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Geotechnical Investigation – Proposed Residential Development

9243 McArton Road, Almonte, Ontario

Prepared for:

1503948 Ontario Inc.
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1.0 INTRODUCTION AND SCOPE

Pinchin Ltd. (Pinchin) was retained by 1503948 Ontario Inc. (Client) to conduct a Geotechnical Investigation and provide subsequent geotechnical design recommendations for the proposed residential subdivision development to be located at 9243 McArton Road, Almonte, Ontario (Site). The Site location is shown on Figure 1.

Based on information provided by the Client, it is Pinchin's understanding that the residential subdivision is to consist of multiple single-family residential dwellings which will be complete with basement levels. The proposed subdivision will also be complete with a municipal roadway and each residential dwelling will include a dedicated well and septic system.

Pinchin's geotechnical comments and recommendations are based on the results of the Geotechnical Investigation and our understanding of the project scope.

The purpose of the Geotechnical Investigation was to delineate the subsurface conditions and soil engineering characteristics by advancing a total of ten (10) sampled boreholes (Boreholes BH1 to BH10), at the Site.

Based on a desk top review and the results of the Geotechnical Investigation, the following geotechnical data and engineering design recommendations are provided herein:

- A detailed description of the soil and groundwater conditions;
- Site preparation recommendations;
- Open cut excavations and anticipated groundwater management;
- Foundation design recommendations including bedrock bearing resistances at Ultimate Limit States (ULS) design;
- Potential total and differential settlements;
- Foundation frost protection and engineered fill specifications and installation;
- Seismic Site classification for seismic Site response;
- Basement Design;
- Concrete floor slab-on-grade support recommendations;
- Asphaltic concrete pavement structure design for municipal roadway; and
- Potential construction concerns.

Abbreviations, terminology, and principal symbols commonly used throughout the report, borehole logs and appendices are enclosed in Appendix I.

2.0 SITE DESCRIPTION AND GEOLOGICAL SETTING

The Site is located northwest of the cul de sac on the west end of Douglas Side Road, approximately 900 m south of the intersection of McArton Road and Ridgemont Drive. The Site is currently undeveloped and consists of a mixture of mature trees, wild undergrowth, marsh areas/wetlands, and agricultural land. The lands adjacent to the Site are either developed with single family residential dwellings or consist of a mixture of undeveloped agricultural land and forested areas.

Data obtained from the Ontario Geological Survey Maps, as published by the Ontario Ministry of Natural Resources, indicates that the north portion of the Site is located on Paleozoic bedrock, while the south portion of the Site is located on organics deposits consisting of peat, muck, and marl (Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV). The underlying bedrock at this Site is of the Shadow Lake formation consisting of limestone, dolostone, shale, arkose, sandstone, and dolostone (Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1).

3.0 GEOTECHNICAL FIELD INVESTIGATION AND METHODOLOGY

Pinchin completed a field investigation at the Site on September 15, 2022, by advancing a total of ten (10) sampled boreholes throughout the Site. The boreholes were advanced to sampled depths ranging from approximately 0.3 to 0.6 metres below existing ground surface (mbgs), where refusal was encountered on probable bedrock. The approximate spatial locations of the boreholes advanced at the Site are shown on Figure 2.

The boreholes were advanced with the use of a CME55 track-mounted drill rig which was equipped with standard soil sampling equipment. Soil samples were collected using a 51 mm outside diameter (OD) split spoon barrel in conjunction with Standard Penetration Tests (SPT) “N” values (ASTM D1586). The SPT “N” values were used to assess the compactness condition of the non-cohesive soil.

Groundwater observations and measurements were obtained from the open boreholes during and upon completion of drilling. The groundwater observations and measurements recorded are included on the appended borehole logs.

The field investigation was monitored by experienced Pinchin personnel. Pinchin logged the drilling operations and identified the soil samples as they were retrieved. The recovered soil samples were sealed into plastic bags and carefully transported to an independent and accredited materials testing laboratory for detailed analysis and testing. All soil samples were classified according to visual and index properties by the project engineer.

The field logging of the soil and groundwater conditions was performed to collect geotechnical engineering design information. The borehole logs include textural descriptions of the subsoil in accordance with a modified Unified Soil Classification System (USCS) and indicate the soil boundaries inferred from non-continuous sampling and observations made during the borehole advancement. These boundaries reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The modified USCS classification is explained in further detail in Appendix I. Details of the soil and groundwater conditions encountered within the boreholes are included on the Borehole Logs within Appendix II.

Select soil samples collected from the boreholes were submitted to a material testing laboratory to determine the grain size distribution of the soil. A copy of the laboratory analytical reports is included in Appendix III. In addition, the collected samples were compared against previous geotechnical information from the area, for consistency and calibration of results.

4.0 SUBSURFACE CONDITIONS

4.1 Borehole Soil Stratigraphy

In general, the soil stratigraphy at the Site comprises surficial organics overlying glacial till and probable bedrock to the maximum borehole refusal depth of approximately 0.6 mbgs. The appended borehole logs provide detailed soil descriptions and stratigraphies, results of SPT testing, and groundwater observations. It is noted that there is potential that the soil conditions vary in the parts of the site that are heavily treed where drill access was not possible.

Surficial organics were encountered in all boreholes and were measured to range in thickness from approximately 50 to 150 mm.

Glacial till was encountered underlying the surficial organics in all of the boreholes and extended down to the underlying probable bedrock surface located between approximately 0.3 to 0.6 mbgs. The glacial till material ranged in soil matrix from silty sand containing some gravel and some clay, to silty sandy gravel containing trace clay. The non-cohesive glacial till material had a loose to very dense relative density based on SPT ‘N’ values of 7 to 95 blows per 300 mm penetration of a split spoon sampler. The results of three particle size distribution analyses completed on samples of the glacial till indicate that the samples contain 14 to 43% gravel, 24 to 39% sand, 32 to 33% silt and 2 to 14% clay sized particles. The moisture content of the samples tested ranged between 7.2 and 13.7%.

4.2 Bedrock

Auger refusal on probable bedrock was encountered in all boreholes between approximately 0.3 and 0.6 mbgs. It is noted that bedrock coring was not completed to confirm the presence of bedrock and to evaluate the Rock Quality Designation (RQD).

4.3 Groundwater Conditions

Groundwater observations and measurements were obtained in the open boreholes at the completion of drilling and are summarized on the appended borehole logs. Groundwater was not encountered within the open boreholes upon completion of drilling. Seasonal variations in the water table should be expected, with higher levels occurring during wet weather conditions in the spring and fall and lower levels occurring during dry weather conditions.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 General Information

The recommendations presented in the following sections of this report are based on the information available regarding the proposed construction, the results obtained from the geotechnical investigation, and Pinchin's experience with similar projects. Since the investigation only represents a portion of the subsurface conditions, it is possible that conditions may be encountered during construction that are substantially different than those encountered during the investigation. If these situations are encountered, adjustments to the design may be necessary. A qualified geotechnical engineer should be on-Site during the foundation preparation to ensure the subsurface conditions are the same/similar to what was observed during the investigation.

It is Pinchin's understanding that the proposed residential subdivision is to consist of multiple single-family residential dwellings which will be complete with basement levels. The proposed subdivision will also be complete with a municipal roadway and each residential dwelling will include a dedicated well and septic system.

At this time, the depth to the underside of the footing for the proposed basement levels is unknown. As such, for the purpose of this report, Pinchin has assumed a depth of 3.0 mbgs to the underside of the footings for the basement levels. Based on the information obtained during the geotechnical investigation, the footings for the proposed buildings will be founded on the probable bedrock surface.

5.2 Site Preparation

It is anticipated that clearing operations will be completed at the Site prior to commencing Site grading operations.

Preparation of the Site for the proposed development will predominantly consist of removing all surficial organic material in the vicinity of the proposed buildings and municipal roadway. In calculating the approximate quantity of topsoil to be stripped, we recommend that the topsoil thicknesses provided on the individual borehole logs be increased by 50 mm to account for variations and some stripping of the mineral soil below.

