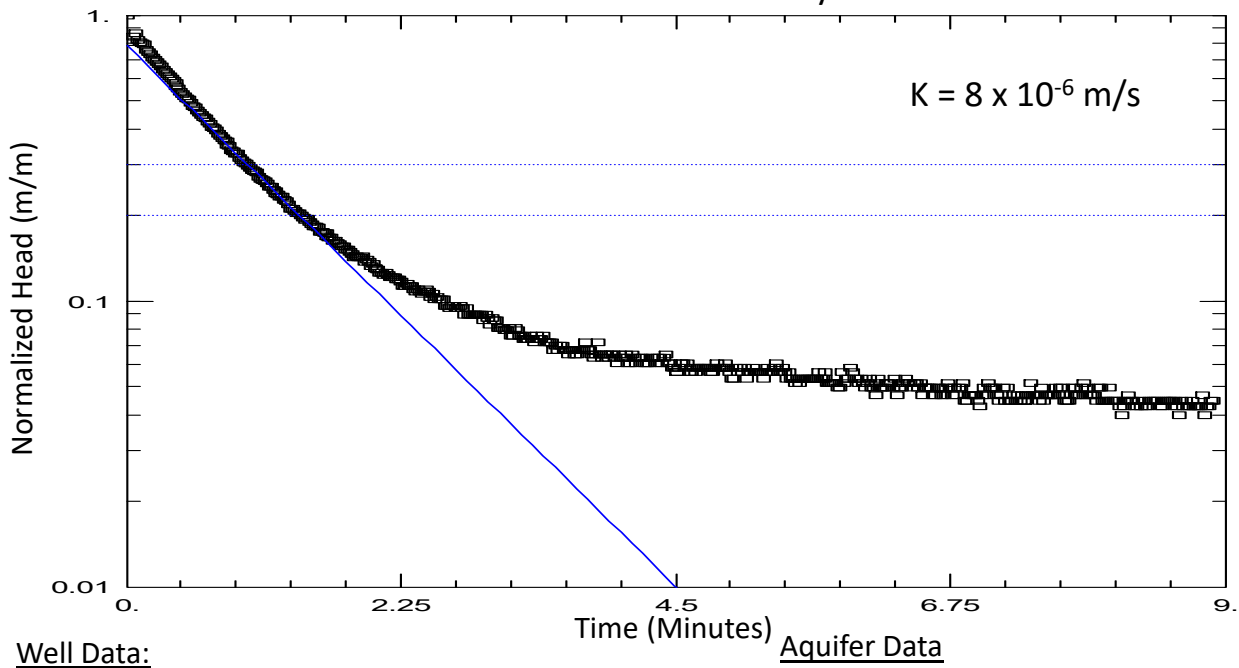
Slug Test Data

MW1 FH

MW1 Falling Head (FH) Test



MW1 FH: Bouwer-Rice Analysis



Well Data:

Displacement based on slug size: 0.60 metres
Well Depth: 8.95 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

Aquifer Data

Saturated Thickness: 7.14 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 1.71 metres bgs

