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PROJECT No.: SM 302489-G

April 28, 2022

CACHET DEVELOPMENT PARTNERS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Andrew Eldebs

**GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
41 PARK STREET WEST
CLIFFORD, ONTARIO**

Dear Mr. Eldebs,

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P302489, dated December 16, 2021. Our comments and recommendations based on our findings at the eight [8] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that it is proposed to acquire the subject lands located at 41 Park Street West in Stratford, Ontario, for the purpose of constructing a residential development consisting of single-family dwellings along asphalt paved roadways, including the installation of associated underground municipal services, as well as a stormwater management [SWM] pond. The purpose of this geotechnical investigation work is to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

This report is based on the above summarised project description and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design

with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover. Other than the limited background analytical testing completed, the environmental aspects of the site have not been commented on within this report.

2. PROCEDURE

A total of eight [8] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on February 24 and 25, 2022 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination depths of between approximately 2.1 to 8.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from borings. Selected samples were also subjected to laboratory grain size analyses and Atterberg Limits testing.

Upon completion of drilling, groundwater monitoring wells were installed at Borehole Nos. 1, 7, and 8 to allow for the future monitoring of the groundwater level. The monitoring wells consisted of 50-millimetre PVC pipe screened in the lower 1.5 to 3 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite 'hole plug' and fitted with a protective steel 'stick up' casing. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

Additionally, a total of five samples [5] selected samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background environmental testing for a standard panel of metals, pH and petroleum hydrocarbons [PHCs], including BTEX. The purpose of this testing was to assess the background environmental characteristics of the existing subsurface soils for comparison to the relevant Standards under Ontario

Regulation 406/19 [as amended] and provide preliminary comment regarding off-site disposal of surplus soil from the project. The results of this background analytical testing have been appended to the end of this report.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site and clearance of underground utilities. The ground surface elevation at the borehole locations have been interpolated based on the geodetic elevations noted on the J. D. Barnes topographic survey [Reference No. 22-40-505-00, dated February 23, 2022] which was forwarded onto our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory testes are in Log of Boreholes Nos. 1 to 8 inclusive following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is located at 41 Park Street West in Clifford, Ontario and consists predominantly of undeveloped agricultural land with a single-family, a barn, and other structures setback from Park Street West. The property is defined to the east by an old railway line that has been converted into a walking/biking trail, to the south and west by agricultural lands, and to the north by Park Street West, assuming an east-west orientation of Park Street West. The grade slopes down and away from Park Street West to the south and west.

The subsurface conditions encountered at the borehole locations are summarized as follows:

Topsoil

A surficial veneer of topsoil/organic disturbed material approximately 300 to 400 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view and does not necessarily reflect its nutrient content or its ability to support plant life. Given the current use of the property is for agricultural purposes the upper levels of the soils would be expected to have a reworked nature with

often times a variable depth of topsoil. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site.

Silty Sand

Native silty sand was encountered beneath the topsoil layer at all of the borehole locations. The fine grained granular soils were brown in colour, contained trace clay, trace to some gravel, with frequent cobbles. The native silty sand was noted to be in a generally loose to compact state, and was proven to depths of between approximately 2.3 to 3.2 metres below the existing ground surface within Borehole No. 1, 2, 4, 6, 7, and 8, and to termination at depths of approximately 2.3 metres below the existing ground surface at Borehole Nos. 3 and 5.

Clayey Silt/Clayey Sandy Silt

Native clayey silt/clayey sandy silt was encountered beneath the native silty sand at Borehole Nos. 1, 2, 4, 6, 7, and 8. The fine grained to cohesive soil was brown in colour, contained traces of, to frequent gravel, and was noted to contain rock fragments and/or cobbles at depth. A transition to grey was noted within Borehole Nos. 1, 7, and 8 at depths of between approximately 5.6 and 7.8 metres below the existing ground surface. The sand content throughout this layer was noted to vary considerably, resulting in pseudo layered structure of cohesive and cohesionless soil strata. The native clayey silt/clayey sandy silt was generally noted to be stiff to very stiff in consistency and was proven to termination at depths of approximately 3.7 to 8.2 metres below the existing ground surface where encountered.

Grain Size Analyses and Atterberg Limits

Grain size analyses and Atterberg limits were conducted on five [5] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH1 SS7	6.1 m	9	30	38	23	10^{-5}	20 to 30
BH4 SS3	3.0 m	23	45	17	15	10^{-7}	< 10
BH7 SS3	1.5 m	9	43	42	6	10^{-5}	20 to 30
BH8 SS3	3.0 m	9	36	37	18	10^{-5}	20 to 30
BH8 SS5	6.1 m	28	52	17	3	10^{-7}	< 10

TABLE B
ATTERBERG LIMITS

Sample ID	Depth	Plastic Limit	Liquid Limit	Plasticity Index
BH8 SS5	6.1 m	12.5	22.1	9.6

Note 1: Infiltration rate estimated using Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

The field and laboratory testing demonstrate the native soils in the upper levels to generally consist of a silty sand/sandy silt mixture with traces of clay, and trace to some gravel, transitioning to a relatively low permeability to effectively impermeable clayey silt/clayey sandy silt soil with trace to some gravel with depth. According to the Unified Soil Classification System (USCS), the upper clayey sand and silt soils are classified as S.M. – Silty sands, sand-silt mixtures to G.M. – Gravel-sand-silt mixtures, transitioning to soils classified as M.L. – Clayey silts with slight plasticity, inorganic silts and very fine sands, silty or clayey fine sands with depth.

The silt and sand deposit in the upper levels over the majority of the site would generally behave as a somewhat permeable material. On a preliminary basis, design infiltration rates on the order of 20 to 30 mm/hr would be available within the silt and sand deposit, however should be confirmed via specific in-situ infiltration testing if these soils are to be utilised for low impact development (LID) stormwater management systems.

The underlying clayey silt/clayey sandy silt deposit would behave as a relatively low permeability to effectively impermeable material, but would be highly frost susceptible. Additional testing would have to be conducted to more thoroughly assess such deposits, as well as potential use as a liner for the SWM pond.

General Soil Conditions

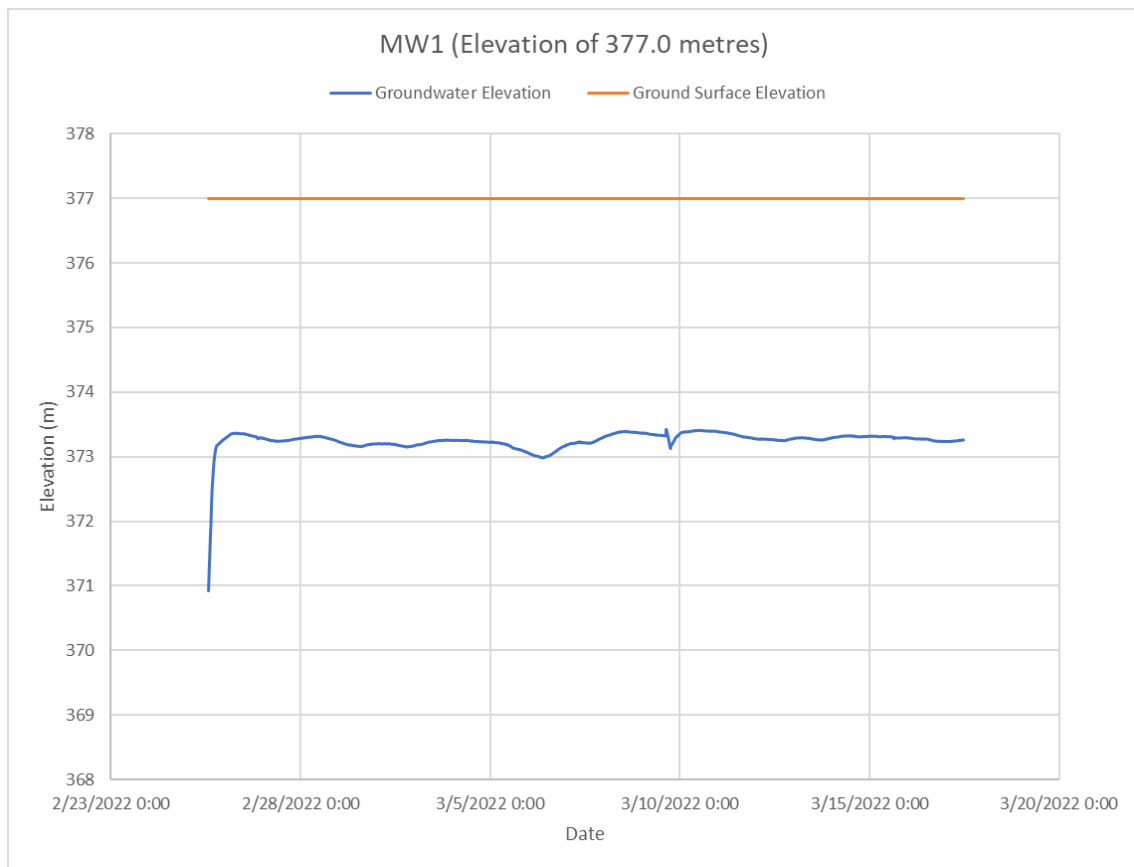
The soil is generally characterised by a silt and sand mixture in the upper approximate 2 to 3 metres, underlain by predominately clayey silt soils. The upper silt and sand layer would tend to have a somewhat permeable properties, however would be hindered by the underlying impermeable soils. In the event that LID stormwater management systems such as infiltration galleries or trenches are considered, the design infiltration rate should be confirmed via specific in-situ infiltration testing. As mentioned above, clayey silt/clayey sandy silt was encountered below the shallow silt and sand soils. This layer's composition was more variable with varying amounts of clay, silt and gravel, and contained frequent pockets of cobbles. Select portions of this material may be well suited for use as a line for the SWM pond, however more thorough investigation and testing would be required to confirm suitability.