As noted in Section 2.0 of this report, mapping indicated the possible presence of peat, muck, and marl in the south portion of Site. While not encountered in the boreholes for this investigation, there is potential these materials are present in the treed areas where drill access was not possible. If encountered, peat, muck, and marl deposits must also be removed from below proposed development areas.

Pinchin recommends that any engineered fill required at the Site be compacted in accordance with the criteria stated in the following table:

Type of Engineered Fill	Maximum Loose Lift Thickness (mm)	Compaction Requirements	Moisture Content (Percent of Optimum)
Structural fill to support foundations and floor slabs	200	100% SPMDD	Plus 2 to minus 4
Subgrade fill beneath parking lots and access roadways	300	98% SPMDD	Plus 2 to minus 4

Prior to placing any fill material at the Site, the bedrock and/or subgrade soil should be inspected by a qualified geotechnical engineer and loosened/soft pockets should be sub excavated and replaced with engineered fill. If work is carried out during very dry weather, water may have to be added to the material to improve compaction.

It is recommended that imported engineered fill comprise OPSS.MUNI 1010 Granular ‘B’ or Select Subgrade Material (SSM).

A qualified geotechnical engineering technician should be on site to observe fill placement operations and perform field density tests at random locations throughout each lift, to indicate the specified compaction is being achieved.

5.3 Open Cut Excavations and Anticipated Groundwater Management

It is anticipated that excavations will extend upwards of 3.0 mbgs to accommodate the proposed basement levels. As such, bedrock removal will be required for the proposed development.

Based on the subsurface information obtained from within the boreholes, it is anticipated that the excavated material will consist of organics, glacial till, and bedrock. Groundwater was not encountered within the boreholes and is not expected to be encountered in the overburden material during excavations. It is noted that the boreholes did not advance into the bedrock; as such, there is a potential for groundwater to be encountered during excavations into the bedrock.

Where workers must enter trench excavations deeper than 1.2 m, the trench excavations should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91, Construction Projects, July 1, 2011, Part III - Excavations, Section 226. Alternatively, the excavation walls may be supported by either closed shoring, bracing, or trench boxes complying with sections 235 to 239 and 241 under O. Reg. 231/91, s. 234(1). The use of trench boxes can most likely be used for temporary support of vertical side walls. The appropriate trench should be designed/confirmed for use in this soil deposit.

Based on the OHSA, the natural subgrade soil would be classified as Type 3 soil and temporary excavations in these soils must be sloped at an inclination of 1 horizontal to 1 vertical (H to V) from the base of the excavation.

The upper approximate 1.5 m of bedrock in this area is typically weathered and can usually be removed with mechanical equipment, such as a large excavator and hydraulic hammer (hoe ram) and where required, with line drilling on close centres. Often a hydraulic hammer can be utilized to create an initial opening for the excavator bucket to gain access of the layered rock. The bedrock is known to contain vertical joints and near horizontal bedding planes. Therefore, some vertical and horizontal over break of the bedrock should be expected.

Depending on the ability of the mechanical equipment to advance through the bedrock, drilling and blasting may be required. It is often difficult to blast “neat” lines using conventional drilling and blasting procedures, as such, problems with “over break” are common. This may affect quantities claimed by the contractor for rock excavations, as well as the potential for off-site disposal of the blasted rock, if necessary. Allowances should be made for over break conditions. Due consideration should also be given to controlled blasting procedures to prevent potential damage to the surrounding environment.

In addition, we recommend that a pre-blast survey of all neighbouring properties be undertaken prior to conducting drilling and blasting activities. The preconstruction survey will serve to protect the Client from claims unrelated to the construction activities in the development of this property.

Pinchin notes that, local contractors are familiar with excavating the local bedrock and have specialized knowledge and techniques for its removal. Depending on the block size and degree of weathering of the rock they may have a different approach than what is presented in the preceding paragraphs.

Construction slopes in intact bedrock should stand near vertical provided the “loose” rock is properly scaled off the face. Once the blasting is completed, if there are any permanent bedrock shear walls, they will have to be reviewed by a Rock Mechanics Specialist to determine if it is stable or if it needs reinforcing, such as rock bolting.

In addition to compliance with the OHSA, the excavation procedures must also comply to any potential other regulatory authorities, such as federal and municipal safety standards.

As previously mentioned, no groundwater was encountered within the overburden deposits; however, depending on the depth of excavation into the bedrock, there is a potential for groundwater to be encountered during excavations into the bedrock. It is believed that this groundwater inflow can be controlled using a gravity dewatering system with perimeter interceptor ditches and high-capacity pumps. It is noted that once the final grades have been set, Pinchin should review this recommendation and revise as necessary.

Seasonal variations in the water table should be expected, with higher levels occurring during wet weather conditions in the spring and fall and lower levels occurring during dry weather conditions. If construction commences during wet periods (typically spring or fall), there is a greater potential that the groundwater elevation could be higher and/or perched groundwater may be present. Any potential inflow of perched groundwater should be able to be controlled from pumping from filtered sumps.

Prior to commencing excavations, it is critical that all existing surface water and potential surface water is controlled and diverted away from the Site to prevent infiltration and subgrade softening. At no time should excavations be left open for a period that will expose them to precipitation and cause subgrade softening.

All collected water is to discharge a sufficient distance away from the excavation to prevent re-entry. Sediment control measures, such as a silt fence should be installed at the discharge point of the dewatering system. The utmost care should be taken to avoid any potential impacts on the environment.

It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater elevation at the time of construction. The method used should not adversely impact any nearby structures. Excavations to conventional design depths for the building foundations are not expected to require a Permit to Take Water or a submission to the Environmental Activity and Sector Registry (EASR). It is the responsibility of the contractor to make this application if required.

5.4 Foundation Design

5.4.1 Discussion

The following geotechnical foundation design recommendations are to be utilized for the proposed single family residential dwellings only. Should any commercial buildings or higher density residential buildings (i.e., multi-storey apartment building) be proposed for the development, they may require additional geotechnical investigation work to be completed once the proposed development and building designs have been finalized.

Foundations may be designed using the recommendations in the following sections of this report. Part 9 of the Ontario Building Code (2012) should be followed related to design aspects not covered below.

5.4.2 Shallow Foundations Bearing on Bedrock

For conventional shallow strip and spread footings established approximately 3.0 mbgs on the probable bedrock surface, a factored geotechnical bearing resistance of 500 kPa may be used at Ultimate Limit States (ULS) design. Prior to installing foundation formwork, the bedrock is to be reviewed by a geotechnical engineer. SLS does not apply to foundations bearing directly on bedrock, since the loads required for unacceptable settlements to occur would be much larger than the factored ULS and would be limited to the elastic compression of the bedrock and concrete.

The bearing resistance of 500 kPa assumes the bedrock is cleaned of all overburden material and any loose rock pieces. The bedrock should be cleaned with air or water pressure exposing clean sound bedrock. If construction proceeds during freezing weather conditions water should not be allowed to pool and freeze in bedrock depressions. All concrete should be installed and maintained above freezing temperatures as required by the concrete supplier.

The bedrock is to be relatively level with slopes not exceeding 10 degrees from the horizontal. Where the bedrock slope exceeds 10 degrees from the horizontal and does not exceed 25 degrees from the horizontal, shear dowels can be incorporated into the design to resist sliding. Where rock slopes are steeper, the bedrock is to be levelled and stepped as required. The change in vertical height will be a function of the rock quality at the proposed foundation location and will need to be determined at the time of construction.

As an alternative to levelling the bedrock, where the bedrock surface is irregular and jagged, it may be more practical to provide a level benching over these areas by pouring lean mix concrete (minimum 10 MPa) prior to constructing the foundations. This decision is made on Site since each situation will depend on the Site-specific bedrock conditions.

5.4.3 Site Classification for Seismic Site Response & Soil Behaviour

The following information has been provided to assist the building designer from a geotechnical perspective only. These geotechnical seismic design parameters should be reviewed in detail by the structural engineer and be incorporated into the design as required.

The seismic site classification has been based on the 2012 OBC. The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the OBC. The site classification is based on the average shear wave velocity in the top 30 m of the site stratigraphy. If the average shear wave velocity is not known, the site class can be estimated from energy corrected Standard Penetration Resistance (N60) and/or the average undrained shear strength of the soil in the top 30 m.