GEMTEC
Consulting Engineers and Scientists

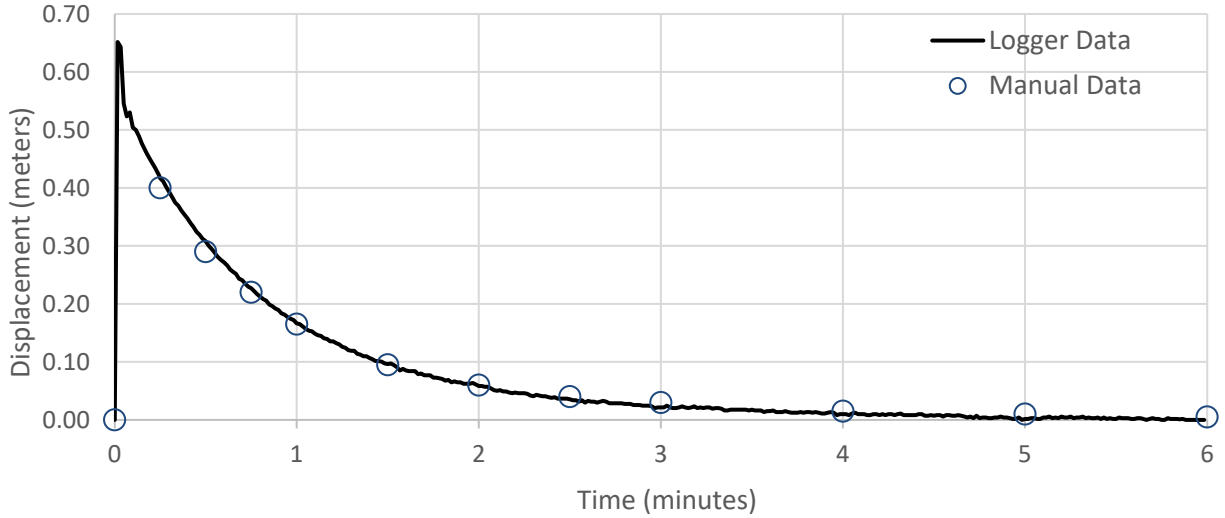
Date: June 2025

Project: 104054.001

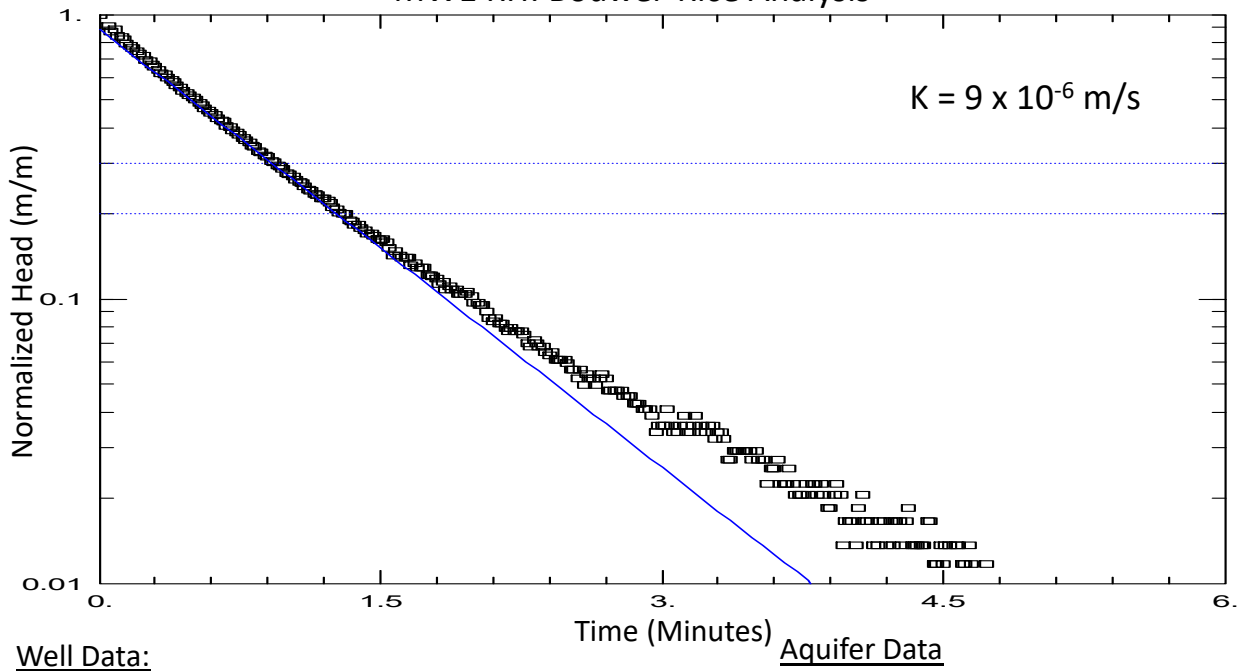
Slug Test Data

MW1 RH

MW1 Rising Head (RH) Test



MW1 RH: Bouwer-Rice Analysis



Well Data:

Displacement based on slug size: 0.60 metres
Well Depth: 8.95 metres
Screen Length: 3.05 metres
Well Radius: 0.0254 metres

Aquifer Data

Saturated Thickness: 7.14 metres
Anisotropy Ratio (Kz/Kr): 0.1
Aquifer Model: Unconfined, Bouwer-Rice
Static Water Level: 1.71 metres bgs

GEMTEC
Consulting Engineers and Scientists

Date: June 2025

Project: 104054.001

APPENDIX F

Chemical Analysis of Water Samples
Sample Relating to Corrosion
(Paracel Laboratories Ltd. Order No. 2523391)
(AGAT Laboratories Order No. 25Z295709)

Certificate of Analysis

Report Date: 11-Jun-2025

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

Order Date: 5-Jun-2025

Client PO:

Project Description: 104054.001

	Client ID:	MW25-02 Corrosion	-	-	-		
	Sample Date:	04-Jun-25 09:45	-	-	-	-	-
	Sample ID:	2523391-01	-	-	-		
	Matrix:	Ground Water	-	-	-		
	MDL/Units						
General Inorganics							
Conductivity	5 uS/cm	1880	-	-	-	-	-
pH	0.1 pH Units	7.7	-	-	-	-	-
Resistivity	0.01 Ohm.m	5.31	-	-	-	-	-
Anions							
Chloride	1 mg/L	416	-	-	-	-	-
Sulphate	1 mg/L	117	-	-	-	-	-

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

CLIENT NAME: GEMTEC CONSULTING ENGINEERS AND SCIENTISTS

AGAT WORK ORDER: 25Z295709

PROJECT: 104054.001 - Corrosion

ATTENTION TO: Nicole Soucy

SAMPLING SITE:

SAMPLED BY:CD

pH, Chloride, Sulphate and EC

SAMPLE TYPE: Water **SAMPLE ID: 6751567** **DATE RECEIVED: May 20, 2025**

DATE SAMPLED: 2025-05-16 **DATE REPORTED: May 27, 2025**

SAMPLE DESCRIPTION: MW25-01 Corrosion

PARAMETER	UNIT	RESULT	G / S	RDL	DATE ANALYZED	INITIAL	DATE PREPARED
pH	pH Units	7.20		NA	May 22, 2025	ND	May 22, 2025
Chloride	mg/L	341		0.12	May 23, 2025	LC	May 23, 2025
Sulphate	mg/L	202		0.10	May 23, 2025	LC	May 23, 2025
Electrical Conductivity	µS/cm	1440		2	May 22, 2025	ND	May 22, 2025

COMMENTS:

RDL - Reported Detection Limit; G / S - Guideline / Standard
Dilution required, RDL has been increased accordingly.

Certified By:

APPENDIX G

Water Quality Testing Results

Paracel Laboratories Ltd. Order No. 2523406

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1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GEMTEC Consulting Engineers and Scientists Limited
32 Steacie Drive
Kanata, ON K2K 2A9
Attn: Andrius Paznekas

Client PO:
Project: 104054.001
Custody: 12645

Report Date: 11-Jun-2025
Order Date: 5-Jun-2025

Order #: 2523406

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

Paracel ID	Client ID
2523406-01	MW25-02
2523406-02	MW25-02 (dissolved)

Approved By:

Mark Foto

Mark Foto, M.Sc.
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	6-Jun-25	6-Jun-25
Metals, ICP-MS	EPA 200.8 - ICP-MS	6-Jun-25	9-Jun-25
Ottawa - San/Comb: SVOCs with PAHs	EPA 625 - GC-MS, extraction	10-Jun-25	11-Jun-25
PCBs, total	EPA 608 - GC-ECD	6-Jun-25	6-Jun-25
Pesticides, OC	EPA 8081B - GC-ECD	6-Jun-25	6-Jun-25
pH	SM 4500-H+	9-Jun-25	9-Jun-25
PHC F1	CWS Tier 1 - P&T GC-FID	6-Jun-25	8-Jun-25
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	6-Jun-25	9-Jun-25
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	10-Jun-25	10-Jun-25
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	10-Jun-25	10-Jun-25
Total Suspended Solids	SM 2540D - Gravimetric	6-Jun-25	6-Jun-25
Turbidity	SM 2130B - Turbidity meter	6-Jun-25	6-Jun-25
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	8-Jun-25	8-Jun-25
Volatile Suspended Solids	SM 2540D - Gravimetric, 550C	6-Jun-25	6-Jun-25