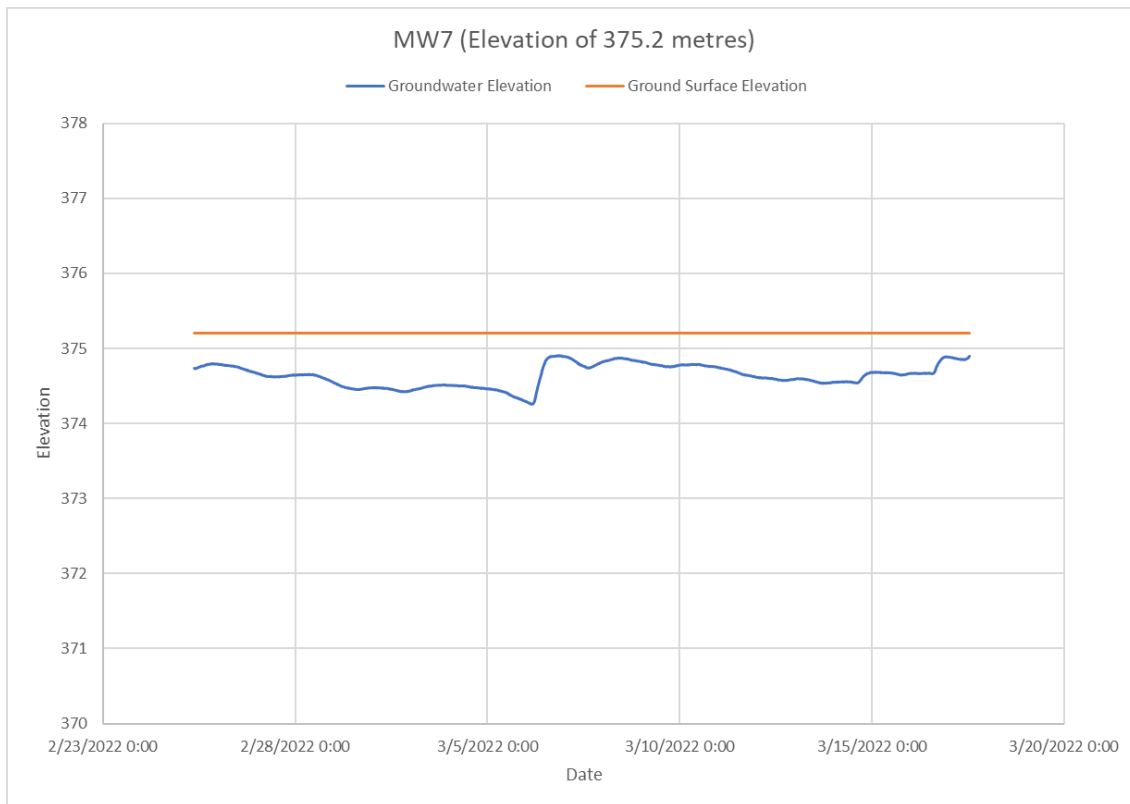
A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till and coarse-textured glaciolacustrine deposits of sand and gravel with minor silt and clay. The area is also known to contain pockets of river deposits. These conditions are consistent with our observations during drilling, encountering predominately silt and sand soils with clayey deposits at depth.

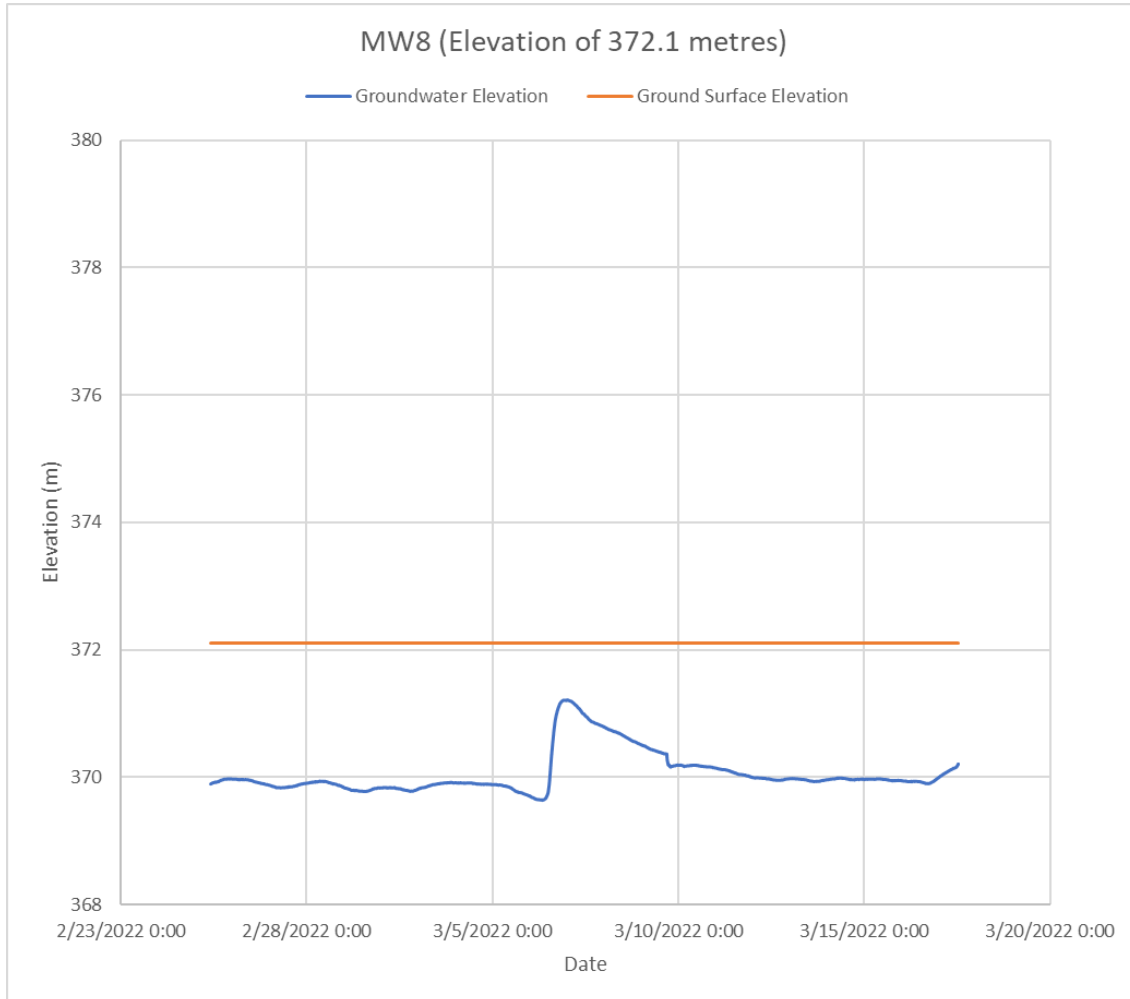
Groundwater Observations

Borehole Nos. 1, 7 and 8 were noted as being open and 'wet' at depths of between approximately 5.5 and 7.6 metres below the existing ground surface. Borehole No. 6 was noted have caved to a depth of approximately 5.5 metres and 'wet' at a depth of 4.6 metres below the existing ground surface upon completion of drilling. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole Nos. 1, 7, and 8, to allow for future measurements of the static groundwater level. A data logger was installed within the monitoring wells to allow for continuous monitoring of the groundwater level between February 25 and March 16 2021, the readings of which have been illustrated in the following graphs:







The groundwater level observed at these monitoring well locations indicate a groundwater level as shallow as 0.5 metres at Borehole No. 7 on the north side of the site, to as deep as 4 metres at Borehole No. 1 at the south end of the site. It is noted that the shallow levels observed may be influenced by 'perched' water deposits, permeable seams during wet weather, and an upward gradient on the groundwater at the greater depth, and are not necessarily reflective of the static groundwater level. Based on our observations during drilling and the groundwater levels as summarised above, the static groundwater level is estimated at depths on the order of 3 to 4 metres beneath the existing ground surface, however would be expected to fluctuate seasonally. Regardless, shallower 'perched' deposits within permeable soils above the relatively impermeable clayey soil would be expected across the site and should be anticipated.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of approximately 2 to 4 metres below the existing grade. Of course, this will be significantly influenced by the final grading of the site for proposed development, which once established should be forwarded onto our office for review. Excavations should be relatively straight forward, with sides slopes through the fine grained to slightly cohesive soils remaining stable for short construction periods at inclinations of up to 45 to 60 degrees to the horizontal. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of the excavation should be expected to 'slough in' to as flat as 3 horizontal to 1 vertical, or flatter. Such infiltration of water through the permeable seams, perched deposits, and from surface run off should be anticipated, especially during the 'wet' times of the year. However, for the anticipated excavations, such infiltration should be expected to be relatively slow, such that it should be readily controlled with typical construction dewatering methods i.e. pumping from sumps in the base of excavations, even for excavations extending slightly below the ground water level. Where excavations extend to greater depths, to and below the groundwater level, the rate of infiltration may be greater and additional pumping or more sophisticated dewatering methods may be required. Once preliminary grading plans have been established, it would be necessary to review and revise the recommendations of this report as warranted to best account for the groundwater conditions. It would be prudent to advance a series of test excavations in areas of proposed deep services/excavations to allow contractors to observe first hand how groundwater conditions may affect deep excavations.

Notwithstanding the above, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native clayey silt/clayey sandy silt and silty sand soils encountered would generally be considered a Type 2 to 3 soil, as outlined in the Ontario Health and Safety Act III – Excavation. Excavations sloped steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the preliminary groundwater level data suggests a groundwater level on the order of approximately 3 and 4 metres below the existing grade, though shallower 'perched' deposits should be anticipated across the site, especially during 'wet' times of the year. The majority of excavations are anticipated to be above the groundwater level, though this is subject to further review based on topographic and grading information. Regardless, some amount of construction dewatering should be anticipated, especially for excavations extending below the observed groundwater level and during the 'wet' times of the year. It should be possible, however, to control such infiltration with typical construction dewatering methods as noted above. The rate of infiltration for the short construction period is anticipated to be less than 50,000 L/day, and certainly less than 400,000 L/day, such that an EASR or PTTW would not be expected. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or Town of Minto/Wellington County should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the silty sand, and clayey silt/clayey sandy silt soil soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 percent of its standard Proctor optimum moisture content. Care should be taken to separate the shallower predominately sandy soils from the more cohesive soils encountered at depth to maintain their respective properties.

It is noted that the on-site soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. The silty sand soils may be moderately free draining, however should be not be used where this characteristic is required without additional testing. Such fine grained granular soils would be preferable over clayey soils in areas of restricted access such as against dwelling foundation walls or within building footprints.

The silty sand and clayey silt/clayey sandy silt soils encountered are generally considered to be near to slightly 'wet' of their standard Proctor optimum moisture content, with some noted 'wet' seams, especially in the lower levels of the silty sand deposit, and from below the estimated groundwater level. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these fine grained to cohesive soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long-term settlements due to the ingress of

groundwater and collapse of fill structure for long term settlement is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the soils be within 3 percent of its Proctor optimum moisture content placement and compaction to minimize long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 percent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. All structural fill should be compacted to 100 percent of its standard Proctor maximum dry density [SPMDD]. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 98 percent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc., in the native competent soils, stabilized where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if the compaction of the fill around these structures are not adequate, causing the settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to within 100 percent of its standard Proctor maximum dry density.

The thrust blocks in the native soils may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~3,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 percent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS.