The boreholes advanced at this Site extended to a maximum depth of approximately 0.6 mbgs where refusal was encountered on bedrock. As such, based on Table 4.1.8.4.A of the OBC, this Site has been classified as Class C. A Site Class C has an average shear wave velocity (Vs) of between 360 and 760 m/s.

5.4.4 Foundation Transition Zones

Where strip footings are founded at different elevations, the subgrade soil is to have a maximum slope of 2 H to 1 V, with the concrete footing having a maximum rise of 600 mm and a minimum run of 600 mm between each step, as detailed in the 2012 Ontario Building Code (OBC). The lower footing should be installed first to mitigate the risk of undermining the upper footing.

Individual spread footings are to be spaced a minimum distance of one and a half times the largest footing width apart from each other to avoid stress bulb interaction between footings. This assumes the footings are at the same elevation.

5.4.5 Estimated Settlement

All individual spread footings should be founded on bedrock, reviewed, and approved by a licensed geotechnical engineer.

Foundations installed in accordance with the recommendations outlined in the preceding sections are not expected to exceed total settlements of 25 mm and differential settlements of 19 mm.

All foundations are to be designed and constructed to the minimum widths as detailed in the 2012 OBC.

5.4.6 Shallow Foundations Frost Protection

In the Almonte, Ontario area, exterior perimeter foundations require a minimum of 1.8 m of soil cover above the underside of the footing to provide soil cover for frost protection.

It is noted that for foundations established on well-draining bedrock (i.e., no ponding adjacent to the foundation), frost protection is not required. This decision is typically made on Site since each situation will depend on Site specific bedrock conditions.

Where the foundations do not have the minimum 1.8 m of soil cover frost protection, and frost protection is required, they should be protected from frost with a combination of soil cover and rigid polystyrene insulation, such as Dow Styrofoam or equivalent product. If required, Pinchin can provide appropriate foundation frost protection recommendations as part of the design review.

If the foundations are not bearing on bedrock, any trees proposed to be planted at the Site are to be planted a minimum of 3 m from the foundation walls.

5.5 Basement Design

It is understood that the residential houses will each possess one basement level, with the underside of the footings being located approximately 3.0 mbgs. As previously mentioned, groundwater was not encountered during the field investigation; however, there is a potential for groundwater to be encountered during bedrock removal. As such, Pinchin recommends that the buildings be constructed with exterior perimeter foundation drains. If high rates of groundwater inflow are encountered above the design basement floor level, the basement floor will need to be raised, or additional design will be needed to ensure dry basements.

To minimize potential frost movements from soil frost adhesion, the perimeter foundation backfill should consist of a free draining granular material, such as a Granular ‘B’ Type I (OPSS 1010) or an approved sand fill, extending a minimum lateral distance of 600 mm beyond the foundation. The existing glacial till material is not considered suitable for reuse as foundation wall backfill. All backfill material is to be placed in maximum 300 mm thick lifts compacted to a minimum of 100% SPMDD in hard landscaping areas and 95% SPMDD in soft landscaping areas. It is recommended that inspection and testing be carried out during construction to confirm backfill quality, thickness and to ensure compaction requirements are achieved.

The foundation drains should consist of a minimum 150 mm diameter fabric wrapped perforated drainage tile surrounded by 19 mm diameter clear stone (OPSS 1004) with a minimum cover of 150 mm on top and sides and 50 mm below the drainage tile. Since the natural soil contains a significant amount of silt sized particles, the clear stone gravel should be wrapped in a non-woven geotextile (Terrafix 270R or

equivalent). The water collected from the weeping tile should be directed away from the building to appropriate drainage areas; either through gravity flow or interior sump pump systems. All subsurface walls should be waterproofed.

To assist in maintaining the building dry from surface water seepage, it is recommended that exterior grades around the buildings be sloped away at a 2% gradient or more, for a distance of at least 2.0 m. Roof drains should discharge a minimum of 1.5 m away from the structure to a drainage swale or appropriate storm drainage system.

The foundation walls must also be designed to resist lateral earth pressure. Depending on the design of the building the earth pressure computations must consider the groundwater level at the Site. For calculating the lateral earth pressure, the coefficient of at-rest earth pressure (K_0) may be assumed at 0.5 for non-cohesive sandy soil. The bulk unit weight of the retained backfill may be taken as 20 kN/m^3 for well compacted soil. An appropriate factor of safety should be applied.

5.6 Lower-Level Concrete Floor Slabs

Prior to the installation of the engineered fill material, all organics and deleterious materials should be removed to the underlying bedrock surface.

The underlying bedrock surface is considered adequate for the support of a concrete floor slab provided it is inspected and approved by an experienced geotechnical engineering consultant.

Based on the in-situ conditions, it is recommended to establish a concrete floor slab-on-grade on a minimum 200 mm thick layer of Granular ’A’ (OPSS 1010). The purpose of the Granular ’A’ is mainly to provide a level surfaced for the concrete formwork. Alternatively, consideration may also be given to using a 200 mm thick layer of uniformly compacted 19 mm clear stone. Any required up-fill should consist of a Granular ‘B’ Type I or Type II (OPSS 1010).

The following table provides the unfactored modulus of subgrade reaction values:

Material Type	Modulus of Subgrade Reaction (kN/m^3)
Granular A (OPSS 1010)	85,000
Granular “B” Type I (OPSS 1010)	75,000
Granular “B” Type II (OPSS 1010)	85,000
Glacial Till	30,000

The values in the table above are for loaded areas of 0.3 m by 0.3 m.

5.7 Asphaltic Concrete Pavement Structure Design for Municipal Roadway

5.7.1 Discussion

It is understood that the proposed subdivision will include a new municipal roadway. The in-situ bedrock and glacial till are considered sufficient bearing materials for an asphaltic concrete pavement structure provided all organics and deleterious materials are removed prior to installing the engineered fill material.

At this time Pinchin is unaware of the proposed final grades for the driveways and municipal roadways. As such, provided the pavement structure overlies the in-situ glacial till and/or bedrock, the following pavement structure is recommended.

5.7.2 Pavement Structure

The following table presents the minimum specifications for a flexible asphaltic concrete pavement structure:

Pavement Layer	Compaction Requirements	Minimum Layer Thickness
Surface Course Asphaltic Concrete HL-3 (OPSS 1150)	92% MRD as per OPSS 310	40 mm
Binder Course Asphaltic Concrete HL-8 (OPSS 1150)	92 % MRD as per OPSS 310	80 mm
Base Course: Granular “A” (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM-D698)	150 mm
Subbase Course: Granular “B” Type I or II (OPSS 1010)	100% Standard Proctor Maximum Dry Density (ASTM D698)	450 mm

Notes:

I. Prior to placing the pavement structure, the subgrade soil is to be proof rolled with a smooth drum roller without vibration to observe weak spots and the deflection of the soil; and

II. The recommended pavement structure may have to be adjusted according to the City of Almonte standards. Also, if construction takes place during times of substantial precipitation and the subgrade soil becomes wet and disturbed, the granular thickness may have to be increased to compensate for the weaker subgrade soil. In addition, the granular fill material thickness may have to be temporarily increased to allow heavy construction equipment to access the Site, in order to avoid the subgrade from “pumping” up into the granular material.

Performance grade PG 58-28 asphaltic concrete should be specified for Marshall mixes.

5.7.3 Pavement Structure Subgrade Preparation and Granular up Fill

The proper placement of base and subbase fill materials becomes very important in addressing the proper load distribution to provide a durable pavement structure.

The pavement subgrade materials should be thoroughly proof-rolled prior to placement of the Granular ‘B’ subbase course. If any unstable areas are noted, then the Granular ‘B’ thickness may need to be increased to support pavement construction traffic. This should be left as a field decision by a qualified

geotechnical engineer at the time of construction, but it is recommended that additional Granular 'B' be carried as a provisional item under the construction contract.

Where fill material is required to increase the grade to the underside of the pavement structure it should consist of Granular 'B' Type I (OPSS 1010). The up-fill material is to be placed in maximum 300 mm thick lifts compacted to 98% SPMDD within 4% of the optimum moisture content.