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-	-	-
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-		
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
General Inorganics							
pH	0.1 pH Units	8.1	-	-	-	-	-
Phosphorus, total	0.01 mg/L	0.02	-	-	-	-	-
Total Suspended Solids	2 mg/L	90	-	-	-	-	-
Volatile Suspended Solids	2 mg/L	<2	-	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	-	-	-	-	-
Turbidity	0.1 NTU	196	-	-	-	-	-
Metals							
Aluminum	0.010 mg/L	-	0.022	-	-	-	-
Antimony	0.001 mg/L	-	0.001	-	-	-	-
Arsenic	0.010 mg/L	-	<0.010	-	-	-	-
Bismuth	0.005 mg/L	-	<0.005	-	-	-	-
Boron	0.050 mg/L	-	0.268	-	-	-	-
Cadmium	0.001 mg/L	-	<0.001	-	-	-	-
Chromium	0.050 mg/L	-	<0.050	-	-	-	-
Cobalt	0.001 mg/L	-	0.004	-	-	-	-
Copper	0.005 mg/L	-	0.016	-	-	-	-
Lead	0.001 mg/L	-	<0.001	-	-	-	-
Mercury	0.0001 mg/L	-	<0.0001	-	-	-	-
Manganese	0.050 mg/L	-	0.066	-	-	-	-
Molybdenum	0.005 mg/L	-	0.008	-	-	-	-
Nickel	0.005 mg/L	-	0.010	-	-	-	-
Selenium	0.005 mg/L	-	<0.005	-	-	-	-
Silver	0.001 mg/L	-	<0.001	-	-	-	-
Tin	0.010 mg/L	-	0.013	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-	-	-
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-		
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Metals							
Titanium	0.010 mg/L	-	<0.010	-	-	-	-
Vanadium	0.001 mg/L	-	0.003	-	-	-	-
Zinc	0.020 mg/L	-	<0.020	-	-	-	-
Metals - Total							
Aluminum	0.01 mg/L	<0.01	-	-	-	-	-
Antimony	0.001 mg/L	0.001	-	-	-	-	-
Arsenic	0.01 mg/L	<0.01	-	-	-	-	-
Bismuth	0.005 mg/L	<0.005	-	-	-	-	-
Boron	0.05 mg/L	<0.05	-	-	-	-	-
Cadmium	0.001 mg/L	<0.001	-	-	-	-	-
Chromium	0.05 mg/L	<0.05	-	-	-	-	-
Cobalt	0.001 mg/L	<0.001	-	-	-	-	-
Copper	0.005 mg/L	<0.005	-	-	-	-	-
Lead	0.001 mg/L	<0.001	-	-	-	-	-
Mercury	0.0001 mg/L	<0.0001	-	-	-	-	-
Manganese	0.05 mg/L	<0.05	-	-	-	-	-
Molybdenum	0.005 mg/L	<0.005	-	-	-	-	-
Nickel	0.005 mg/L	<0.005	-	-	-	-	-
Selenium	0.005 mg/L	<0.005	-	-	-	-	-
Silver	0.001 mg/L	<0.001	-	-	-	-	-
Tin	0.01 mg/L	<0.01	-	-	-	-	-
Titanium	0.01 mg/L	<0.01	-	-	-	-	-
Vanadium	0.001 mg/L	<0.001	-	-	-	-	-
Zinc	0.02 mg/L	<0.02	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-		
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-	-	-
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Volatiles							
Acetone	0.0050 mg/L	<0.0050	-	-	-	-	-
Benzene	0.0005 mg/L	<0.0005	-	-	-	-	-
Bromodichloromethane	0.0005 mg/L	<0.0005	-	-	-	-	-
Bromoform	0.0005 mg/L	<0.0005	-	-	-	-	-
Bromomethane	0.0005 mg/L	<0.0005	-	-	-	-	-
Carbon Tetrachloride	0.0002 mg/L	<0.0002	-	-	-	-	-
Chlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
Chloroethane	0.0010 mg/L	<0.0010	-	-	-	-	-
Chloroform	0.0005 mg/L	<0.0005	-	-	-	-	-
Chloromethane	0.0030 mg/L	<0.0030	-	-	-	-	-
Dibromochloromethane	0.0005 mg/L	<0.0005	-	-	-	-	-
Dichlorodifluoromethane	0.0010 mg/L	<0.0010	-	-	-	-	-
1,2-Dibromoethane	0.0002 mg/L	<0.0002	-	-	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,3-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1-Dichloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
1,2-Dichloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	-
trans-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,2-Dichloroethylene, total	0.0005 mg/L	<0.0005	-	-	-	-	-
1,2-Dichloropropane	0.0005 mg/L	<0.0005	-	-	-	-	-
cis-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-		
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-	-	-
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Volatiles							
trans-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,3-Dichloropropene, total	0.0005 mg/L	<0.0005	-	-	-	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
Hexane	0.0010 mg/L	<0.0010	-	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.0050 mg/L	<0.0050	-	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	0.0100 mg/L	<0.0100	-	-	-	-	-
Methyl Isobutyl Ketone	0.0050 mg/L	<0.0050	-	-	-	-	-
Methyl tert-butyl ether	0.0020 mg/L	<0.0020	-	-	-	-	-
Methylene Chloride	0.0050 mg/L	<0.0050	-	-	-	-	-
Styrene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1,1,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
Tetrachloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	-
Toluene	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1,1-Trichloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
1,1,2-Trichloroethane	0.0005 mg/L	<0.0005	-	-	-	-	-
Trichloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	-
Trichlorofluoromethane	0.0010 mg/L	<0.0010	-	-	-	-	-
1,3,5-Trimethylbenzene	0.0005 mg/L	<0.0005	-	-	-	-	-
Vinyl chloride	0.0005 mg/L	<0.0005	-	-	-	-	-
m,p-Xylenes	0.0005 mg/L	<0.0005	-	-	-	-	-
o-Xylene	0.0005 mg/L	<0.0005	-	-	-	-	-
Xylenes, total	0.0005 mg/L	<0.0005	-	-	-	-	-
4-Bromofluorobenzene	Surrogate	102%	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-	-	-
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-		
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Volatiles							
Dibromofluoromethane	Surrogate	79.5%	-	-	-	-	-
Toluene-d8	Surrogate	102%	-	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	0.025 mg/L	<0.025	-	-	-	-	-
F2 PHCs (C10-C16)	0.1 mg/L	<0.1	-	-	-	-	-
F3 PHCs (C16-C34)	0.1 mg/L	<0.1	-	-	-	-	-
F4 PHCs (C34-C50)	0.1 mg/L	<0.1	-	-	-	-	-
Semi-Volatiles							
1-Methylnaphthalene	0.00005 mg/L	<0.00005	-	-	-	-	-
2-Methylnaphthalene	0.00005 mg/L	<0.00005	-	-	-	-	-
7H-Dibenzo[c,g]carbazole	0.00050 mg/L	<0.00050	-	-	-	-	-
Anthracene	0.00001 mg/L	<0.00001	-	-	-	-	-
Benzo [a] anthracene	0.00001 mg/L	<0.00001	-	-	-	-	-
Benzo [a] pyrene	0.00001 mg/L	<0.00001	-	-	-	-	-
Benzo [b&j] fluoranthene	0.00005 mg/L	<0.00005	-	-	-	-	-
Benzo [e] pyrene	0.00005 mg/L	<0.00005	-	-	-	-	-
Benzo [g,h,i] perylene	0.00005 mg/L	<0.00005	-	-	-	-	-
Benzo [k] fluoranthene	0.00005 mg/L	<0.00005	-	-	-	-	-
Benzylbutylphthalate	0.00050 mg/L	<0.00050	-	-	-	-	-
Biphenyl	0.00005 mg/L	<0.00005	-	-	-	-	-
Bis(2-chloroethoxy)methane	0.00100 mg/L	<0.00100	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	0.00100 mg/L	<0.00100	-	-	-	-	-
Chrysene	0.00005 mg/L	<0.00005	-	-	-	-	-
Dibenzo [a,h] anthracene	0.00005 mg/L	<0.00005	-	-	-	-	-
Dibenzo [a,i] pyrene	0.00050 mg/L	<0.00050	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-		
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-	-	-
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Semi-Volatiles							
Dibenzo [a,j] acridine	0.00050 mg/L	<0.00050	-	-	-	-	-
Diethylphthalate	0.00100 mg/L	<0.00100	-	-	-	-	-
Di-n-butylphthalate	0.00100 mg/L	0.00400	-	-	-	-	-
Di-n-octylphthalate	0.00100 mg/L	<0.00100	-	-	-	-	-
Fluoranthene	0.00001 mg/L	<0.00001	-	-	-	-	-
Fluorene	0.00005 mg/L	<0.00005	-	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.00005 mg/L	<0.00005	-	-	-	-	-
Indole	0.00100 mg/L	<0.00100	-	-	-	-	-
Naphthalene	0.00005 mg/L	<0.00005	-	-	-	-	-
Phenanthrene	0.00005 mg/L	<0.00005	-	-	-	-	-
Perylene	0.00050 mg/L	<0.00050	-	-	-	-	-
Pyrene	0.00001 mg/L	<0.00001	-	-	-	-	-
2,4-Dichlorophenol	0.00100 mg/L	<0.00100	-	-	-	-	-
PAHs, Total	0.0025 mg/L	<0.0025	-	-	-	-	-
2-Fluorobiphenyl	Surrogate	97.6%	-	-	-	-	-
Nitrobenzene-d5	Surrogate	89.6%	-	-	-	-	-
Terphenyl-d14	Surrogate	108%	-	-	-	-	-
2,4,6-Tribromophenol	Surrogate	103%	-	-	-	-	-
2-Fluorophenol	Surrogate	27.1% [2]	-	-	-	-	-
Phenol-d6	Surrogate	27.6% [2]	-	-	-	-	-
Pesticides, OC							
Aldrin	0.01 ug/L	<0.01	-	-	-	-	-
alpha-BHC	0.01 ug/L	<0.01	-	-	-	-	-
beta-BHC	0.01 ug/L	<0.01	-	-	-	-	-
delta-BHC	0.01 ug/L	<0.01	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-	-	-
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-		
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Pesticides, OC							
gamma-BHC (Lindane)	0.01 ug/L	<0.01	-	-	-	-	-
alpha-Chlordane	0.01 ug/L	<0.01	-	-	-	-	-
gamma-Chlordane	0.01 ug/L	<0.01	-	-	-	-	-
Chlordane	0.01 ug/L	<0.01	-	-	-	-	-
o,p'-DDD	0.01 ug/L	<0.01	-	-	-	-	-
p,p'-DDD	0.01 ug/L	<0.01	-	-	-	-	-
DDD	0.01 ug/L	<0.01	-	-	-	-	-
o,p'-DDE	0.01 ug/L	<0.01	-	-	-	-	-
p,p'-DDE	0.01 ug/L	<0.01	-	-	-	-	-
DDE	0.01 ug/L	<0.01	-	-	-	-	-
o,p'-DDT	0.01 ug/L	<0.01	-	-	-	-	-
p,p'-DDT	0.01 ug/L	<0.01	-	-	-	-	-
DDT	0.01 ug/L	<0.01	-	-	-	-	-
Dieldrin	0.01 ug/L	<0.01	-	-	-	-	-
Endrin	0.01 ug/L	<0.01	-	-	-	-	-
Endrin aldehyde	0.01 ug/L	<0.01	-	-	-	-	-
Endrin ketone	0.01 ug/L	<0.01	-	-	-	-	-
Endosulfan I	0.01 ug/L	<0.01	-	-	-	-	-
Endosulfan II	0.01 ug/L	<0.01	-	-	-	-	-
Endosulfan I/II	0.01 ug/L	<0.01	-	-	-	-	-
Endosulfan sulfate	0.02 ug/L	<0.02	-	-	-	-	-
Heptachlor	0.01 ug/L	<0.01	-	-	-	-	-
Heptachlor epoxide	0.01 ug/L	<0.01	-	-	-	-	-
Hexachlorobenzene	0.01 ug/L	<0.01	-	-	-	-	-