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be sub excavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap' etc.] 'punched' into the soft areas. In severe cases where the subgrade is well wet to saturated and presenting significant instability, the provision of a stabilising geogrid or geofabric separator between subgrade and granular sub-base layers may be warranted. This assessment would be best made at the time of construction pending assessment of the subgrade, weather conditions, etc.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote the drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent the softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to the construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B' Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The proposed roadways through the residential subdivision would be required to adequately support cars, trucks, and intermittent delivery and garbage trucks. Where the roads are to be assumed by the Town of Minto, the pavement structure should conform to the relevant Town of Minto standards. For a typical local road, the Town of Minto standard is understood to consist of a minimum of 300 millimetres of OPSS Granular 'B' sub-base course, 150 millimetres of OPSS Granular 'A' base course, 50 millimetres of HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. This pavement structure anticipates the use of pit run, or Type I, Granular B material, which may be more readily available regionally. It is in our opinion that this design is suitable for use on a typical local residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base material is placed. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base course thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or Town of Minto requirements. This would typically be a minimum of 98% of Standard Proctor maximum dry density [SPMDD] for granular layers, and a minimum of 92% of Maximum Relative Density [MRD] for asphalt layers. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and racking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A

typical recommended light duty pavement structure for residential driveways would consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings below any fill, organic, organic, or otherwise unsuitable materials. This typically considers a nominal bearing capacity of 75 kPa [~1,500 psf], however bearing capacities of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete. Basement levels for dwellings should be limited to no more than about 2 to 2.5 metres below the existing grade to ensure sufficient separation from the estimated groundwater level. In the event that basement levels are proposed to extend below this depth, the advancement of additional test pits in these areas would be prudent to further assess the groundwater level relative to the proposed basement depths.

In the event that site grading work results in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. Soil import would need to be conducted in accordance with Ontario Regulation 406/19, including the preparation of a Fill Management Plan and associated tracking, confirmatory testing, etc. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for the variable support and loading conditions. The use of nominal reinforcement is considered good

construction practice as it will act to reduce the potential for cracking in the foundation walls due to settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimetres from the top of the foundation walls at a minimum depending on the ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

As noted above, the groundwater level is conservatively estimated at depths of approximately 3 to 4 metres below the existing ground surface. Based on our observations, it is estimated that the basement levels of the new dwellings would be above the estimated groundwater level. Regardless, all basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product.

All footings exposed to the environment must be provided with a minimum of 1.2 metres of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single-family dwellings, including the installation of associated underground municipal services along asphalt paved roadways, as well as a SWM pond at the northeast corner of the site. Excavations for the proposed underground services and foundations are expected to extend to depths of up to approximately 2 to 4 metres below the existing ground surface. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 3 to 4 metres below the existing ground surface, however 'perched' water deposits may exist within the more permeable silt and sand material.

The short-term excavations for the proposed servicing are generally anticipated to extend through the upper layer of silt and sand and into the clayey silt/clayey sandy silt material, generally above, however may extend slightly into the observed groundwater levels. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possible to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly less than 400,000 L/day, such that an EASR or PTTW should not be required.

The somewhat permeable condition of the native sand and silt soils present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay 'cut-offs' within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be above the groundwater level, and as such would not be expected to require ongoing groundwater control, other than typical perimeter weeping tile and sump pump as noted above.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development may be viable the proposed development. The permeable silt and sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc., pending further laboratory and in-situ testing to support such systems.

Based on our observations, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area. Conversely, the groundwater level will have minimal impact on construction of the proposed development, limited to typical control of infiltration and runoff into open excavations, readily handled at the time of construction via conventional construction dewatering techniques. SOIL-MAT should be given the opportunity to review detailed development plans as they are finalised, to confirm feasibility based on the observed conditions, and conformance with our recommendations provided in this report.

10. STORMWATER MANAGEMENT (SWM) POND DESIGN CONSIDERATIONS

While LID methods such as infiltration trenches or galleries may be considered as part of the stormwater management plan for the site, it is understood municipal sewers leading to a stormwater management pond at the east side of the site will be constructed. As summarised above, grain size analyses of selected soil samples were conducted, indicating moderately permeable shallow silt and sand deposits, however the presence of low permeable clayey silt/clayey sandy silt soils may be suitable for use as a low permeability clay liner for such a SWM pond.

As noted above, the static groundwater level at the southeast corner of the site is conservatively estimated at a depth of approximately 3 metres below the existing ground surface, however shallower perched water deposits may be present based on the preliminary data available to date. At this time the design details of the proposed SWM pond are not known, however it may be feasible for the pond to be designed as a 'dry pond' accommodating temporary storage and allowing for infiltration, or partial infiltration, of stormwater. On a preliminary basis a conservative infiltration rate of 20 to 30 mm/hr may be considered within the silt and sand deposit, however this should be reviewed in further detail, along with additional site investigation, to support the detailed design. The base of the pond should be sufficiently above the static groundwater level in order for infiltration methods to be effective. Alternatively, the pond may be constructed as a wet pond, with a set storage volume and permanent pool elevation.

Where the permanent pool elevation is below the static groundwater elevation, it will be necessary to provide a low permeability layer over the base of the pond to resist the infiltration of natural groundwater, and of sufficient weight to resist the hydrostatic uplift pressures. Conversely, where the permanent pool elevation is above the static groundwater level, a low permeability liner will be required to prevent the exfiltration of water out of the pond. This could be accomplished through the use of a compacted clay liner, or with a weighed down proprietary liner system, etc. The weight of the liner system would have to exceed the uplift pressure of the ground water during the most severe periods of the year, likely when maximum storage is required. In approximate terms for example, one metre of clay liner, or equivalent, would be required for about every two meters of water storage below static ground water level, i.e., when the water level in the pond is 2 metres below the static ground water table, the clay liner would have to be at least one metre thick; if 3 metres below the static level, then 1.5 metres thick, etc. It is recommended that best efforts be made to design the static pool elevation close to the static groundwater elevation so that the natural seasonal fluctuations of the groundwater elevation dictate the permanent pool elevation. This would eliminate the need to construct a weighted liner to resist the hydrostatic uplift pressures of the static groundwater elevation. That being said, this would only work if the former solution could be achieved whilst attaining the required water storage volume for the development.

An impermeable compacted clay liner would consist of a sufficiently plastic clay soil, with a recommended minimum clay content of 20 per cent and plasticity index of 7. Based on the current laboratory testing of the native soils encountered, select portions of the native cohesive soils below depths of about 3 metres may be considered suitable for use as a low permeability to impermeable liner for the proposed SWM pond.

Depending on the final design details of the SWM pond and soils present in this area, the native soils present at the base level of the pond may be of sufficiently low permeability, pending further assessment and laboratory testing. If sufficiently impermeable, the base of the pond may be prepared by scarifying or 'discing' in the upper perhaps 0.3 to 0.5 metres to destroy any natural layering structure, moisture conditioned to within -2 to +4 per cent of its optimum moisture content, and recompacted in place. In the event that an imported clayey soil is required for use as an impermeable liner, the clay liner should be placed in nominal lifts of 300 millimetres, sufficiently worked and moisture conditions as noted above, and compacted to 95 per cent of its SPMDD. It is noted as well, regardless of the provision of an impermeable liner, the sides of the pond should be well worked or scarified to destroy any natural layers or seams, specifically any more permeable sandy or gravelly seams. Where such layers are encountered, a layer of available on-site clayey soil should be placed and



compacted, as outlined above, to restrict the natural infiltration of groundwater into the pond through these more permeable horizontal seams.

Alternatively, weighed down proprietary liners could be considered, however the material suppliers of such materials (such as Layfield, Terrafox, Suprema) would have to be consulted for recommendations on the appropriate product and installation methods for the site conditions. Such artificial liners would not require compaction efforts and could be weighed down with practically any available soil or granular material.

Interior pond slopes beneath the permanent pool elevation should be limited to inclinations no steeper than 4 horizontal to 1 vertical, with interior slopes above permanent pool elevation and exterior slopes no steeper than 3 horizontal to 1 vertical. Should steeper slopes be required, it will be necessary to provide some form of stabilisation such as the placement of coarse 'rip rap' stone, or proprietary product such as Turfstone or Cable-Crete, or construction as a reinforced earth embankment. It is recommended that all interior pond slopes be provided with at least some form of nominal stabilisation/protection to control loss erosion/loss of ground. Above the pond level this may consist of appropriate vegetation. It is anticipated that topsoil will be placed within the SWM pond area and 'seeded' to provide stabilisation and erosion protection.

It is noted that as the design process proceeds this office should be contacted for further consultations, and to undertake additional assessment of the site as may be warranted, to support the detailed design of the storm water management elements for the site.

11. ENVIRONMENTAL CONSIDERATIONS

As noted above, five [5] representative samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background environmental testing for a standard panel of metals, pH, petroleum hydrocarbons [PHCs], including BTEX. The purpose of this testing was to assess the environmental characteristics of the subsurface soils and provide preliminary comments with respect to the off-site disposal of surplus soil during construction in accordance with Ontario Regulation 406/19, if required. The results of this testing are presented in the attached AGAT Certificate of Analysis [22T868329].

The laboratory test results received in our office were compared to the applicable standard from the Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, as follows:

- **Table 1:** Full Depth Background Site Condition Standards.
- **Table 2.1:** Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.
- **Table 3.1:** Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.

Based on SOIL-MAT ENGINEERS' field observations and the analytical test results from AGAT, SOIL-MAT ENGINEERS has the following comments to offer:

1. The sampled material was found to meet the Table 1 [RPI/ICC] Standards for all the tested parameters.
2. The submitted samples were found to meet the Table 2.1 and 3.1 [RPI] Standards for the tested parameters.
3. The submitted samples were found to meet the Table 2.1 and 3.1 [ICC] Standards for the tested parameters.
4. The samples secured for analytical testing are believed to be representative of the soil conditions at the borehole locations only. If any significant changes are noted, i.e., odours, staining etc., SOIL-MAT should be contacted to reassess the environmental characteristics of the soil.
5. As noted above, detailed results of the Phase Two ESA have been reported under a separate cover.

Given the above test results the following disposal options are applicable under Regulation 406/19, as amended:

- As the tested material has been shown to meet the Table 1 [RPI/ICC] Standards for the parameters tested surplus material may reasonably be accepted at an off-site Table 1 [RPI/ICC] property, including a property subject to a Record of Site Condition [RSC] or MECP Certificate of Authorisation, subject to approval of the receiving property owner/Qualified Person (QP).
- As the tested material has been shown to meet the Table 2.1 and 3.1 [RPI and ICC] Standards for the parameters tested, surplus material may reasonably be accepted at an off-site Table 2.1 and 3.1 property, including a property subject to an RSC or MECP Certificate of Authorisation subject to approval of the receiving property owner/QP.