Samples of both the Granular 'A' and Granular 'B' Type I aggregates should be tested for conformance to OPSS 1010 prior to utilization on Site and during construction. All stockpiled material should be protected from deleterious materials, additional moisture and be kept from freezing.

Post compaction settlement of fine-grained soil can be expected, even when placed to compaction specifications. As such, fill material should be installed as far in advance as possible before finishing the municipal roadway and driveways for best grade integrity.

Where the subgrade material types differ below the underside of the pavement structure, the transition between the materials should be sloped as per frost heave taper OPSD 205.60.

5.7.4 Drainage

Control of surface water is a critical factor in achieving good pavement structure life. The pavement thickness designs are based on a drained pavement subgrade via sub-drains or ditches. As such, Pinchin recommends that pavement subdrains be installed along the edges of the roadway and be connected to catch basins or drainage ditches.

The surface of the roadways should be free of depressions and be sloped at a minimum grade of 1% in order to drain to appropriate drainage areas. Subgrade soil should slope a minimum of 3% toward stormwater collection points. Positive slopes are very important for the proper performance of the drainage system. The granular base and subbase materials should extend horizontally to any potential ditches or swales.

In addition, routine maintenance of the drainage systems will assist with the longevity of the pavement structure. Ditches, culverts, and catch basins should be regularly cleared of debris and vegetation.

6.0 SLOPE STABILITY

During the Site visit to complete the borehole drilling, Pinchin did not identify any slopes that would be cause for further investigation or could potentially fail during the development of the property.

It is anticipated that some slopes could be created as part of area grading to develop the Site. Pinchin notes that finished slopes less steep than 3 Horizontal to 1 Vertical are typically stable, provided the soils

comprise natural mineral soils and there is no groundwater seepage. Proposed final grades throughout the Site should be reviewed by a Geotechnical engineer to ensure compliance with this report.

7.0 SITE SUPERVISION & QUALITY CONTROL

It is recommended that all geotechnical aspects of the project be reviewed and confirmed under the appropriate geotechnical supervision, to routinely check such items. This includes but is not limited to inspection and confirmation of the cleaned bedrock surface prior to subgrade preparation, pouring any foundations or footings, backfilling, or engineered fill installation to ensure that the actual conditions are not markedly different than what was observed at the borehole locations and geotechnical components are constructed as per Pinchin's recommendations. Compaction quality control of engineered fill material (full-time monitoring) is recommended as standard practice, as well as regular sampling and testing of aggregates and concrete, to ensure that physical characteristics of materials for compliance during installation and satisfies all specifications presented within this report.

8.0 TERMS AND LIMITATIONS

This Geotechnical Investigation was performed for the exclusive use of 1503948 Ontario Inc. (Client) in order to evaluate the subsurface conditions at 9243 McArton Road, Almonte, Ontario. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practises in the field of geotechnical engineering for the Site. Classification and identification of soil, and geologic units have been based upon commonly accepted methods employed in professional geotechnical practice. No warranty or other conditions, expressed or implied, should be understood. Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations.

Performance of this Geotechnical Investigation to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the subgrade soil at the Site, and recognizes reasonable limits on time and cost.

Regardless how exhaustive a Geotechnical Investigation is performed; the investigation cannot identify all the subsurface conditions. Therefore, no warranty is expressed or implied that the entire Site is representative of the subsurface information obtained at the specific locations of our investigation. If during construction, subsurface conditions differ from then what was encountered within our test location and the additional subsurface information provided to us, Pinchin should be contacted to review our recommendations. This report does not alleviate the contractor, owner, or any other parties of their respective responsibilities.

This report has been prepared for the exclusive use of the Client and their authorized agents. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

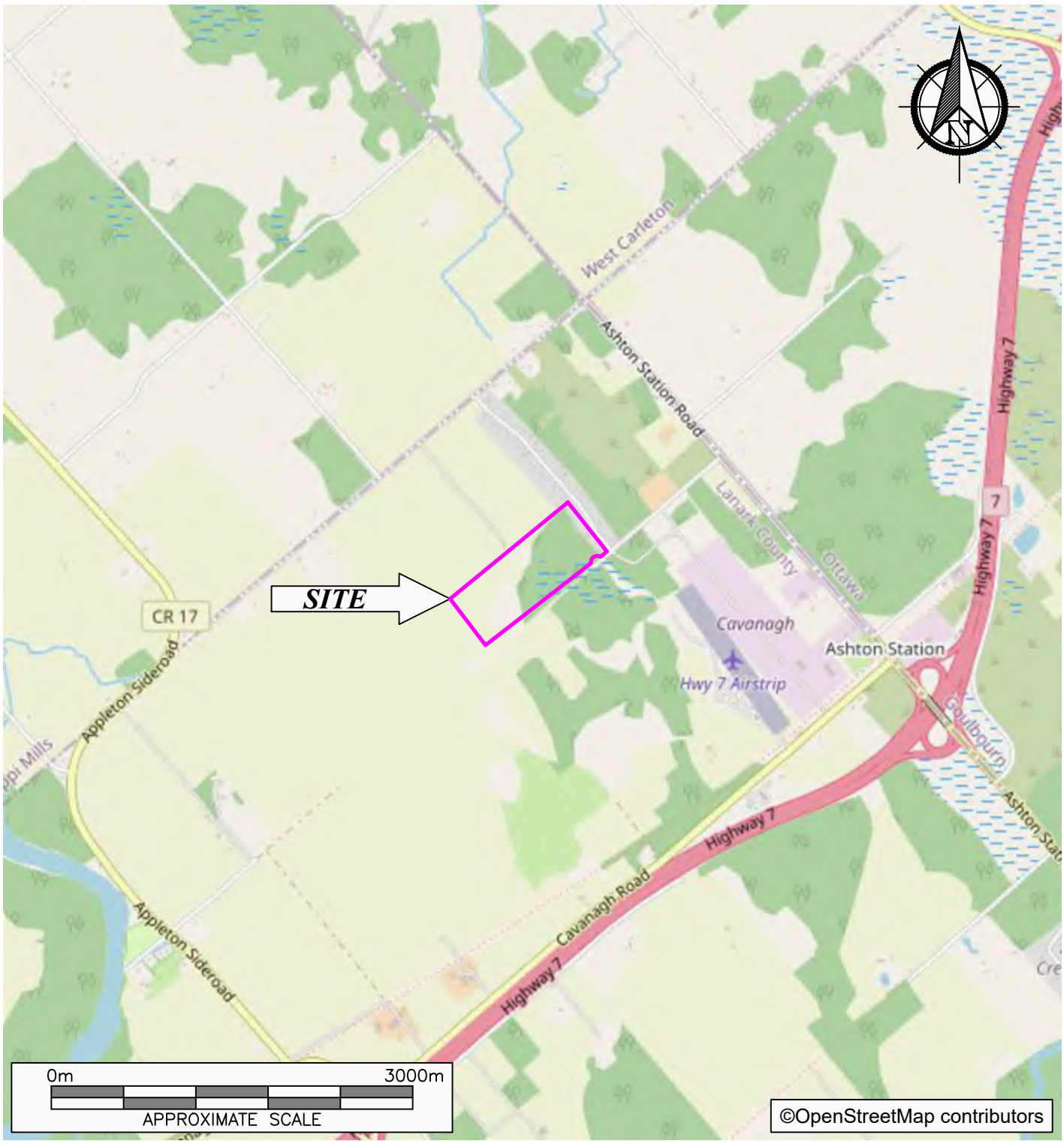
The liability of Pinchin or our officers, directors, shareholders or staff will be limited to the lesser of the fees paid or actual damages incurred by the Client. Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered (Claim Period), to commence legal proceedings against Pinchin to recover such losses or damage unless the laws of the jurisdiction which governs the Claim Period which is applicable to such claim provides that the applicable Claim Period is greater than two years and cannot be abridged by the contract between the Client and Pinchin, in which case the Claim Period shall be deemed to be extended by the shortest additional period which results in this provision being legally enforceable.

Pinchin makes no other representations whatsoever, including those 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 these interpretations may change over time. Please refer to Appendix IV, Report Limitations and Guidelines for Use, which pertains to this report.