	Client ID:	MW25-02	MW25-02 (dissolved)	-	-		
	Sample Date:	04-Jun-25 09:45	04-Jun-25 09:45	-	-	-	-
	Sample ID:	2523406-01	2523406-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Pesticides, OC							
Hexachlorobutadiene	0.01 ug/L	<0.01	-	-	-	-	-
Hexachloroethane	0.01 ug/L	<0.01	-	-	-	-	-
Methoxychlor	0.01 ug/L	<0.01	-	-	-	-	-
Decachlorobiphenyl	Surrogate	52.7%	-	-	-	-	-
PCBs							
PCBs, total	0.05 ug/L	<0.05	-	-	-	-	-
Decachlorobiphenyl	Surrogate	83.2%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Phosphorus, total	ND	0.01	mg/L					
Total Suspended Solids	ND	2	mg/L					
Volatile Suspended Solids	ND	2	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Turbidity	ND	0.1	NTU					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	0.025	mg/L					
F2 PHCs (C10-C16)	ND	0.1	mg/L					
F3 PHCs (C16-C34)	ND	0.1	mg/L					
F4 PHCs (C34-C50)	ND	0.1	mg/L					
Metals								
Aluminum	ND	0.010	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.010	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.050	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.050	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.050	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.010	mg/L					
Titanium	ND	0.010	mg/L					
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.020	mg/L					
Metals - Total								