PROJECT No.: SM 302489-G

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
41 PARK STREET WEST
CLIFFORD, ONTARIO



-
- Depending on the volume of surplus soil to be handled, as well as the environmental requirements of the receiving site, additional testing may be required.
 - Excavated soil may be reused on site.

It is noted that this testing is intended to provide an initial preliminary characterization of the environmental quality of the on-site soils. Where surplus soil is identified to require export as part of site development, it would be necessary prepare the required documentation under Regulation 406/19 [as amended]. This may require additional sampling as a function of the volume of surplus to be exported, and the results of the Phase Two ESA.

12. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. 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 such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.



Scott Wylie, EIT, B. Eng.
Junior Engineer



Kyle Richardson, P. Eng.
Project Engineer




Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 8, inclusive
Grain Size Analyses
Atterberg Limits - Plasticity Chart
Drawing No. 2, Recommended Design Requirements for Basement Construction
AGAT Certificate of Analyses [22T868329]

Distribution: Cachet Developments [pdf, by email]



LEGEND


 Borehole Location
 BH#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Geotechnical Report SM 302489-G.
2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
 Proposed Residential
 Development
 41 Park Street West
 Clifford, Ontario

Borehole Location Plan

Project No. SM 302489-G

Date: March 2022

Drawn: CL | Checked: SW

SM 302489-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 1

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

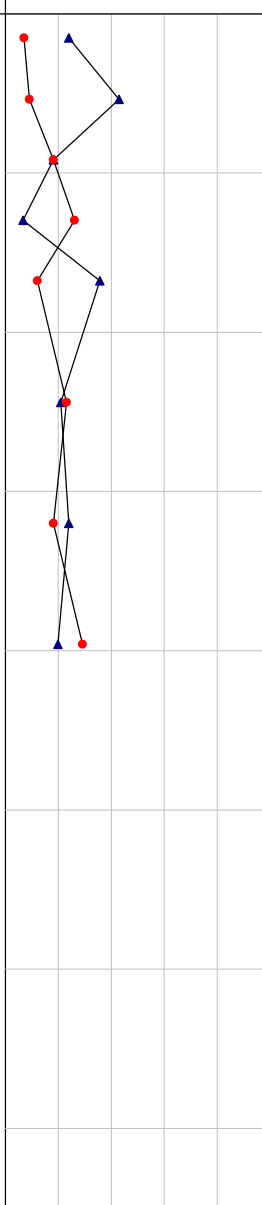
Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867684

E: 501870



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt. (kN/m3)	▲
0	377.00		Ground Surface									
1	376.60		Topsoil Approximately 400 millimetres of topsoil.	SS	1	7,4,3,5	7					
2			Silty Sand Brown, trace to some gravel, trace clay, occasional to frequent cobbles, loose to compact.	SS	2	4,5,4,6	9					
3				SS	3	3,8,10,12	18					
4				SS	4	14,15,11,10	26					
5				SS	5	8,6,6,8	12					
6	373.53		Clayey Sandy Silt Till Brown, trace to some gravel, occasional cobbles, compact.									
7				SS	6	6,15,8,10	23					
8				SS	7	12,10,8,9	18					
9	368.93		Transition to grey in color	SS	8	12,15,14,25	29					
10			End of Borehole									
11			NOTES:									
12			1. Borehole was advanced using hollow stem auger equipment on February 25, 2022 to termination at a depth of 8.3 metres.									
13			2. Borehole was recorded as open and 'wet' at a depth of 7.6 metres upon completion and backfilled as per Ontario Regulation 903.									
14			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									
15			4. A monitoring well was installed. The following free groundwater level readings have been measured: March 9, 2022 - 3.58 metres March 16, 2022 - 3.74 metres									



Drill Method: Hollow Stem Augers
Drill Date: February 25, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech Drilling

Soil-Mat Engineers & Consultants Ltd.
 130 Lancing Drive, Hamilton, ON L8W 3A1
 T: 905.318.7440 F: 905.318.7455
 E: info@soil-mat.ca

Datum: Geodetic Benchmark
Field Logged by: CL
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

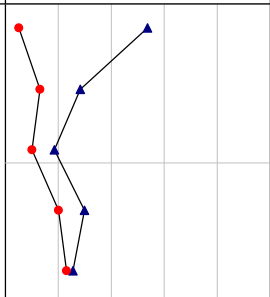
Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867924

E: 501902



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	▲
0	376.33		Ground Surface									
0	376.03		Topsoil Approximately 300 millimetres of topsoil.		SS	1	2,3,2,2	5				
1			Silty Sand Brown, trace to some gravel, trace clay, frequent to occasional cobbles, loose to compact.		SS	2	4,5,8,7	13				
2	374.03		Clayey Silt Brown, trace to some sand and gravel, occasional cobbles, compact.		SS	3	2,6,4,6	10				
3					SS	4	3,9,11,15	20				
4	372.70				SS	5	5,9,14,17	23				
4			End of Borehole									
5			NOTES: 1. Borehole was advanced using hollow stem auger equipment on February 25, 2022 to termination at a depth of 3.6 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									



Drill Method: Hollow Stem Augers
Drill Date: February 25, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech Drilling

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Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867816

E: 501896



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	▲
0	377.30		Ground Surface									
0	377.00		Topsoil Approximately 300 millimetres of topsoil.		SS	1	3,4,6,4	10				
2			Silty Sand Brown, trace to some gravel and clay, frequent to occasional cobbles, compact.		SS	2	5,7,10,5	17				
2	375.17		End of Borehole									
			NOTES:									
			1. Borehole was advanced using hollow stem auger equipment on February 25, 2022 to termination at a depth of 2.1 metres.									
			2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.									
			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									

Drill Method: Hollow Stem Augers

Drill Date: February 25, 2022

Hole Size: 200 millimetres

Drilling Contractor: Altech Drilling

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Datum: Geodetic Benchmark

Field Logged by: CL

Checked by: SW

Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

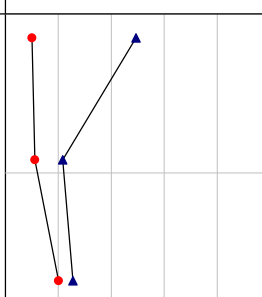
Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867758

E: 501821



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt.(kN/m ³)	▲
0	377.80		Ground Surface									
0	377.50		Topsoil Approximately 300 millimetres of topsoil.		SS	1	9,7,3,3	10				
1			Silty Sand Brown, trace to some gravel, trace clay, frequent to occasional cobbles, compact.		SS	2	5,5,6,6	11				
3	374.72		Clayey Silt Brown, trace to some gravel, trace sand, occasional cobbles, compact.		SS	3	8,4,16,8	20				
3.7	374.12		End of Borehole									
			NOTES:									
			1. Borehole was advanced using solid stem auger equipment on February 25, 2022 to termination at a depth of 3.7 metres.									
			2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.									
			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									



Drill Method: Solid Stem Augers

Drill Date: February 25, 2022

Hole Size: 150 millimetres

Drilling Contractor: Altech Drilling

Soil-Mat Engineers & Consultants Ltd.

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Datum: Geodetic Benchmark

Field Logged by: CL

Checked by: SW

Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867790

E: 501732



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	▲
0	379.10		Ground Surface									
1	378.80		Topsoil Approximately 300 millimetres of topsoil.		SS	1	2,3,2,3	5				
2			Silty Sand Brown, trace to some gravel and clay, frequent to occasional cobbles, loose.		SS	2	2,2,2,2	4				
3	376.99		End of Borehole									
4			NOTES: 1. Borehole was advanced using solid stem auger equipment on February 25, 2022 to termination at a depth of 2.1 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									

Drill Method: Solid Stem Augers

Drill Date: February 25, 2022

Hole Size: 150 millimetres

Drilling Contractor: Altech Drilling

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Datum: Geodetic Benchmark

Field Logged by: CL

Checked by: SW

Sheet: 1 of 1

Log of Borehole No. 6

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867 847

E: 501785



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	▲ 10 20 30 40 ▲
0	377.20		Ground Surface									
1	376.90		Topsoil Approximately 300 millimetres of topsoil.		SS 1	4,2,2,3	4					
2			Silty Sand Brown, trace to some gravel and clay, frequent to occasional cobbles, loose to compact.		SS 2	8,5,6,6	11					
3					SS 3	3,5,6,6	11					
4	373.78		Clayey Sandy Silt Till Brown, trace to some gravel, occasional cobbles, compact.		SS 4	2,9,13,14	21					
5					SS 5	5,7,9,8	16					
6	370.48											
7			End of Borehole									
8			NOTES: 1. Borehole was advanced using solid stem auger equipment on February 25, 2022 to termination at a depth of 6.7 metres. 2. Borehole was recorded as open and 'wet' to a depth of 4.6 metres upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.									
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Drill Method: Solid Stem Augers

Drill Date: February 25, 2022

Hole Size: 150 millimetres

Drilling Contractor: Altech Drilling

Soil-Mat Engineers & Consultants Ltd.

130 Lancing Drive, Hamilton, ON L8W 3A1

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Datum: Geodetic Benchmark

Field Logged by: CL

Checked by: SW

Sheet: 1 of 1

Log of Borehole No. 7

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

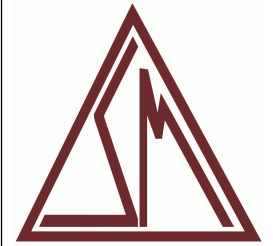
Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867924

E: 501902



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	▲ 10 20 30 40 ▲
0	375.20		Ground Surface									
1	374.80		Topsoil Approximately 400 millimetres of topsoil.		SS 1	0,0,3,3	3					
2			Silty Sand Brown, trace to some gravel, trace clay, frequent to occasional cobbles, loose.		SS 2	3,4,4,8	8					
3	372.18		Clayey Silt Brown, trace to some gravel, trace sand, occasional cobbles, compact.		SS 3	3,5,11,11	16					
4					SS 4	10,10,13,13	23					
5	369.58		Transition to grey in color									
6	368.48				SS 5	3,5,7,10	12					
7			End of Borehole									
8			NOTES: 1. Borehole was advanced using solid stem auger equipment on February 25, 2022 to termination at a depth of 6.7 metres. 2. Borehole was recorded as open and 'wet' to a depth of 6.1 metres upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client. 4. A monitoring well was installed. The following free groundwater level readings have been measured: March 9, 2022 - 0.44 metres March 16, 2022 - 0.30 metres									

Drill Method: Hollow Stem Augers
Drill Date: February 25, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech Drilling

Soil-Mat Engineers & Consultants Ltd.
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 E: info@soil-mat.ca

Datum: Geodetic Benchmark
Field Logged by: CL
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 8