Specific limitations related to the legal and financial and limitations to the scope of the current work are outlined in our proposal, the attached Methodology and the Authorization to Proceed, Limitation of Liability and Terms of Engagement which accompanied the proposal.

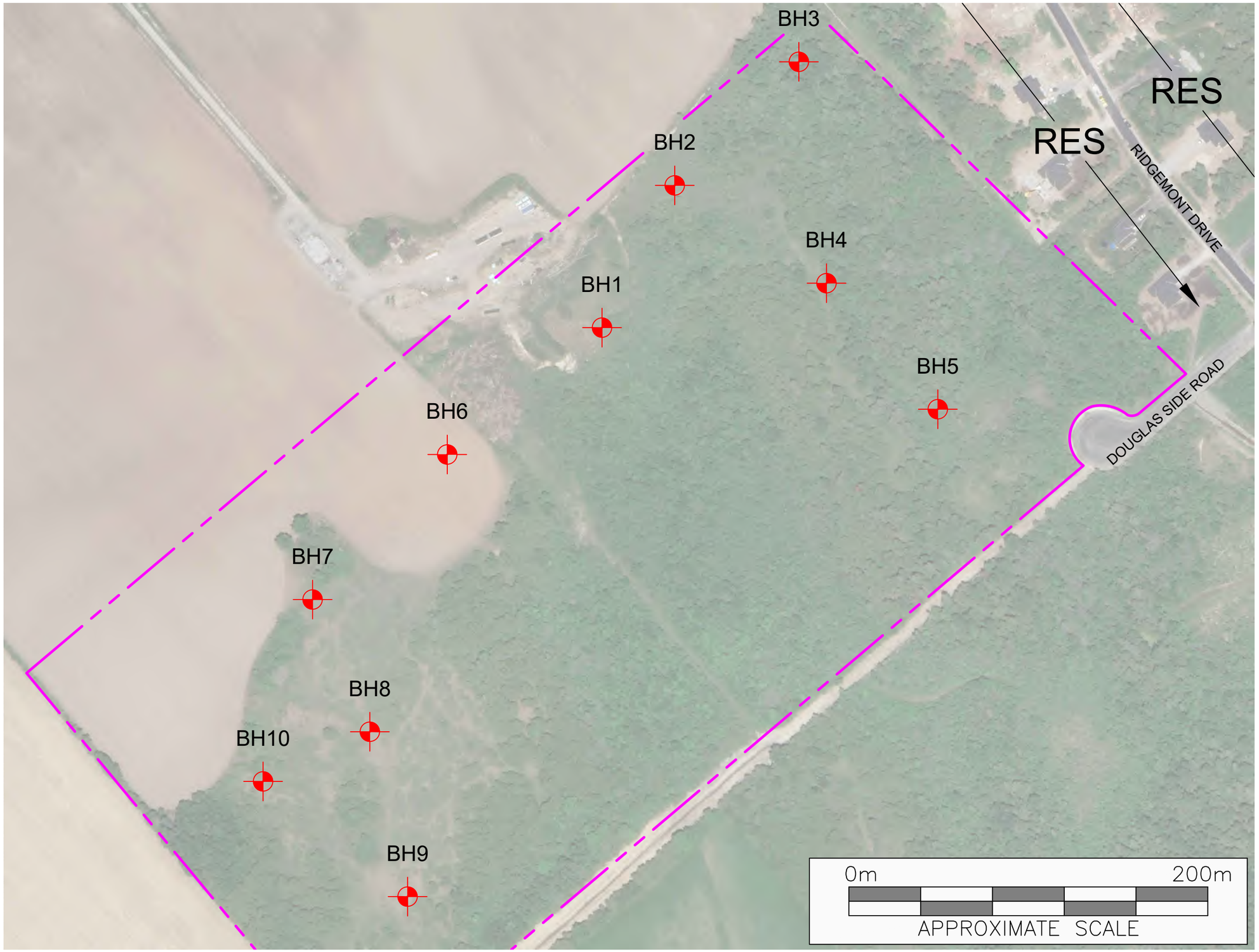
Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

FIGURES



PINCHIN

PROJECT NAME: GEOTECHNICAL INVESTIGATION			
CLIENT NAME: 1503948 ONTARIO INC.			
PROJECT LOCATION: 9243 MCARTON ROAD, ALMONTE, ONTARIO			
FIGURE NAME: KEY MAP			FIGURE NO.: 1
APPROXIMATE SCALE: AS SHOWN	PROJECT NO.: 283258.002	DATE: JANUARY 2025	



LEGEND

BOREHOLE LOCATION

ALL SITE FEATURES AND TESTING LOCATIONS ARE BASED ON FIELD OBSERVATIONS AND SHOULD BE CONSIDERED APPROXIMATE.

PINCHIN

PROJECT NAME

GEOTECHNICAL INVESTIGATION

CLIENT NAME

GILLIAN ESPIE

PROJECT LOCATION

9243 MCARTON ROAD,
BECKWITH TOWNSHIP, ONTARIO

FIGURE NAME

BOREHOLE/MONITORING WELL LOCATION PLAN

APPROXIMATE SCALE	PROJECT NO.
AS SHOWN	283258.002
DATE	FIGURE NO.
JANUARY 2025	2

APPENDIX I

Abbreviations, Terminology and Principle Symbols used in Report and Borehole Logs

ABBREVIATIONS, TERMINOLOGY & PRINCIPAL SYMBOLS USED

Sampling Method

AS	Auger Sample	**w**	Washed Sample
SS	Split Spoon Sample	**HQ**	Rock Core (63.5 mm diam.)
ST	Thin Walled Shelby Tube	**NQ**	Rock Core (47.5 mm diam.)
BS	Block Sample	**BQ**	Rock Core (36.5 mm diam.)

In-Situ Soil Testing

Standard Penetration Test (SPT), "N" value is the number of blows required to drive a 51 mm outside diameter spilt barrel sampler into the soil a distance of 300 mm with a 63.5 kg weight free falling a distance of 760 mm after an initial penetration of 150 mm has been achieved. The SPT, "N" value is a qualitative term used to interpret the compactness condition of cohesionless soils and is used only as a very approximation to estimate the consistency and undrained shear strength of cohesive soils.

Dynamic Cone Penetration Test (DCPT) is the number of blows required to drive a cone with a 60 degree apex attached to "A" size drill rods continuously into the soil for each 300 mm penetration with a 63.5 kg weight free falling a distance of 760 mm.

Cone Penetration Test (CPT) is an electronic cone point with a 10 cm2 base area with a 60 degree apex pushed through the soil at a penetration rate of 2 cm/s.

Field Vane Test (FVT) consists of a vane blade, a set of rods and torque measuring apparatus used to determine the undrained shear strength of cohesive soils.

Soil Descriptions

The soil descriptions and classifications are based on an expanded Unified Soil Classification System (USCS). The USCS classifies soils on the basis of engineering properties. The system divides soils into three major categories; coarse grained, fine grained and highly organic soils. The soil is then subdivided based on either gradation or plasticity characteristics. The classification excludes particles larger than 75 mm. To aid in quantifying material amounts by weight within the respective grain size fractions the following terms have been included to expand the USCS:

Soil Classification		Terminology	Proportion
Clay	< 0.002 mm		
Silt	0.002 to 0.06 mm	“trace”, trace sand, etc.	1 to 10%
Sand	0.075 to 4.75 mm	“some”, some sand, etc.	10 to 20%
Gravel	4.75 to 75 mm	Adjective, sandy, gravelly, etc.	20 to 35%
Cobbles	75 to 200 mm	And, and gravel, and silt, etc.	>35%
Boulders	>200 mm	Noun, Sand, Gravel, Silt, etc.	>35% and main fraction

Notes:

- Soil properties, such as strength, gradation, plasticity, structure, etcetera, dictate the soils engineering behaviour over grain size fractions; and
- With the exception of soil samples tested for grain size distribution or plasticity, all soil samples have been classified based on visual and tactile observations. The accuracy of visual and tactile observation is not sufficient to differentiate between changes in soil classification or precise grain size and is therefore an approximate description.