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Aluminum	ND	0.01	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.01	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.05	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.05	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.05	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.01	mg/L					
Titanium	ND	0.01	mg/L					
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.02	mg/L					
PCBs								
PCBs, total	ND	0.05	ug/L					
Surrogate: Decachlorobiphenyl	*0.256*		*%*	*102*	*60-140*			
Pesticides, OC								
Aldrin	ND	0.01	ug/L					
alpha-BHC	ND	0.01	ug/L					
beta-BHC	ND	0.01	ug/L					
delta-BHC	ND	0.01	ug/L					
gamma-BHC (Lindane)	ND	0.01	ug/L					
alpha-Chlordane	ND	0.01	ug/L					
gamma-Chlordane	ND	0.01	ug/L					
Chlordane	ND	0.01	ug/L					
o,p'-DDD	ND	0.01	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
p,p'-DDD	ND	0.01	ug/L					
DDD	ND	0.01	ug/L					
o,p'-DDE	ND	0.01	ug/L					
p,p'-DDE	ND	0.01	ug/L					
DDE	ND	0.01	ug/L					
o,p'-DDT	ND	0.01	ug/L					
p,p'-DDT	ND	0.01	ug/L					
DDT	ND	0.01	ug/L					
Dieldrin	ND	0.01	ug/L					
Endrin	ND	0.01	ug/L					
Endrin aldehyde	ND	0.01	ug/L					
Endrin ketone	ND	0.01	ug/L					
Endosulfan I	ND	0.01	ug/L					
Endosulfan II	ND	0.01	ug/L					
Endosulfan I/II	ND	0.01	ug/L					
Endosulfan sulfate	ND	0.02	ug/L					
Heptachlor	ND	0.01	ug/L					
Heptachlor epoxide	ND	0.01	ug/L					
Hexachlorobenzene	ND	0.01	ug/L					
Hexachlorobutadiene	ND	0.01	ug/L					
Hexachloroethane	ND	0.01	ug/L					
Methoxychlor	ND	0.01	ug/L					
Surrogate: Decachlorobiphenyl	*0.183*		*%*	*73.0*	*50-140*			
Semi-Volatiles								
1-Methylnaphthalene	ND	0.00005	mg/L					
2-Methylnaphthalene	ND	0.00005	mg/L					
7H-Dibenzo[c,g]carbazole	ND	0.00050	mg/L					
Anthracene	ND	0.00001	mg/L					
Benzo [a] anthracene	ND	0.00001	mg/L					
Benzo [a] pyrene	ND	0.00001	mg/L					
Benzo [b&j] fluoranthene	ND	0.00005	mg/L					
Benzo [e] pyrene	ND	0.00005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	ND	0.00005	mg/L					
Benzo [k] fluoranthene	ND	0.00005	mg/L					
Benzylbutylphthalate	ND	0.00050	mg/L					
Biphenyl	ND	0.00005	mg/L					
Bis(2-chloroethoxy)methane	ND	0.00100	mg/L					
Bis(2-ethylhexyl)phthalate	ND	0.00100	mg/L					
Chrysene	ND	0.00005	mg/L					
Dibenzo [a,h] anthracene	ND	0.00005	mg/L					
Dibenzo [a,i] pyrene	ND	0.00050	mg/L					
Dibenzo [a,j] acridine	ND	0.00050	mg/L					
Diethylphthalate	ND	0.00100	mg/L					
Di-n-butylphthalate	ND	0.00100	mg/L					
Di-n-octylphthalate	ND	0.00100	mg/L					
Fluoranthene	ND	0.00001	mg/L					
Fluorene	ND	0.00005	mg/L					
Indeno [1,2,3-cd] pyrene	ND	0.00005	mg/L					
Indole	ND	0.00100	mg/L					
Naphthalene	ND	0.00005	mg/L					
Phenanthrene	ND	0.00005	mg/L					
Perylene	ND	0.00050	mg/L					
Pyrene	ND	0.00001	mg/L					
2,4-Dichlorophenol	ND	0.00100	mg/L					
Surrogate: 2-Fluorobiphenyl	*0.0177*		*%*	*88.6*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0159*		*%*	*79.4*	*50-140*			
Surrogate: Terphenyl-d14	*0.0190*		*%*	*95.0*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0327*		*%*	*81.6*	*50-140*			
Surrogate: 2-Fluorophenol	*0.0115*		*%*	*28.8*	*50-140*			S-GC
Surrogate: Phenol-d6	*0.0125*		*%*	*31.2*	*50-140*			S-GC
Volatiles								
Acetone	ND	0.0050	mg/L					
Benzene	ND	0.0005	mg/L					
Bromodichloromethane	ND	0.0005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	ND	0.0005	mg/L					
Bromomethane	ND	0.0005	mg/L					
Carbon Tetrachloride	ND	0.0002	mg/L					
Chlorobenzene	ND	0.0005	mg/L					
Chloroethane	ND	0.0010	mg/L					
Chloroform	ND	0.0005	mg/L					
Chloromethane	ND	0.0030	mg/L					
Dibromochloromethane	ND	0.0005	mg/L					
Dichlorodifluoromethane	ND	0.0010	mg/L					
1,2-Dibromoethane	ND	0.0002	mg/L					
1,2-Dichlorobenzene	ND	0.0005	mg/L					
1,3-Dichlorobenzene	ND	0.0005	mg/L					
1,4-Dichlorobenzene	ND	0.0005	mg/L					
1,1-Dichloroethane	ND	0.0005	mg/L					
1,2-Dichloroethane	ND	0.0005	mg/L					
1,1-Dichloroethylene	ND	0.0005	mg/L					
cis-1,2-Dichloroethylene	ND	0.0005	mg/L					
trans-1,2-Dichloroethylene	ND	0.0005	mg/L					
1,2-Dichloroethylene, total	ND	0.0005	mg/L					
1,2-Dichloropropane	ND	0.0005	mg/L					
cis-1,3-Dichloropropylene	ND	0.0005	mg/L					
trans-1,3-Dichloropropylene	ND	0.0005	mg/L					
1,3-Dichloropropene, total	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Hexane	ND	0.0010	mg/L					
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L					
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L					
Methyl Isobutyl Ketone	ND	0.0050	mg/L					
Methyl tert-butyl ether	ND	0.0020	mg/L					
Methylene Chloride	ND	0.0050	mg/L					
Styrene	ND	0.0005	mg/L					
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L					
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Tetrachloroethylene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
1,1,1-Trichloroethane	ND	0.0005	mg/L					
1,1,2-Trichloroethane	ND	0.0005	mg/L					