Project No: SM 302489-G

Project: Proposed Residential Development

Location: 41 Park Street West, Clifford

Client: Cachet Development Partners

Project Manager: Kyle Richardson, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 4867834

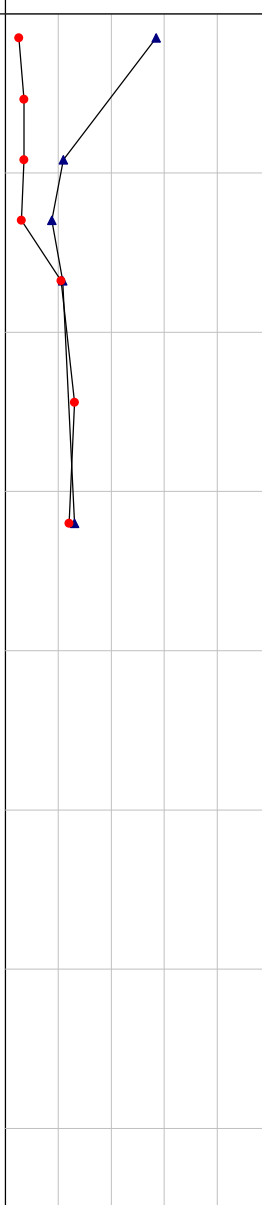
E: 501982



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w%	
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)
0	372.10		Ground Surface								
1	371.70		Topsoil Approximately 300 millimetres of topsoil.	SS	1	2,1,4,5	5				
2			Silty Sand Brown, trace to some gravel, trace clay, frequent to occasional cobbles, compact.	SS	2	3,3,4,4	7				
3				SS	3	3,4,3,4	7				
4				SS	4	4,3,3,5	6				
5				SS	5	5,11,10,11	21				
6	369.09		Clayey Sandy Silt Till Brown, trace to some gravel, occasional cobbles, compact.								
7			Transition to grey in color	SS	6	5,7,19,14	26				
8											
9											
10											
11											
12											
13											
14											
15	367.49										
16											
17											
18											
19											
20											
21											
22	365.39			SS	7	14,11,13,10	24				
23			End of Borehole								
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
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39											
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49											

NOTES:

- Borehole was advanced using solid stem auger equipment on February 25, 2022 to termination at a depth of 6.7 metres.
- Borehole was recorded as open and 'wet' to a depth of 5.5 metres upon completion and backfilled as per Ontario Regulation 903.
- Soil samples will be discarded after 3 months unless otherwise directed by our client.
- A monitoring well was installed. The following free groundwater level readings have been measured:
March 9, 2022 - 1.97 metres
March 16, 2022 - 1.89 metres



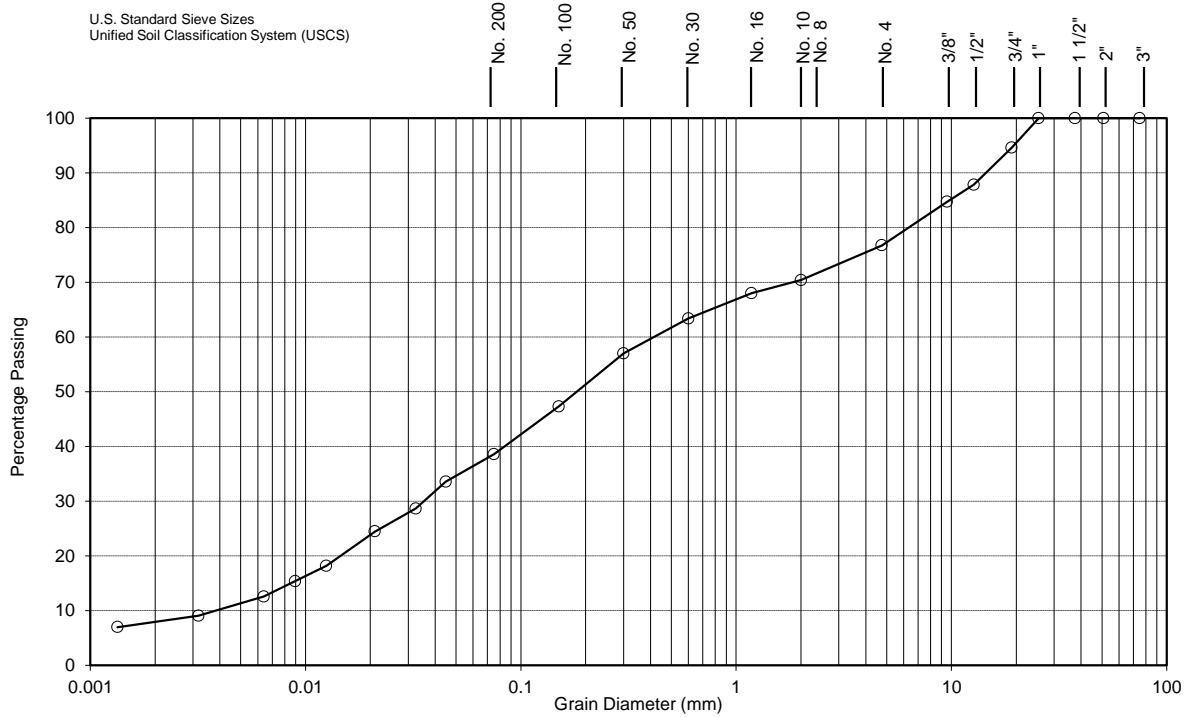
Drill Method: Hollow Stem Augers
Drill Date: February 25, 2022
Hole Size: 200 millimetres
Drilling Contractor: Altech Drilling

Soil-Mat Engineers & Consultants Ltd.
 130 Lancing Drive, Hamilton, ON L8W 3A1
 T: 905.318.7440 F: 905.318.7455
 E: info@soil-mat.ca

Datum: Geodetic Benchmark
Field Logged by: CL
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses

U.S. Standard Sieve Sizes
Unified Soil Classification System (USCS)



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.: 22-099	Notes: Depth: 20'	
Borehole No.: 1		
Sample No.: 7		
CLAY [%]: 9 SILT [%]: 30 SAND [%]: 38 GRAVEL [%]: 23	Soil Description: Brown Silty Gravelly Sand w/ traces of Clay S.M. - Silty sands, sand-silt-mixtures to G.M. - Gravel-sand-silt mixtures	
D ₁₀ (Effective Diam. in mm): 0.0038	Estimated Infiltration Rate [mm/hr] : 20 to 30	Estimated Permeability, k [cm/s] 10⁻⁵
	Coefficient of Uniformity C _u : 107.9	Coefficient of Curvature C _c : 0.8

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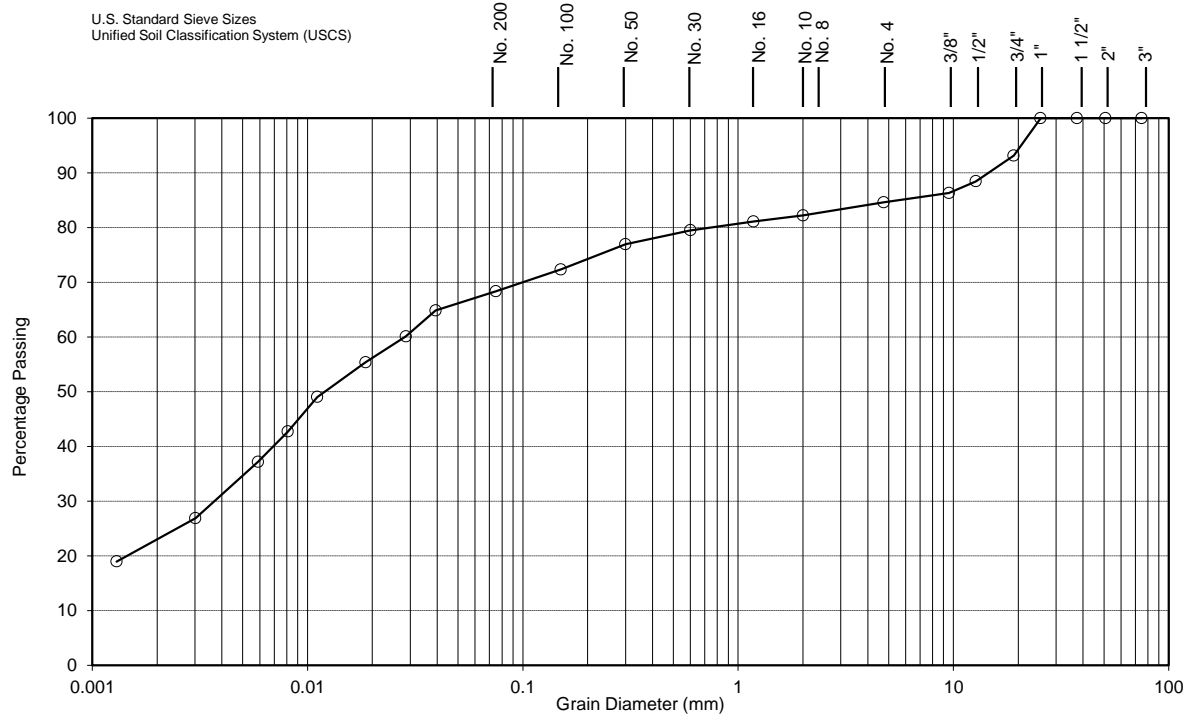
March 2022

Grain Size Analysis No. 1

Project No.: SM 302489-T

Mechanical & Hydrometer Analyses

U.S. Standard Sieve Sizes
Unified Soil Classification System (USCS)



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.: 22-100	Notes: Depth: 10'	
Borehole No.: 4		
Sample No.: 3		
CLAY [%]: 23 SILT [%]: 45 SAND [%]: 17 GRAVEL [%]: 15	Soil Description: Brown Clayey Silt w/ some Sand and Gravel M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands, silty or clayey fine sands	
D ₁₀ (Effective Diam. in mm): 0.0006	Estimated Infiltration Rate [mm/hr] : < 10	Estimated Permeability, k [cm/s] 10⁻⁷
	Coefficient of Uniformity C _u : 48.3	Coefficient of Curvature C _c : 0.8