The following table outlines the qualitative terms used to describe the compactness condition of cohesionless soil:

Cohesionless Soil	
Compactness Condition	**SPT N-Index (blows per 300 mm)**
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

The following table outlines the qualitative terms used to describe the consistency of cohesive soils related to undrained shear strength and SPT, N-Index:

Cohesive Soil		
Consistency	**Undrained Shear Strength (kPa)**	**SPT N-Index (blows per 300 mm)**
Very Soft	<12	<2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

Note: Utilizing the SPT, N-Index value to correlate the consistency and undrained shear strength of cohesive soils is only very approximate and needs to be used with caution.

Soil & Rock Physical Properties

General

W Natural water content or moisture content within soil sample

γ Unit weight

γ' Effective unit weight

γ_d Dry unit weight

γ_{sat} Saturated unit weight

ρ Density

ρ_s Density of solid particles

ρ_w Density of Water

ρ_d Dry density

ρ_{sat} Saturated density e Void ratio

n Porosity

S_r Degree of saturation

E_{50} Strain at 50% maximum stress (cohesive soil)

Consistency

W_L	Liquid limit
W_P	Plastic Limit
I_P	Plasticity Index
W_S	Shrinkage Limit
I_L	Liquidity Index
I_C	Consistency Index
e_{max}	Void ratio in loosest state
e_{min}	Void ratio in densest state
I_D	Density Index (formerly relative density)

Shear Strength

C_u, S_u	Undrained shear strength parameter (total stress)
C'_d	Drained shear strength parameter (effective stress)
r	Remolded shear strength
τ_p	Peak residual shear strength
τ_r	Residual shear strength
ø’	Angle of interface friction, coefficient of friction = tan ø’

Consolidation (One Dimensional)

C_C	Compression index (normally consolidated range)
C_r	Recompression index (over consolidated range)
C_S	Swelling index
m_V	Coefficient of volume change
c_V	Coefficient of consolidation
T_V	Time factor (vertical direction)
U	Degree of consolidation
σ'_O	Overburden pressure
σ'_p	Preconsolidation pressure (most probable)
OCR	Overconsolidation ratio

Permeability

The following table outlines the terms used to describe the degree of permeability of soil and common soil types associated with the permeability rates**:**

Permeability (k cm/s)	Degree of Permeability	Common Associated Soil Type
$> 10^{-1}$	Very High	Clean gravel
10^{-1} to 10^{-3}	High	Clean sand, Clean sand and gravel
10^{-3} to 10^{-5}	Medium	Fine sand to silty sand
10^{-5} to 10^{-7}	Low	Silt and clayey silt (low plasticity)
$>10^{-7}$	Practically Impermeable	Silty clay (medium to high plasticity)

Rock Coring

Rock Quality Designation (RQD) is an indirect measure of the number of fractures within a rock mass, Deere et al. (1967). It is the sum of sound pieces of rock core equal to or greater than 100 mm recovered from the core run, divided by the total length of the core run, expressed as a percentage. If the core section is broken due to mechanical or handling, the pieces are fitted together and if 100 mm or greater included in the total sum**.**

RQD is calculated as follows:

$$\text{RQD (\%)} = \frac{\Sigma \text{ Length of core pieces} > 100 \text{ mm} \times 100}{\text{Total length of core run}}$$

The following is the Classification of Rock with Respect to RQD Value:

RQD Classification	RQD Value (%)
Very poor quality	**<25**
Poor quality	25 to 50
Fair quality	50 to 75
Good quality	75 to 90
Excellent quality	90 to 100

APPENDIX II

Pinchin's Borehole Logs

Log of Borehole: BH1

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20, 40, 60)	Shear Strength kPa (100, 200)	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 50 mm	0.00											
		Glacial Till Silty sand, some gravel, some clay, brown, damp, compact	0.05	No Monitoring Well Installed	SS	1	20	20						
		End of Borehole	0.30											
		Borehole terminated at 0.30 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH2

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 50 mm	0.00											
		Glacial Till Silty sand, some gravel, some clay, brown, damp, loose	0.05	No Monitoring Well Installed	SS	1	30	7	□		13.7			Hyd.
		End of Borehole	0.61											
		Borehole terminated at 0.61 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH3

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 75 mm	0.00											
		Glacial Till Silty sand, some gravel, some clay, brown, moist, loose	0.08	No Monitoring Well Installed	SS	1	20	7	□					
		End of Borehole	0.46											
		Borehole terminated at 0.46 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH4

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 75 mm	0.00	↑ No Monitoring Well Installed										
		Glacial Till Silty sand, some gravel, some clay, brown, damp, compact	0.08		SS	1	30	22	□					
		End of Borehole	0.30	↓										
		Borehole terminated at 0.30 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH5

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 50 mm	0.00											
		Glacial Till Silty sand, some gravel, some clay, brown, damp, compact	0.05	No Monitoring Well Installed	SS	1	50	26	□					
		End of Borehole	0.61											
		Borehole terminated at 0.61 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH6

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 75 mm	0.00	No Monitoring Well Installed										
		Glacial Till Gravelly, silty sand, trace clay, brown, damp, compact	0.08		SS	1	30	15	□		12.0			Hyd.
		End of Borehole	0.46											
		Borehole terminated at 0.46 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH7

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value □ 20 40 60 □	Shear Strength △ kPa △ 100 200	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 75 mm	0.00											
		Glacial Till Gravelly, silty sand, trace clay, brown, damp, compact	0.08	No Monitoring Well Installed	SS	1	40	15	□					
		End of Borehole Borehole terminated at 0.46 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.	0.46											
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH8

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20, 40, 60)	Shear Strength kPa (100, 200)	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 150 mm	0.00	No Monitoring Well Installed										
		Glacial Till Silty sandy gravel, trace clay, brown, damp, very dense	0.15		SS	1	80	95						
		End of Borehole	0.61											
		Borehole terminated at 0.61 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc. **Grade Elevation:** N/A

Drilling Method: Solid Stem Auger/Split Spoon **Top of Casing Elevation:** N/A

Well Casing Size: N/A **Sheet:** 1 of 1

Log of Borehole: BH9

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value (20, 40, 60)	Shear Strength kPa (100, 200)	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 75 mm	0.00	No MW Installed										
		Glacial Till Silty sandy gravel, trace clay, brown, damp, loose	0.08		SS	1	10	5	□		7.2			Hyd.
		End of Borehole	0.15											
		Borehole terminated at 0.15 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.												
1														

Contractor: Canadian Environmental Drilling and Contractors Inc.

Grade Elevation: N/A

Drilling Method: Solid Stem Auger/Split Spoon

Top of Casing Elevation: N/A

Well Casing Size: N/A

Sheet: 1 of 1

Log of Borehole: BH10

Project #: 283258.002 **Logged By:** MK

Project: Geotechnical Investigation

Client: 1503948 Ontario Inc.

Location: 9243 McArton Road, Almonte, ON

Drill Date: September 15, 2022 **Project Manager:** WT

SUBSURFACE PROFILE					SAMPLE									
Depth (m)	Symbol	Description	Elevation (m)	Monitoring Well Details	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Standard Penetration N-Value (□ 20 40 60 □)	Shear Strength (△ kPa △ 100 200)	Water Content (%)	Sample ID	Soil Vapour Concentration (ppm)	Laboratory Analysis
0		Ground Surface												
		Organics ~ 150 mm	0.00	No Monitoring Well Installed										
		Glacial Till Silty sandy gravel, trace clay, brown, damp, dense	0.15		SS	1	60	31	□					
		End of Borehole Borehole terminated at 0.46 mbgs due to auger refusal on probable bedrock. At drilling completion, groundwater was not encountered.	0.46											
1														

Contractor: Canadian Environmental Drilling and Contractors Inc.