Trichloroethylene	ND	0.0005	mg/L					
Trichlorofluoromethane	ND	0.0010	mg/L					
1,3,5-Trimethylbenzene	ND	0.0005	mg/L					
Vinyl chloride	ND	0.0005	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: 4-Bromofluorobenzene	*0.0835*		*%*	*104*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0733*		*%*	*91.6*	*50-140*			
Surrogate: Toluene-d8	*0.0795*		*%*	*99.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.4	0.1	pH Units	7.3			0.5	3.3	
Phosphorus, total	0.170	0.01	mg/L	0.169			0.5	15	
Total Suspended Solids	ND	2	mg/L	ND			NC	10	
Volatile Suspended Solids	ND	2	mg/L	ND			NC	10	
Total Kjeldahl Nitrogen	6.88	1.0	mg/L	6.78			1.4	20	
Turbidity	194	0.1	NTU	196			1.0	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L	ND			NC	30	
Metals									
Aluminum	0.0211	0.010	mg/L	0.0218			3.2	20	
Antimony	0.0013	0.001	mg/L	0.0015			10.7	20	
Arsenic	ND	0.010	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.265	0.050	mg/L	0.268			1.2	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.050	mg/L	ND			NC	20	
Cobalt	0.0036	0.001	mg/L	0.0035			1.9	20	
Copper	0.0169	0.005	mg/L	0.0164			3.2	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	0.0665	0.050	mg/L	0.0656			1.3	20	
Molybdenum	0.0078	0.005	mg/L	0.0076			2.9	20	
Nickel	0.0101	0.005	mg/L	0.0099			1.3	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	0.0125	0.010	mg/L	0.0127			1.5	20	
Titanium	ND	0.010	mg/L	ND			NC	20	
Vanadium	0.0030	0.001	mg/L	0.0029			1.2	20	
Zinc	ND	0.020	mg/L	ND			NC	20	
Metals - Total									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Aluminum	0.09	0.01	mg/L	0.08			14.5	20	
Antimony	ND	0.001	mg/L	ND			NC	20	
Arsenic	ND	0.01	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.26	0.05	mg/L	0.25			4.7	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	ND	0.005	mg/L	ND			NC	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	ND	0.05	mg/L	ND			NC	20	
Molybdenum	0.012	0.005	mg/L	0.012			0.3	20	
Nickel	0.009	0.005	mg/L	0.009			1.9	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.01	mg/L	ND			NC	20	
Titanium	ND	0.01	mg/L	ND			NC	20	
Vanadium	ND	0.001	mg/L	ND			NC	20	
Zinc	ND	0.02	mg/L	ND			NC	20	
Volatiles									
Acetone	ND	0.0050	mg/L	ND			NC	30	
Benzene	ND	0.0005	mg/L	ND			NC	30	
Bromodichloromethane	ND	0.0005	mg/L	ND			NC	30	
Bromoform	ND	0.0005	mg/L	ND			NC	30	
Bromomethane	ND	0.0005	mg/L	ND			NC	30	
Carbon Tetrachloride	ND	0.0002	mg/L	ND			NC	30	
Chlorobenzene	ND	0.0005	mg/L	ND			NC	30	
Chloroethane	ND	0.0010	mg/L	ND			NC	30	
Chloroform	ND	0.0005	mg/L	ND			NC	30	
Chloromethane	ND	0.0030	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dibromochloromethane	ND	0.0005	mg/L	ND			NC	30	
Dichlorodifluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,2-Dibromoethane	ND	0.0002	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloropropane	ND	0.0005	mg/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Hexane	ND	0.0010	mg/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	0.0100	mg/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	0.0050	mg/L	ND			NC	30	
Methyl tert-butyl ether	ND	0.0020	mg/L	ND			NC	30	
Methylene Chloride	ND	0.0050	mg/L	ND			NC	30	
Styrene	ND	0.0005	mg/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
Trichlorofluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.0005	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Vinyl chloride	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0826*		*%*		*103*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0679*		*%*		*84.9*	*50-140*			
Surrogate: Toluene-d8	*0.0807*		*%*		*101*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Phosphorus, total	1.16	0.01	mg/L	0.169	99.3	80-120			
Total Suspended Solids	24.0	2	mg/L	ND	112	75-125			
Total Kjeldahl Nitrogen	1.02	0.1	mg/L	ND	102	84-116			
Hydrocarbons									
F1 PHCs (C6-C10)	1.87	0.025	mg/L	ND	93.4	85-115			
F2 PHCs (C10-C16)	1.6	0.1	mg/L	ND	101	60-140			
F3 PHCs (C16-C34)	4.4	0.1	mg/L	ND	111	60-140			
F4 PHCs (C34-C50)	2.8	0.1	mg/L	ND	114	60-140			
Metals									
Aluminum	43.2	0.010	mg/L	2.2	81.9	80-120			
Antimony	42.9	0.001	mg/L	0.1	85.5	80-120			
Arsenic	51.8	0.010	mg/L	0.1	103	80-120			
Bismuth	35.0	0.005	mg/L	0.008	69.9	80-120			QM-07
Boron	62.0	0.050	mg/L	26.8	70.4	80-120			QM-07
Cadmium	43.7	0.001	mg/L	0.008	87.4	80-120			
Chromium	57.1	0.050	mg/L	0.3	114	80-120			
Cobalt	51.7	0.001	mg/L	0.4	103	80-120			
Copper	48.8	0.005	mg/L	1.6	94.3	80-120			
Lead	38.7	0.001	mg/L	0.02	77.5	80-120			QM-07
Mercury	0.00282	0.0001	mg/L	ND	94.1	70-130			
Manganese	58.5	0.050	mg/L	6.6	104	80-120			
Molybdenum	49.8	0.005	mg/L	0.8	98.0	80-120			
Nickel	49.9	0.005	mg/L	1.0	97.7	80-120			
Selenium	44.7	0.005	mg/L	0.2	88.9	80-120			
Silver	42.2	0.001	mg/L	ND	84.4	80-120			
Tin	52.1	0.010	mg/L	1.3	102	80-120			
Titanium	58.0	0.010	mg/L	0.04	116	80-120			
Vanadium	59.4	0.001	mg/L	0.3	118	80-120			
Zinc	42.0	0.020	mg/L	1.8	80.4	80-120			
Metals - Total									