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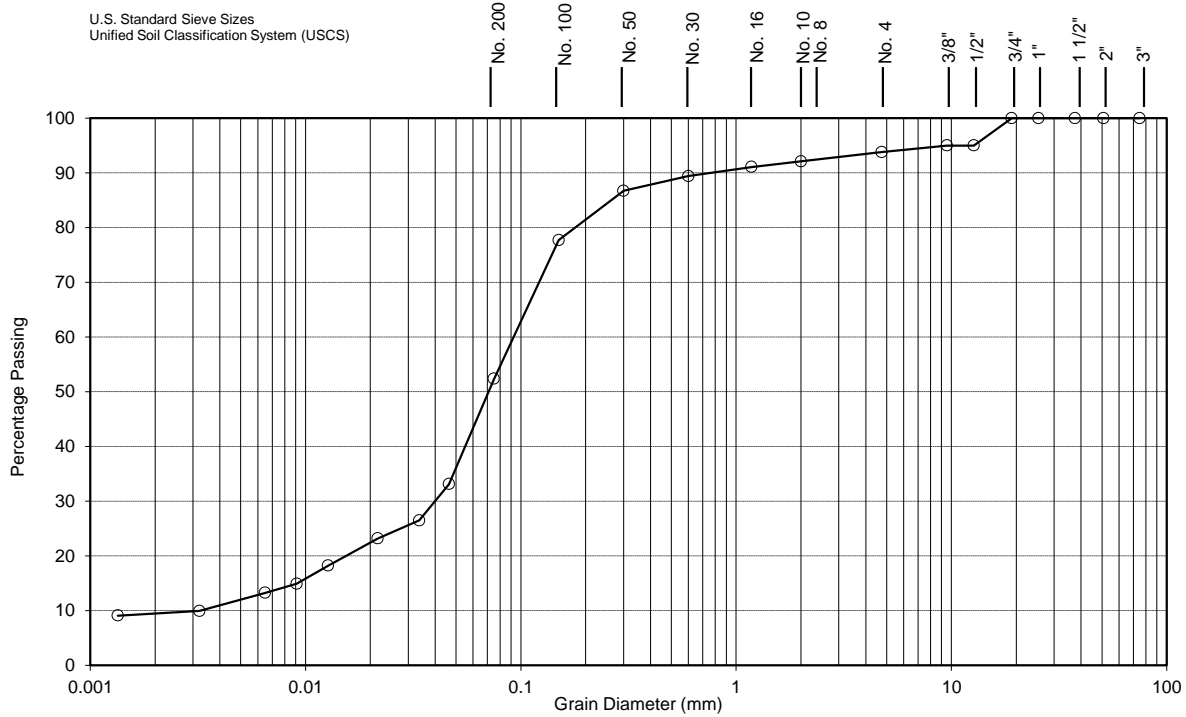
March 2022

Grain Size Analysis No. 2

Project No.: SM 302489-T

Mechanical & Hydrometer Analyses

U.S. Standard Sieve Sizes
Unified Soil Classification System (USCS)



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.: 22-101	Notes: Depth: 5'		
Borehole No.: 7			
Sample No.: 3			
CLAY [%]: 9	Soil Description: Brown Silt and Sand w/ traces of Clay and Gravel S.M. - Sand-silt mixtures		
SILT [%]: 43			
SAND [%]: 42			
GRAVEL [%]: 6			
D ₁₀ (Effective Diam. in mm): 0.0030	Estimated Infiltration Rate [mm/hr]: 20 to 30	Estimated Permeability, k [cm/s]: 10⁻⁵	
	Coefficient of Uniformity C _u : 30.7	Coefficient of Curvature C _c : 5.8	

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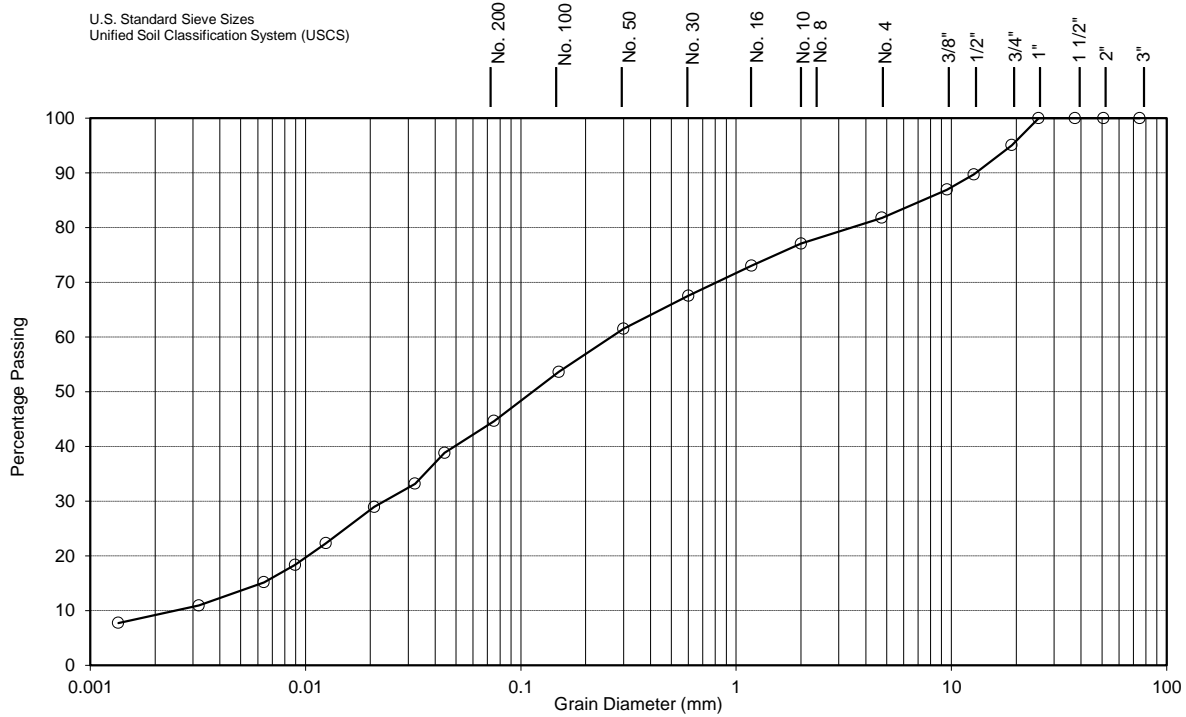
March 2022

Grain Size Analysis No. 3

Project No.: SM 302489-T

Mechanical & Hydrometer Analyses

U.S. Standard Sieve Sizes
Unified Soil Classification System (USCS)



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	22-102	Notes: Depth: 10'			
Borehole No.:	8	Soil Description: Brown Sand and Silt w/ some Gravel and a trace of Clay S.M. - Silty sands, sand-silt mixtures to G.M. - Gravel-sand-silt mixtures			
Sample No.:	3				
CLAY [%]:	9				
SILT [%]:	36	Estimated Infiltration Rate [mm/hr] :	20 to 30	Estimated Permeability, k [cm/s]	10⁻⁵
SAND [%]:	37	Coefficient of Uniformity C _u :	117.4	Coefficient of Curvature C _c :	0.9
GRAVEL [%]:	18	D ₁₀ (Effective Diam. in mm):	0.0023		

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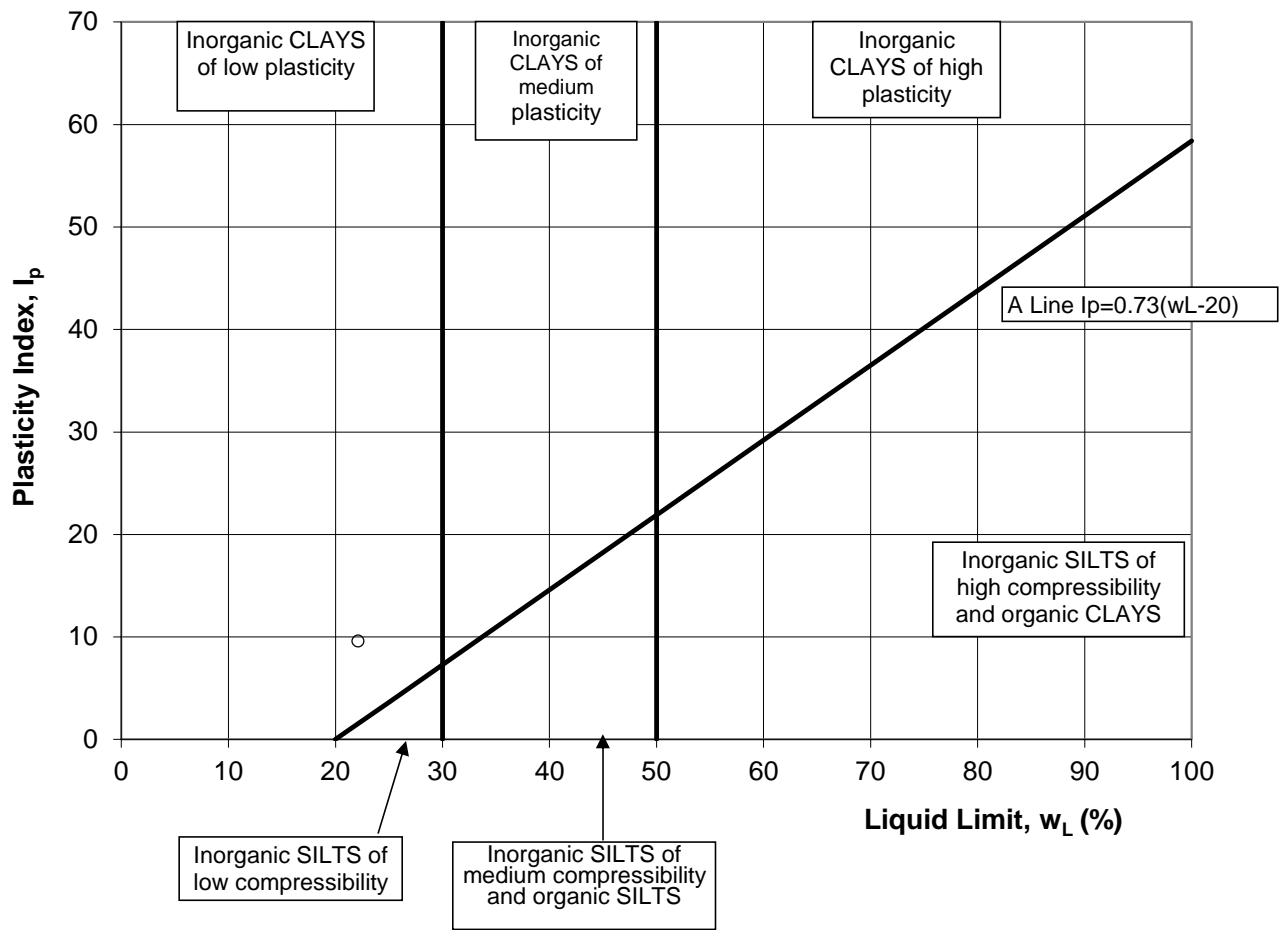
41 Park Street West, Clifford, Ontario