Grade Elevation: N/A

Drilling Method: Solid Stem Auger/Split Spoon

Top of Casing Elevation: N/A

Well Casing Size: N/A

Sheet: 1 of 1

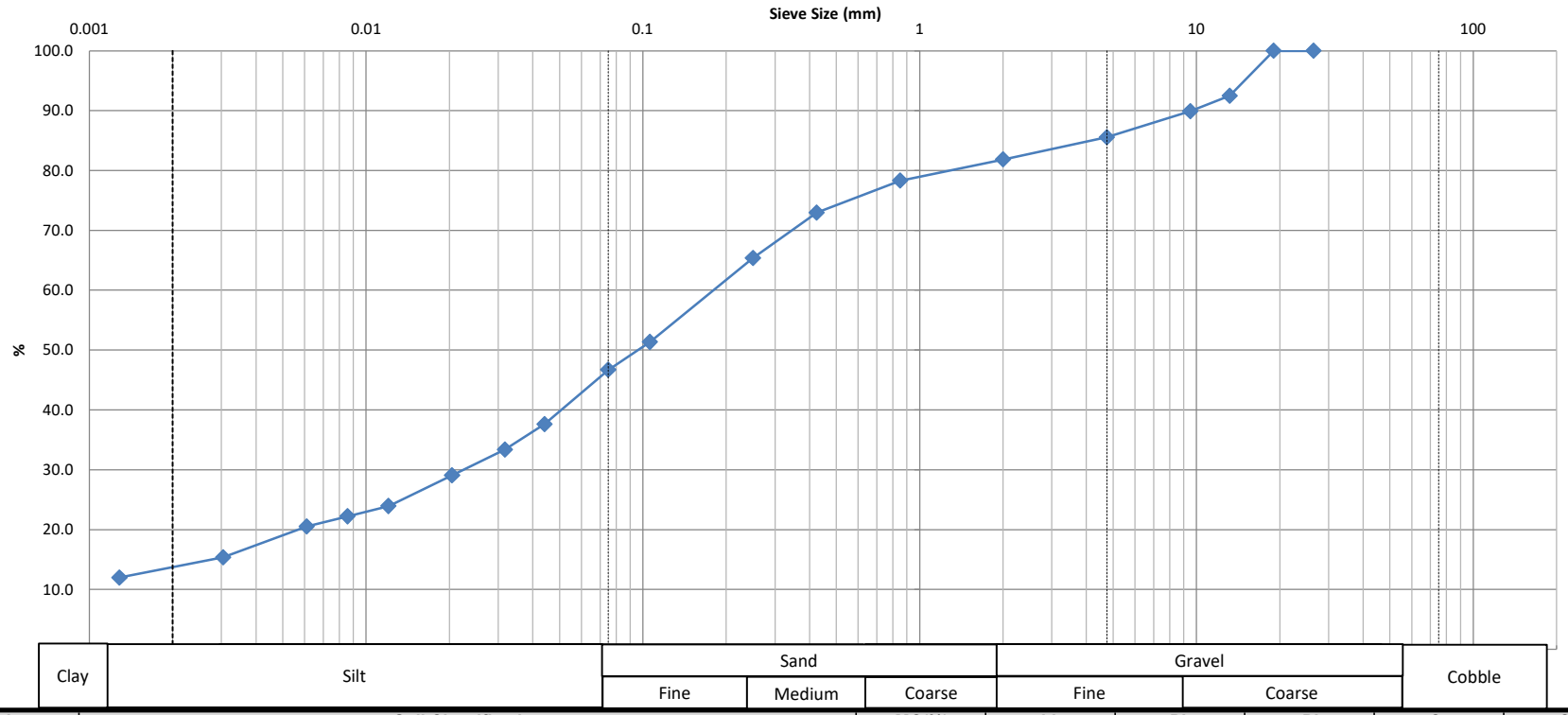
APPENDIX III

Laboratory Testing Reports for Soil Samples

patersongroup
consulting engineers

SIEVE ANALYSIS
ASTM C136

CLIENT:	Pinchin	DEPTH:	0'-2'	FILE NO:	PM4184
CONTRACT NO.:		BH OR TP No.:	2	LAB NO:	38493
PROJECT:	283258.002			DATE RECEIVED:	20-Sep-22
				DATE TESTED:	29-Sep-22
DATE SAMPLED:	15-Sep-22			DATE REPORTED:	4-Oct-22
SAMPLED BY:	Client			TESTED BY:	DK/CS



Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						13.7					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					14.4	38.9		33.2		13.5	

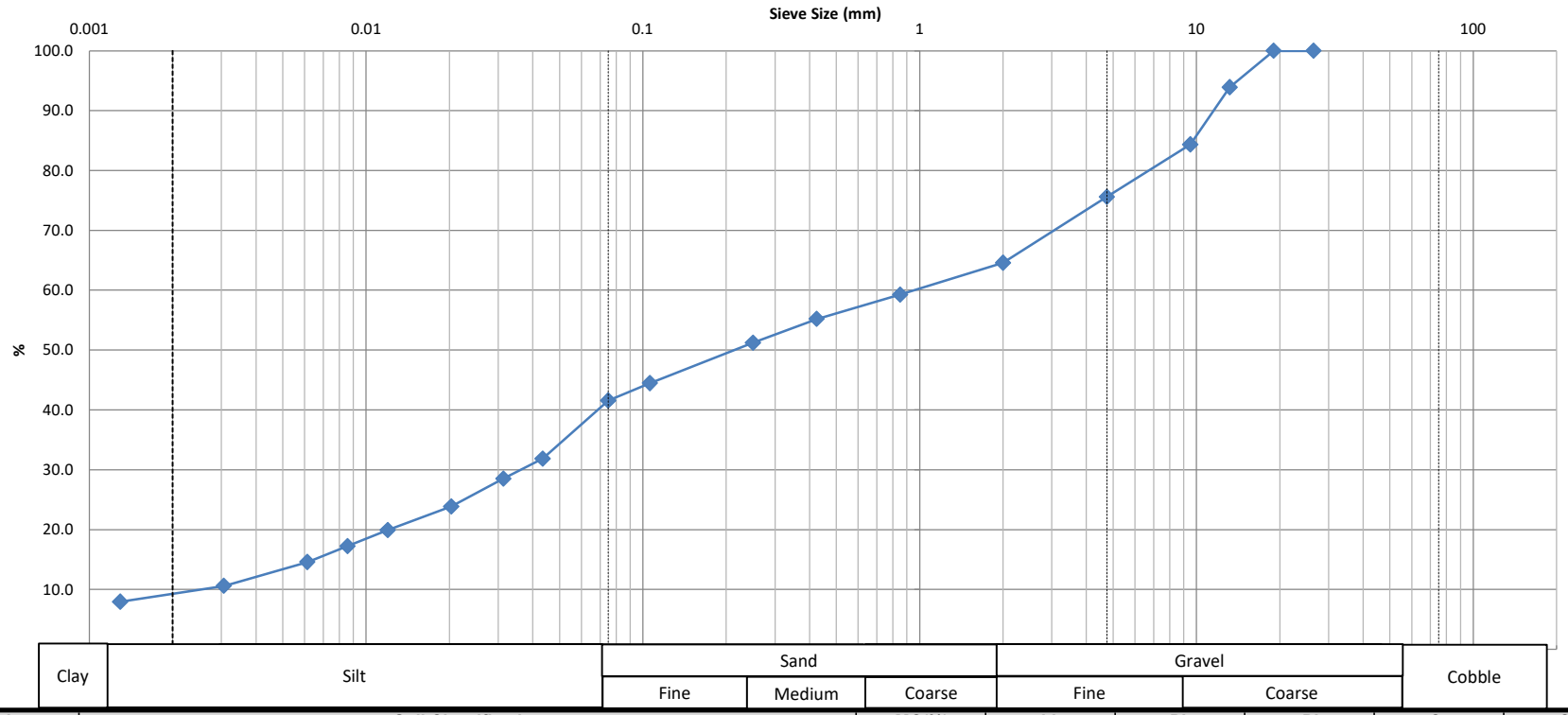
Comments:

REVIEWED BY:	Curtis Beadow	Joe Forsyth, P. Eng.

paterson group
consulting engineers

SIEVE ANALYSIS
ASTM C136

CLIENT:	Pinchin	DEPTH:	0'-2'	FILE NO:	PM4184
CONTRACT NO.:		BH OR TP No.:	6	LAB NO:	38492
PROJECT:	283258.002			DATE RECEIVED:	20-Sep-22
				DATE TESTED:	29-Sep-22
DATE SAMPLED:	15-Sep-22			DATE REPORTED:	4-Oct-22
SAMPLED BY:	Client			TESTED BY:	DK/CS



Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						12.0					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					24.4	34.0		32.1		9.5	

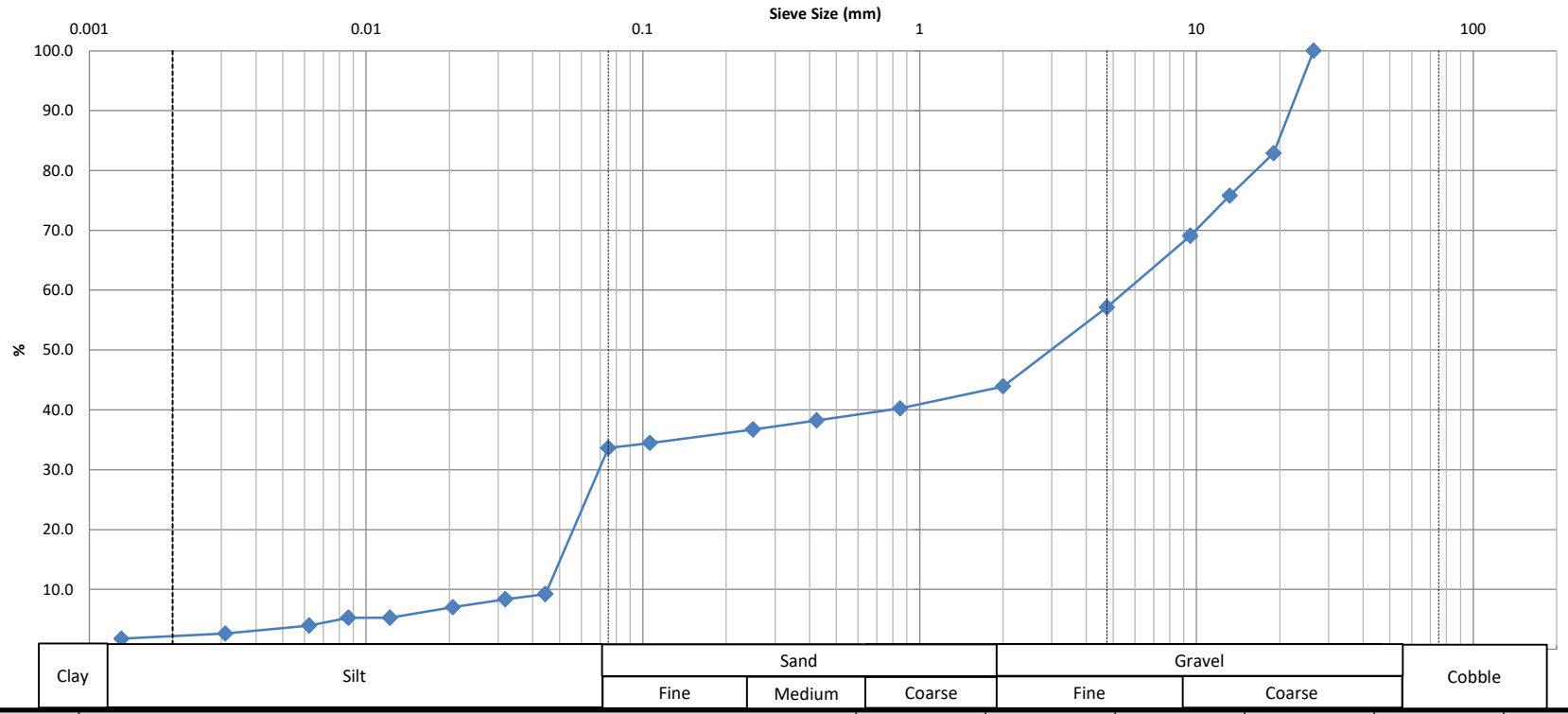
Comments:

REVIEWED BY:	Curtis Beadow	Joe Forsyth, P. Eng.

paterson group
consulting engineers

SIEVE ANALYSIS
ASTM C136

CLIENT:	Pinchin	DEPTH:	0'-2'	FILE NO:	PM4184
CONTRACT NO.:		BH OR TP No.:	BH9	LAB NO:	38494
PROJECT:	283258.002			DATE RECEIVED:	20-Sep-22
				DATE TESTED:	26-Sep-22
DATE SAMPLED:	15-Sep-22			DATE REPORTED:	29-Sep-22
SAMPLED BY:	Client			TESTED BY:	DK/CS



Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						7.2					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					42.8	23.5		32.2		1.5	

Comments:

REVIEWED BY:	Curtis Beadow	Joe Forsyth, P. Eng.

APPENDIX IV

Report Limitations and Guidelines for Use

REPORT LIMITATIONS & GUIDELINES FOR USE

This information has been provided to help manage risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report was prepared for the exclusive use of the Client and their authorized agents, subject to the conditions and limitations contained within the duly authorized work plan. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical report is based on the existing conditions at the time the study was performed, and Pinchin's opinion of soil conditions are strictly based on soil samples collected at specific test hole locations. The findings and conclusions of Pinchin's reports may be affected by the passage of time, by manmade events such as construction on or adjacent to the Site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations.

LIMITATIONS TO PROFESSIONAL OPINIONS

Interpretations of subsurface conditions are based on field observations from test holes that were spaced to capture a 'representative' snap shot of subsurface conditions. Site exploration identifies subsurface conditions only at points of sampling. Pinchin reviews field and laboratory data and then applies professional judgment to formulate an opinion of subsurface conditions throughout the Site. Actual subsurface conditions may differ, between sampling locations, from those indicated in this report.

LIMITATIONS OF RECOMMENDATIONS

Subsurface soil conditions should be verified by a qualified geotechnical engineer during construction. Pinchin should be notified if any discrepancies to this report or unusual conditions are found during construction.

Sufficient monitoring, testing and consultation should be provided by Pinchin during construction and/or excavation activities, to confirm that the conditions encountered are consistent with those indicated by the test hole investigation, and to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated. In addition, monitoring, testing and consultation by Pinchin should be completed to evaluate whether or not earthwork activities are completed in

accordance with our recommendations. Retaining Pinchin for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions. However, please be advised that any construction/excavation observations by Pinchin is over and above the mandate of this geotechnical evaluation and therefore, additional fees would apply.

MISINTERPRETATION OF GEOTECHNICAL ENGINEERING REPORT

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having Pinchin confer with appropriate members of the design team after submitting the report. Also retain Pinchin to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having Pinchin participate in pre-bid and preconstruction conferences, and by providing construction observation. Please be advised that retaining Pinchin to participation in any 'other' activities associated with this project is over and above the mandate of this geotechnical investigation and therefore, additional fees would apply.

CONTRACTORS RESPONSIBILITY FOR SITE SAFETY

This geotechnical report is not intended to direct the contractor's procedures, methods, schedule or management of the work Site. The contractor is solely responsible for job Site safety and for managing construction operations to minimize risks to on-Site personnel and to adjacent properties. It is ultimately the contractor's responsibility that the Ontario Occupational Health and Safety Act is adhered to, and Site conditions satisfy all 'other' acts, regulations and/or legislation that may be mandated by federal, provincial and/or municipal authorities.

SUBSURFACE SOIL AND/OR GROUNDWATER CONTAMINATION

This report is geotechnical in nature and was not performed in accordance with any environmental guidelines. As such, any environmental comments are very preliminary in nature and based solely on field observations. Accordingly, the scope of services do not include any interpretations, recommendations, findings, or conclusions regarding the, assessment, prevention or abatement of contaminants, and no conclusions or inferences should be drawn regarding contamination, as they may relate to this project. The term "contamination" includes, but is not limited to, molds, fungi, spores, bacteria, viruses, PCBs, petroleum hydrocarbons, inorganics, pesticides/insecticides, volatile organic compounds, polycyclic aromatic hydrocarbons and/or any of their by-products.

Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be held liable for damages resulting from the negligence of Pinchin. Pinchin will not be liable for any losses or damage if the Client has failed, within a period of two years following the date upon which the claim is discovered within the meaning of the Limitations Act, 2002 (Ontario), to commence legal proceedings against Pinchin to recover such losses or damage.