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Aluminum	68.6	0.01	mg/L	7.81	122	80-120			QM-07
Antimony	52.6	0.001	mg/L	0.073	105	80-120			
Arsenic	59.5	0.01	mg/L	0.035	119	80-120			
Bismuth	41.5	0.005	mg/L	0.005	83.0	80-120			
Boron	78.6	0.05	mg/L	25.1	107	80-120			
Cadmium	54.3	0.001	mg/L	0.001	109	80-120			
Chromium	66.7	0.05	mg/L	0.066	133	80-120			QM-07
Cobalt	61.3	0.001	mg/L	0.025	123	80-120			QM-07
Copper	57.1	0.005	mg/L	0.155	114	80-120			
Lead	44.6	0.001	mg/L	0.019	89.1	80-120			
Mercury	0.0029	0.0001	mg/L	ND	97.8	70-130			
Manganese	65.0	0.05	mg/L	0.524	129	80-120			QM-07
Molybdenum	59.3	0.005	mg/L	1.18	116	80-120			
Nickel	60.0	0.005	mg/L	0.886	118	80-120			
Selenium	53.4	0.005	mg/L	0.030	107	80-120			
Silver	52.8	0.001	mg/L	ND	106	80-120			
Tin	61.7	0.01	mg/L	0.072	123	80-120			QM-07
Titanium	67.7	0.01	mg/L	0.256	135	80-120			QM-07
Vanadium	66.8	0.001	mg/L	0.031	133	80-120			QM-07
Zinc	54.2	0.02	mg/L	0.923	107	80-120			
PCBs									
PCBs, total	1.14	0.05	ug/L	ND	114	65-135			
Surrogate: Decachlorobiphenyl	*0.231*		*%*		*92.5*	*60-140*			
Pesticides, OC									
Aldrin	0.40	0.01	ug/L	ND	80.6	50-140			
alpha-BHC	0.47	0.01	ug/L	ND	93.5	50-140			
beta-BHC	0.36	0.01	ug/L	ND	72.6	50-140			
delta-BHC	0.42	0.01	ug/L	ND	83.3	50-140			
gamma-BHC (Lindane)	0.41	0.01	ug/L	ND	81.3	50-140			
alpha-Chlordane	0.36	0.01	ug/L	ND	72.9	50-140			
gamma-Chlordane	0.36	0.01	ug/L	ND	72.1	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o,p'-DDD	0.48	0.01	ug/L	ND	95.2	50-140			
p,p'-DDD	0.43	0.01	ug/L	ND	86.9	50-140			
o,p'-DDE	0.42	0.01	ug/L	ND	83.6	50-140			
p,p'-DDE	0.37	0.01	ug/L	ND	74.5	50-140			
o,p'-DDT	0.52	0.01	ug/L	ND	104	50-140			
p,p'-DDT	0.40	0.01	ug/L	ND	80.8	50-140			
Dieldrin	0.40	0.01	ug/L	ND	80.8	50-140			
Endrin	0.63	0.01	ug/L	ND	125	50-140			
Endrin aldehyde	0.43	0.01	ug/L	ND	85.8	50-140			
Endrin ketone	0.32	0.01	ug/L	ND	63.8	50-140			
Endosulfan I	0.39	0.01	ug/L	ND	77.7	50-140			
Endosulfan II	0.38	0.01	ug/L	ND	76.9	50-140			
Endosulfan sulfate	0.41	0.02	ug/L	ND	81.3	50-140			
Heptachlor	0.40	0.01	ug/L	ND	79.6	50-140			
Heptachlor epoxide	0.41	0.01	ug/L	ND	82.3	50-140			
Hexachlorobenzene	0.61	0.01	ug/L	ND	121	50-140			
Hexachlorobutadiene	0.67	0.01	ug/L	ND	133	50-140			
Hexachloroethane	0.60	0.01	ug/L	ND	121	50-140			
Methoxychlor	0.47	0.01	ug/L	ND	93.6	50-140			
Surrogate: Decachlorobiphenyl	*0.175*		*%*		*70.0*	*50-140*			
Semi-Volatiles									
1-Methylnaphthalene	0.00894	0.00005	mg/L	ND	89.4	50-140			
2-Methylnaphthalene	0.0102	0.00005	mg/L	ND	102	50-140			
7H-Dibenzo[c,g]carbazole	0.0104	0.00050	mg/L	ND	104	50-140			
Anthracene	0.00809	0.00001	mg/L	ND	80.9	50-140			
Benzo [a] anthracene	0.00988	0.00001	mg/L	ND	98.8	50-140			
Benzo [a] pyrene	0.00782	0.00001	mg/L	ND	78.2	50-140			
Benzo [b&j] fluoranthene	0.0110	0.00005	mg/L	ND	110	50-140			
Benzo [e] pyrene	0.0113	0.00005	mg/L	ND	113	50-140			
Benzo [g,h,i] perylene	0.00880	0.00005	mg/L	ND	88.0	50-140			
Benzo [k] fluoranthene	0.00810	0.00005	mg/L	ND	81.0	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzylbutylphthalate	0.0103	0.00050	mg/L	ND	103	50-140			
Biphenyl	0.0107	0.00005	mg/L	ND	107	50-140			
Bis(2-chloroethoxy)methane	0.0103	0.00100	mg/L	ND	103	50-140			
Bis(2-ethylhexyl)phthalate	0.0105	0.00100	mg/L	ND	105	50-140			
Chrysene	0.00944	0.00005	mg/L	ND	94.4	50-140			
Dibenzo [a,h] anthracene	0.00909	0.00005	mg/L	ND	90.9	50-140			
Dibenzo [a,i] pyrene	0.0117	0.00050	mg/L	ND	117	50-140			
Dibenzo [a,j] acridine	0.00505	0.00050	mg/L	ND	50.5	50-140			
Diethylphthalate	0.0109	0.00100	mg/L	ND	109	50-140			
Di-n-butylphthalate	0.0116	0.00100	mg/L	ND	116	50-140			
Di-n-octylphthalate	0.0106	0.00100	mg/L	ND	106	50-140			
Fluoranthene	0.00994	0.00001	mg/L	ND	99.4	50-140			
Fluorene	0.00966	0.00005	mg/L	ND	96.6	50-140			
Indeno [1,2,3-cd] pyrene	0.00924	0.00005	mg/L	ND	92.4	50-140			
Indole	0.00906	0.00100	mg/L	ND	90.6	50-140			
Naphthalene	0.00915	0.00005	mg/L	ND	91.5	50-140			
Phenanthrene	0.00969	0.00005	mg/L	ND	96.9	50-140			
Perylene	0.0105	0.00050	mg/L	ND	105	50-140			
Pyrene	0.0101	0.00001	mg/L	ND	101	50-140			
2,4-Dichlorophenol	0.0107	0.00100	mg/L	ND	107	50-140			
Surrogate: 2-Fluorobiphenyl	*0.0201*		*%*		*101*	*50-140*			
Surrogate: Nitrobenzene-d5	*0.0211*		*%*		*106*	*50-140*			
Surrogate: Terphenyl-d14	*0.0202*		*%*		*101*	*50-140*			
Surrogate: 2,4,6-Tribromophenol	*0.0444*		*%*		*111*	*50-140*			
Surrogate: 2-Fluorophenol	*0.0225*		*%*		*56.1*	*50-140*			
Surrogate: Phenol-d6	*0.0224*		*%*		*55.9*	*50-140*			
Volatiles									
Acetone	0.112	0.0050	mg/L	ND	112	50-140			
Benzene	0.0468	0.0005	mg/L	ND	117	60-130			
Bromodichloromethane	0.0469	0.0005	mg/L	ND	117	60-130			
Bromoform	0.0476	0.0005	mg/L	ND	119	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	0.0477	0.0005	mg/L	ND	119	50-140			
Carbon Tetrachloride	0.0475	0.0002	mg/L	ND	119	60-130			
Chlorobenzene	0.0484	0.0005	mg/L	ND	121	60-130			
Chloroethane	0.0485	0.0010	mg/L	ND	121	50-140			
Chloroform	0.0459	0.0005	mg/L	ND	115	60-130			
Chloromethane	0.0473	0.0030	mg/L	ND	118	50-140			
Dibromochloromethane	0.0462	0.0005	mg/L	ND	115	60-130			
Dichlorodifluoromethane	0.0381	0.0010	mg/L	ND	95.2	50-140			
1,2-Dibromoethane	0.0457	0.0002	mg/L	ND	114	60-130			
1,2-Dichlorobenzene	0.0493	0.0005	mg/L	ND	123	60-130			
1,3-Dichlorobenzene	0.0500	0.0005	mg/L	ND	125	60-130			
1,4-Dichlorobenzene	0.0483	0.0005	mg/L	ND	121	60-130			
1,1-Dichloroethane	0.0418	0.0005	mg/L	ND	105	60-130			
1,2-Dichloroethane	0.0459	0.0005	mg/L	ND	115	60-130			
1,1-Dichloroethylene	0.0475	0.0005	mg/L	ND	119	60-130			
cis-1,2-Dichloroethylene	0.0451	0.0005	mg/L	ND	113	60-130			
trans-1,2-Dichloroethylene	0.0423	0.0005	mg/L	ND	106	60-130			
1,2-Dichloropropane	0.0475	0.0005	mg/L	ND	119	60-130			
cis-1,3-Dichloropropylene	0.0496	0.0005	mg/L	ND	124	60-130			
trans-1,3-Dichloropropylene	0.0460	0.0005	mg/L	ND	115	60-130			
Ethylbenzene	0.0475	0.0005	mg/L	ND	119	60-130			
Hexane	0.0378	0.0010	mg/L	ND	94.6	60-130			
Methyl Ethyl Ketone (2-Butanone)	0.105	0.0050	mg/L	ND	105	50-140			
Methyl Butyl Ketone (2-Hexanone)	0.110	0.0100	mg/L	ND	110	50-140			
Methyl Isobutyl Ketone	0.120	0.0050	mg/L	ND	120	50-140			
Methyl tert-butyl ether	0.0936	0.0020	mg/L	ND	93.6	50-140			
Methylene Chloride	0.0504	0.0050	mg/L	ND	126	60-130			
Styrene	0.0480	0.0005	mg/L	ND	120	60-130			
1,1,1,2-Tetrachloroethane	0.0459	0.0005	mg/L	ND	115	60-130			
1,1,2,2-Tetrachloroethane	0.0486	0.0005	mg/L	ND	121	60-130			
Tetrachloroethylene	0.0487	0.0005	mg/L	ND	122	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	0.0443	0.0005	mg/L	ND	111	60-130			
1,1,1-Trichloroethane	0.0470	0.0005	mg/L	ND	118	60-130			
1,1,2-Trichloroethane	0.0490	0.0005	mg/L	ND	123	60-130			
Trichloroethylene	0.0473	0.0005	mg/L	ND	118	60-130			
Trichlorofluoromethane	0.0485	0.0010	mg/L	ND	121	60-130			
1,3,5-Trimethylbenzene	0.0482	0.0005	mg/L	ND	121	60-130			
Vinyl chloride	0.0440	0.0005	mg/L	ND	110	50-140			
m,p-Xylenes	0.0924	0.0005	mg/L	ND	115	60-130			
o-Xylene	0.0477	0.0005	mg/L	ND	119	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0800*		*%*		*100*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0828*		*%*		*104*	*50-140*			
Surrogate: Toluene-d8	*0.0814*		*%*		*102*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