March 2022

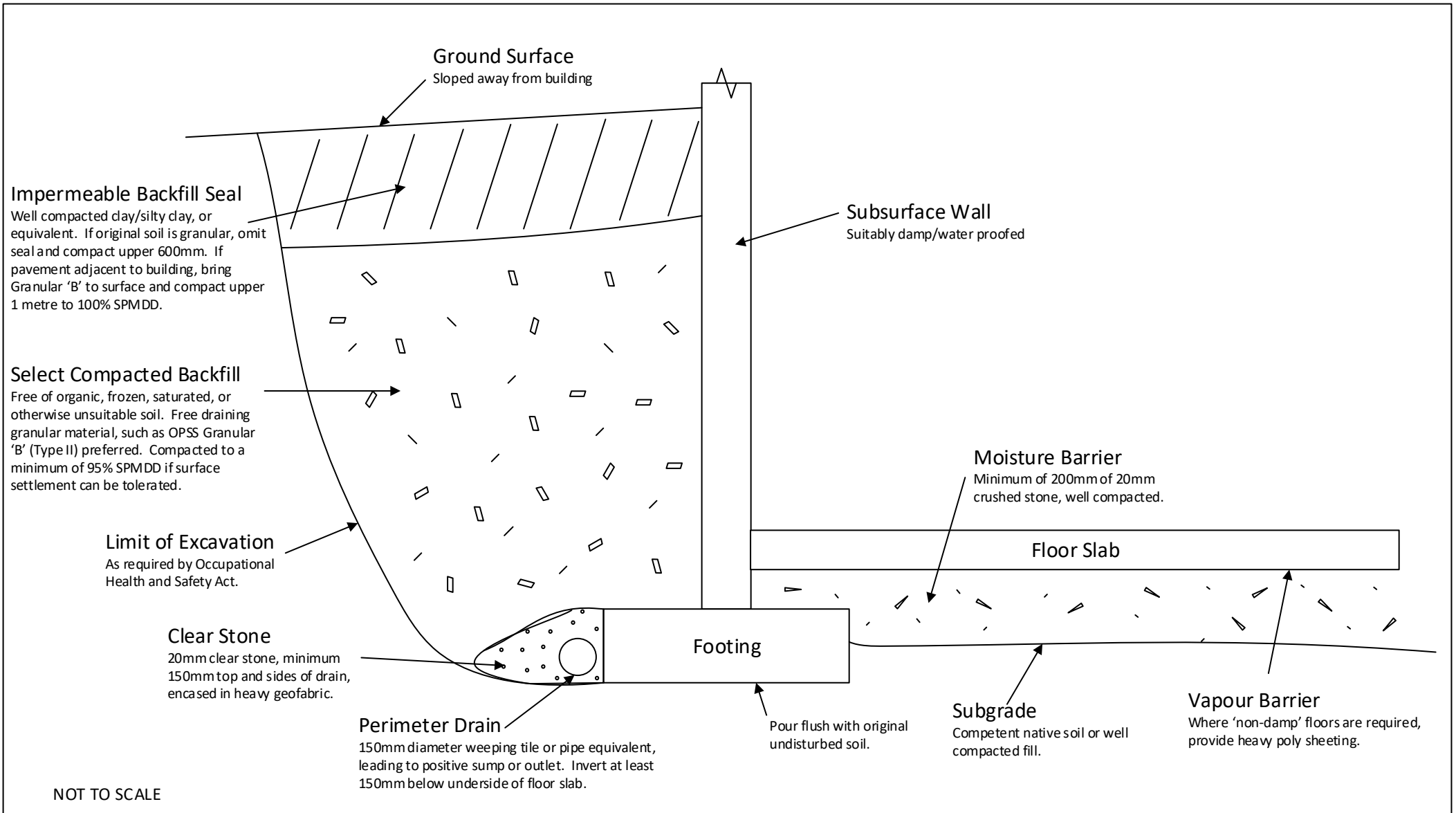
Grain Size Analysis No. 4

Project No.: SM 302489-T



Atterberg Limits				
Sample No.	Sample Location	Liquid Limit wL	Plastic Limit wp	Plasticity Index Ip
BH8 SS5	Depth 20'	22.1	12.5	9.6

SOIL-MAT ENGINEERS & CONSULTANTS LTD.		
41 Park Street West, Clifford ON		
Atterberg Limits		
Client:		
Project No.:	SM 302489-G	March 2022
		Plasticity Chart



	<h1>Soil-Mat Engineers & Consultants Ltd.</h1>		Project No.:	SM 302489-G
			Date:	March 2022
<h2>Typical Design Requirements Drainage and Backfill for Basement Walls</h2>			<h3>Drawing No. 2</h3>	



CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
130 LANCING DRIVE
HAMILTON, ON L8W3A1
(905) 318-7440

ATTENTION TO: Scott Wylie

PROJECT: 302489

AGAT WORK ORDER: 22T868329

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Mar 04, 2022

PAGES (INCLUDING COVER): 17

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***Notes**

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.



Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

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<http://www.agatlabs.com>

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Scott Wylie

SAMPLING SITE: 41 Park St. W

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Parameter	Unit	SAMPLE DESCRIPTION:		BH3 SS2	BH4 SS2	BH5 SS2	BH6 SS3	BH7 SS3
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-24
		G / S	RDL	3566181	3566198	3566199	3566200	3566201
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	4	3	3	2
Barium	µg/g	220	2.0	26.6	26.6	26.1	24.8	16.3
Beryllium	µg/g	2.5	0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Boron	µg/g	36	5	11	15	11	11	6
Boron (Hot Water Soluble)	µg/g	NA	0.10	0.18	<0.10	0.16	<0.10	0.17
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	13	16	14	12	9
Cobalt	µg/g	21	0.5	5.1	6.1	4.6	4.4	2.5
Copper	µg/g	92	1.0	12.0	15.7	10.9	10.7	4.9
Lead	µg/g	120	1	7	6	6	5	4
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	10	12	9	8	4
Selenium	µg/g	1.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	µg/g	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	2.5	0.50	0.63	0.59	0.65	0.57	<0.50
Vanadium	µg/g	86	0.4	21.0	24.6	20.6	19.4	13.9
Zinc	µg/g	290	5	23	25	21	23	14
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040	0.051
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.208	0.124	0.174	0.125	0.180
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	N/A	0.196	0.091	0.159	0.134	0.151
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.41	7.38	7.80	6.84	7.54

Certified By:



Allyson Beach



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

5835 COOPERS AVENUE
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CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

SAMPLING SITE: 41 Park St. W

ATTENTION TO: Scott Wylie

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 1: Full Depth Background Site Condition - RPIC
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
3566181-3566201 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl₂ extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Handwritten signature of the analyst.



Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

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<http://www.agatlabs.com>

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

SAMPLING SITE: 41 Park St. W

ATTENTION TO: Scott Wylie

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - Metals (As, Pb) (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Parameter	Unit	SAMPLE DESCRIPTION:		BH7 SS1	BH8 SS1	BH1 SS1	BH2 SS1	BH3 SS1	BH4 SS1	BH5 SS1	BH6 SS1
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2022-02-24	2022-02-24	2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-25
		G / S	RDL	3566178	3566179	3566203	3566204	3566205	3566206	3566207	3566208
Arsenic	µg/g	18	1	6	5	5	5	6	5	5	5
Lead	µg/g	120	1	20	14	13	15	11	12	12	14

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 1: Full Depth Background Site Condition - RPIC
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

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Nvine Basly



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AGAT WORK ORDER: 22T868329

PROJECT: 302489

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CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Scott Wylie

SAMPLING SITE: 41 Park St. W

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Parameter	Unit	SAMPLE DESCRIPTION:		BH7 SS1	BH8 SS1	BH1 SS1	BH2 SS1	BH3 SS1	BH4 SS1	BH5 SS1	BH6 SS1
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2022-02-24	2022-02-24	2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-25
		G / S	RDL	3566178	3566179	3566203	3566204	3566205	3566206	3566207	3566208
Hexachloroethane	µg/g	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Hexachlorocyclohexane	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan I	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Alpha-Chlordane	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-Chlordane	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	µg/g	0.05	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
op'-DDE	ug/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp'-DDE	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DDE	µg/g	0.05	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
op'-DDD	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp'-DDD	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DDD	µg/g	0.05	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
op'-DDT	µg/g	1.4	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pp'-DDT	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
DDT (Total)	µg/g	1.4	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Dieldrin	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	µg/g	0.01	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobutadiene	µg/g	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Moisture Content	%		0.1	22.9	21.8	20.5	19.3	27.7	21.1	11.8	18.9
wet weight OC	g		0.01	10.92	10.21	10.64	10.59	10.09	10.72	10.31	10.00
Surrogate	Unit	Acceptable Limits									
TCMX	%	50-140		100	100	88	87	89	95	107	93
Decachlorobiphenyl	%	50-140		109	107	108	112	93	96	114	103

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

SAMPLING SITE: 41 Park St. W

ATTENTION TO: Scott Wylie

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 1: Full Depth Background Site Condition - RPIC
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3566178-3566208 Results are based on the dry weight of the soil.
DDT total is a calculated parameter. The calculated value is the sum of op'DDT and pp'DDT.
DDD total is a calculated parameter. The calculated value is the sum of op'DDD and pp'DDD.
DDE total is a calculated parameter. The calculated value is the sum of op'DDE and pp'DDE.
Endosulfan total is a calculated parameter. The calculated value is the sum of Endosulfan I and Endosulfan II.
Chlordane total is a calculated parameter. The calculated value is the sum of Alpha-Chlordane and Gamma-Chlordane.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

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CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
SAMPLING SITE: 41 Park St. W

ATTENTION TO: Scott Wylie
SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Parameter	Unit	SAMPLE DESCRIPTION:		BH3 SS2	BH4 SS2	BH5 SS2	BH6 SS3	BH7 SS3
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2022-02-25	2022-02-25	2022-02-25	2022-02-25	2022-02-24
		G / S	RDL	3566181	3566198	3566199	3566200	3566201
Benzene	µg/g	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m & p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	µg/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
F1 (C6 - C10)	µg/g		5	<5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	<5	<5	<5	<5
F2 (C10 to C16)	µg/g	10	10	<10	<10	<10	<10	<10
F3 (C16 to C34)	µg/g	240	50	<50	<50	<50	<50	<50
F4 (C34 to C50)	µg/g	120	50	<50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA	NA
Moisture Content	%		0.1	17.3	11.0	7.8	11.5	14.8
Surrogate	Unit	Acceptable Limits						
Toluene-d8	% Recovery	60-140		108	115	123	105	107
Terphenyl	%	60-140		85	96	107	74	100

Certified By:





Certificate of Analysis

AGAT WORK ORDER: 22T868329

PROJECT: 302489

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

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

SAMPLING SITE: 41 Park St. W

ATTENTION TO: Scott Wylie

SAMPLED BY: Carinne Lafleur

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2022-02-28

DATE REPORTED: 2022-03-04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 406/19 TABLE 1: Full Depth Background Site Condition - RPIC
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3566181-3566201 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6-C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
AGAT WORK ORDER: 22T868329
PROJECT: 302489
ATTENTION TO: Scott Wylie
SAMPLING SITE: 41 Park St. W
SAMPLED BY: Carinne Lafleur

Soil Analysis															
RPT Date: Mar 04, 2022			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)

Antimony	3568882		<0.8	<0.8	NA	< 0.8	107%	70%	130%	95%	80%	120%	76%	70%	130%
Arsenic	3568882		2	2	NA	< 1	119%	70%	130%	92%	80%	120%	105%	70%	130%
Barium	3568882		71.7	72.2	0.7%	< 2.0	106%	70%	130%	96%	80%	120%	97%	70%	130%
Beryllium	3568882		<0.4	<0.4	NA	< 0.4	101%	70%	130%	93%	80%	120%	84%	70%	130%
Boron	3568882		7	7	NA	< 5	85%	70%	130%	100%	80%	120%	82%	70%	130%
Boron (Hot Water Soluble)	3568882		<0.10	<0.10	NA	< 0.10	101%	60%	140%	103%	70%	130%	100%	60%	140%
Cadmium	3568882		<0.5	<0.5	NA	< 0.5	94%	70%	130%	102%	80%	120%	98%	70%	130%
Chromium	3568882		18	18	NA	< 5	113%	70%	130%	97%	80%	120%	119%	70%	130%
Cobalt	3568882		6.9	7.0	1.4%	< 0.5	111%	70%	130%	96%	80%	120%	105%	70%	130%
Copper	3568882		13.0	13.4	3.0%	< 1.0	98%	70%	130%	96%	80%	120%	96%	70%	130%
Lead	3568882		6	6	0.0%	< 1	109%	70%	130%	96%	80%	120%	94%	70%	130%
Molybdenum	3568882		<0.5	<0.5	NA	< 0.5	120%	70%	130%	102%	80%	120%	115%	70%	130%
Nickel	3568882		11	12	8.7%	< 1	107%	70%	130%	95%	80%	120%	102%	70%	130%
Selenium	3568882		<0.8	<0.8	NA	< 0.8	131%	70%	130%	104%	80%	120%	107%	70%	130%
Silver	3568882		<0.5	<0.5	NA	< 0.5	103%	70%	130%	101%	80%	120%	90%	70%	130%
Thallium	3568882		<0.5	<0.5	NA	< 0.5	116%	70%	130%	93%	80%	120%	95%	70%	130%
Uranium	3568882		0.55	0.55	NA	< 0.50	121%	70%	130%	92%	80%	120%	104%	70%	130%
Vanadium	3568882		29.3	29.1	0.7%	< 0.4	119%	70%	130%	97%	80%	120%	115%	70%	130%
Zinc	3568882		33	34	3.0%	< 5	110%	70%	130%	98%	80%	120%	99%	70%	130%
Chromium, Hexavalent	3566027		<0.2	<0.2	NA	< 0.2	95%	70%	130%	92%	80%	120%	83%	70%	130%
Cyanide, Free	3566201	3566201	0.051	0.052	NA	< 0.040	95%	70%	130%	104%	80%	120%	103%	70%	130%
Mercury	3568882		<0.10	<0.10	NA	< 0.10	110%	70%	130%	99%	80%	120%	90%	70%	130%
Electrical Conductivity (2:1)	3569711		0.203	0.206	1.5%	< 0.005	106%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3568882		0.219	0.219	0.0%	NA									
pH, 2:1 CaCl2 Extraction	3561969		6.74	7.00	3.8%	NA	99%	80%	120%						

Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

O. Reg. 153(511) - Metals & Inorganics (Soil)

pH, 2:1 CaCl2 Extraction	3566200	3566200	6.84	6.98	2.1%	NA	99%	80%	120%
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Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

O. Reg. 153(511) - Metals (As, Pb) (Soil)

Arsenic	3568882		2	2	NA	< 1	119%	70%	130%	92%	80%	120%	105%	70%	130%
Lead	3568882		6	6	0.0%	< 1	109%	70%	130%	96%	80%	120%	94%	70%	130%

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
PROJECT: 302489
SAMPLING SITE: 41 Park St. W

AGAT WORK ORDER: 22T868329
ATTENTION TO: Scott Wylie
SAMPLED BY: Carinne Lafleur

Soil Analysis (Continued)

RPT Date: Mar 04, 2022			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: NA Signifies Not Applicable.
 Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:



Nivine Basily

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
PROJECT: 302489
SAMPLING SITE: 41 Park St. W

AGAT WORK ORDER: 22T868329
ATTENTION TO: Scott Wylie
SAMPLED BY: Carinne Lafleur

Trace Organics Analysis

RPT Date: Mar 04, 2022			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - OC Pesticides (Soil)

Hexachloroethane	3564056		< 0.01	< 0.01	NA	< 0.01	89%	50%	140%	105%	50%	140%	100%	50%	140%
Gamma-Hexachlorocyclohexane	3564056		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%	87%	50%	140%	96%	50%	140%
Heptachlor	3564056		< 0.005	< 0.005	NA	< 0.005	105%	50%	140%	92%	50%	140%	102%	50%	140%
Aldrin	3564056		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%	90%	50%	140%	100%	50%	140%
Heptachlor Epoxide	3564056		< 0.005	< 0.005	NA	< 0.005	88%	50%	140%	88%	50%	140%	81%	50%	140%
Endosulfan I	3564056		< 0.005	< 0.005	NA	< 0.005	88%	50%	140%	85%	50%	140%	80%	50%	140%
Endosulfan II	3564056		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	87%	50%	140%	87%	50%	140%
Alpha-Chlordane	3564056		< 0.005	< 0.005	NA	< 0.005	95%	50%	140%	89%	50%	140%	98%	50%	140%
gamma-Chlordane	3564056		< 0.005	< 0.005	NA	< 0.005	91%	50%	140%	88%	50%	140%	99%	50%	140%
op'-DDE	3564056		< 0.005	< 0.005	NA	< 0.005	118%	50%	140%	106%	50%	140%	118%	50%	140%
pp'-DDE	3564056		< 0.005	< 0.005	NA	< 0.005	96%	50%	140%	94%	50%	140%	109%	50%	140%
op'-DDD	3564056		< 0.005	< 0.005	NA	< 0.005	94%	50%	140%	92%	50%	140%	102%	50%	140%
pp'-DDD	3564056		< 0.005	< 0.005	NA	< 0.005	101%	50%	140%	106%	50%	140%	108%	50%	140%
op'-DDT	3564056		< 0.005	< 0.005	NA	< 0.005	95%	50%	140%	102%	50%	140%	107%	50%	140%
pp'-DDT	3564056		< 0.005	< 0.005	NA	< 0.005	85%	50%	140%	82%	50%	140%	93%	50%	140%
Dieldrin	3564056		< 0.005	< 0.005	NA	< 0.005	94%	50%	140%	85%	50%	140%	83%	50%	140%
Endrin	3564056		< 0.005	< 0.005	NA	< 0.005	97%	50%	140%	89%	50%	140%	91%	50%	140%
Methoxychlor	3564056		< 0.005	< 0.005	NA	< 0.005	97%	50%	140%	108%	50%	140%	107%	50%	140%
Hexachlorobenzene	3564056		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	107%	50%	140%	91%	50%	140%
Hexachlorobutadiene	3564056		< 0.01	< 0.01	NA	< 0.01	90%	50%	140%	102%	50%	140%	104%	50%	140%

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

Benzene	3566201	3566201	<0.02	<0.02	NA	< 0.02	80%	60%	140%	73%	60%	140%	88%	60%	140%
Toluene	3566201	3566201	<0.05	<0.05	NA	< 0.05	95%	60%	140%	87%	60%	140%	103%	60%	140%
Ethylbenzene	3566201	3566201	<0.05	<0.05	NA	< 0.05	87%	60%	140%	77%	60%	140%	97%	60%	140%
m & p-Xylene	3566201	3566201	<0.05	<0.05	NA	< 0.05	100%	60%	140%	102%	60%	140%	92%	60%	140%
o-Xylene	3566201	3566201	<0.05	<0.05	NA	< 0.05	85%	60%	140%	84%	60%	140%	104%	60%	140%
F1 (C6 - C10)	3566201	3566201	<5	<5	NA	< 5	85%	60%	140%	108%	60%	140%	91%	60%	140%
F2 (C10 to C16)	3557465		< 10	< 10	NA	< 10	105%	60%	140%	109%	60%	140%	75%	60%	140%
F3 (C16 to C34)	3557465		< 50	< 50	NA	< 50	110%	60%	140%	108%	60%	140%	73%	60%	140%
F4 (C34 to C50)	3557465		< 50	< 50	NA	< 50	96%	60%	140%	63%	60%	140%	70%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:



QC Exceedance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
AGAT WORK ORDER: 22T868329
PROJECT: 302489
ATTENTION TO: Scott Wylie

RPT Date: Mar 04, 2022		REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - Metals & Inorganics (Soil)

Selenium	131%	70%	130%	104%	80%	120%	107%	70%	130%
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Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Duplicate NA: results are under 5X the RDL and will not be calculated.

More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
AGAT WORK ORDER: 22T868329
PROJECT: 302489
ATTENTION TO: Scott Wylie
SAMPLING SITE: 41 Park St. W
SAMPLED BY: Carinne Lafleur

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl ₂ Extraction	INOR-93-6075	modified from EPA 9045D, MCKEAGUE 3.11 E3137	PC TITRATE

Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
AGAT WORK ORDER: 22T868329
PROJECT: 302489
ATTENTION TO: Scott Wylie
SAMPLING SITE: 41 Park St. W
SAMPLED BY: Carinne Lafleur

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Hexachloroethane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Gamma-Hexachlorocyclohexane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Heptachlor	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Aldrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Heptachlor Epoxide	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan I	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan II	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endosulfan	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
Alpha-Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
gamma-Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Chlordane	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
op'-DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDE	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
op'-DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDD	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	CALCULATION
op'-DDT	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
pp'-DDT	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
DDT (Total)	ORG-91-5113	modified from EPA 3570, 3620C & 8081B	CALCULATION
Dieldrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Endrin	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Methoxychlor	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Hexachlorobenzene	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Hexachlorobutadiene	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
TCMX	ORG-91-5112	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Decachlorobiphenyl	ORG-91-5113	modified from EPA 3570 & 3620C & 8081B	GC/ECD
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE



Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 22T868329

PROJECT: 302489

ATTENTION TO: Scott Wylie

SAMPLING SITE: 41 Park St. W

SAMPLED BY: Carinne Lafleur

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
wet weight OC	ORG-91-5113		BALANCE
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