2: Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

QC Qualifiers:

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

S-GC Surrogate recovery outside of control limits. The data was accepted based on valid recovery of the remaining surrogate.

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

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

PARACE LABORATORIES L

Paracel ID: 2523406

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Paracel Order Number	Chain Of Custody
2523406	Ontario Drinking Water Samples № 12645

Client Name:	GEMTEC	Project Ref:	104054.001	Waterworks Name:	Samples Taken By:	
Contact Name:	Andrius Pazrekas	Quote #:		Waterworks Number:	Name:	Jeffrey Gauthier
Address:	32 Stacie Drive	PO #:		Address:	Signature:	
After Hours Contact:		E-mail:	andrius.pazrekas@gemtec.ca		Page 1 of 1	
Telephone:		Fax:		Public Health Unit:	Turn Around Time Required: ☐ 1 day ☐ 2 day ☐ 3 day ☒ 4 day	

Samples Submitted Under: (Indicate **ONLY one**)
☐ ON REG 170/03 ☐ ON REG 319/08 ☐ Private Well
☐ ON REG 243/07 ☒ Other Sewer use

Have LSN forms been submitted to MOE/MOHLTC?: ☐ Yes ☐ No ☒ N/A

Are these samples for human consumption?: ☐ Yes ☒ No

All information must be completed before samples will be processed.

Sample Type: R = Raw ; T = Treated ; D = Distribution; P = Plumbing
Source Type: G = Ground Water; S = Surface Water
Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No

	LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y / N	Resample	SAMPLE COLLECTED DATE	SAMPLE COLLECTED TIME	# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S / F (REG 243)	Required Analyses: Total Coliform/E. Coli	HPC	Lead	THM	GEMTEC Sewer use with Fluoride metals			
1		MW25-02	R	GW	N	/	June 4/25	9:45	12							✓	/		
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: WALKIN.

Relinquished By (Sign):	Received By Driver/Depot: DROP OFF	Received at Lab: LTJ	Verified By: SD
Relinquished By (Print): Jeffrey Gauthier	Date/Time: June 5, 25 2:25	Date/Time: 05/06/25, 16:15	Date/Time: June 6, 2025 9:23am
Date/Time: June 5/25 2:25	Temperature: 6.9 °C	Temperature: 8.0°C °C	pH Verified: ☑ By: LTJ

PARACE LABORATORIES

Paracel ID: 2523406

Office
219 St. Laurent Blvd.
a, Ontario K1G 4J8
00-749-1947
ace@paracellabs.com
paracellabs.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2523406	

Client Name: GEMTEC	Project Ref: 104054.001	Page 1 of 1
Contact Name: Andrius Paznekas	Quote #:	Turnaround Time
Address: 32 Steacie Drive	PO #:	☐ 1 day ☐ 3 day
	E-mail: andrius.paznekas@gemtec.ca	☐ 2 day ☒ Regular
Telephone:		Date Required:

☐ REG 153/04 ☐ REG 406/19	Other Regulation
☐ Table 1 ☐ Agri/Other ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Res/Park ☐ Coarse	☐ CCME ☐ MISA
☐ Table 3 ☐ Ind/Comm	☒ SU - Sani ☐ SU - Storm
☐ Table___	Mun:
For RSC: ☐ Yes ☒ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Field Filtered	Sample Taken: Date	Sample Taken: Time	Required Analysis: Gemtec sewer use	Required Analysis: with filtered metals
1	MW25-02	GW	-	12		June 4/2025	9:45	X	X
2									
3									
4									
5									
6									
7									
8									
9									
10									

Comments: Has field filtered metals Revised CoC

Method of Delivery: Paracel Courier

Relinquished By (Sign): Jeffrey Gauthier (Digitally signed by Jeffrey Gauthier Date: 2025.06.05 15:53:51 -04'00')	Received at Depot:	Received at Lab: LTJ	Verified By: SD
Relinquished By (Print): Jeffrey Gauthier	Date/Time:	Date/Time: 05/06/25; 16:15	Date/Time: June 6, 2025 9:23am
Date/Time: June 5/2025	Temperature: °C	Temperature: 8.0°C	pH Verified: ☑ By: LTJ

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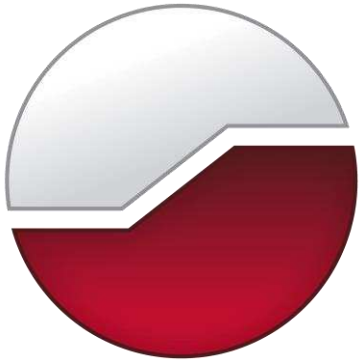

civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité