SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455

Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

Project No.: SM 301553-G May 14, 2021

LIV COMMUNITIES
1005 SKYVIEW ROAD – SUITE 301
Burlingotn, Ontario
L7P 5B1

Attention: Sam Bedawi, BES, MBA
Land Development Manager

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED SHADOW CREEK RESIDENTIAL DEVELOPMENT
HIGHWAY 11 AND MENOKE BEACH ROAD
TOWNSHIP OF SEVERN, ONTARIO

Dear Mr. Bedawi,

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 P301553, dated March 12, 2021. Our comments and recommendations based on our findings at the nine [9] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development on the property located south west of the intersection of Highway 11 and Menoke Beach Road in the Township of Severn, Ontario. The details of the development have not been established at present but is anticipated to consist of single-family dwellings and townhouse blocks, as well as the installation of associated underground municipal services and a stormwater management pong, along asphalt paved roadways. The purpose of this geotechnical investigation work was 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 the information contained in this report does not reflect upon the environmental aspects of the site.

2. PROCEDURE

A total of nine [9] 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 April 8 and 9, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination or practical auger refusal on assumed bedrock at depths of between approximately 2.3 and 11 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 the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, a monitoring well was installed at Borehole Nos. 3, 6, 7, and 9 to allow for the future monitoring of the static groundwater level. The monitoring wells consisted of 50-millimetre PVC pipe, screened in the lower 1.5 to 3.0 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' to the surface 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, six [6] 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 metal and inorganic parameters, as well as petroleum hydrocarbons [PHCs] and volatile organic compounds [VOCs]. The purpose of this testing was to assess the background environmental characteristics of the subsurface soils for comparison to the relevant Standards under Ontario Regulation 406/19 [as amended] and provide 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 accessibility over the site and clearance of underground utilities. The ground surface elevation at the borehole locations have been referenced to a site specific temporary benchmark, described as the base of the hydro pole on the east side of Highway 11 - assuming a north-south orientation of Highway 11 - as illustrated in the attached Drawing No. 1. This benchmark was assigned an elevation of 100.0 metres for convenience.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 9, 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 the agricultural plot of land located northeast of the intersection of Highway 11 and Menoke Beach Road in the Township of Severn, Ontario. Wet and dry drainage channels run from west to east across the subject lands leading to a creek tributary which outlets at Lake Couchiching to the east. Of note, the large natural drainage channel that roughly divides the northern half from the southern half was wet during the time of our drilling operations. The site is bound to the north by Webers, – a fast food eatery – to the east by forested lands and existing residential dwellings, to the south by Menoke Beach Road, and to the west by Highway 11. The site is relatively flat and even with gentle undulations, and an overall drop in grade from west to east resulting in elevation variations of up to approximately 7 to 8 metres across the site.

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

Topsoil

A surficial veneer of topsoil approximately 150 to 300 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. In particular, greater depths of topsoil would be expected in the area of drainage courses or treed areas of the site. 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 ability to support plant life.

Silt, Sandy Silt and Clayey Silt

Native silt, sandy silt and clayey silt soils were encountered beneath the topsoil at all borehole locations. The fine-grained granular to slightly cohesive soils were brown to greyish brown in colour, contained traces of to some sand and clay, trace gravel, and were generally in a loose to compact condition. There were noted to be variable seams of more clayey, sandy or gravelly soil with depth and across the site. Black staining was noted within the upper levels of some of the boreholes, suggesting residual organics associated with natural drainage courses, wooded areas, and possible former marsh deposits. A transition to grey was noted within all boreholes, with the exception of Borehole Nos. 2 and 4, at depths of between approximately 2.2 and 4.1 metres below the ground surface. The material was generally more silty in the upper levels becoming more clayey with depth. The silt soil tended to be in a wet to saturated condition. It is noted that due to the fine-grained nature of the native soils, and the wet condition, they are considered sensitive to disturbance caused by drill activities and moisture, and as such the measured 'N' values may be artificially low in the more saturated silt soils.

Bedrock

Bedrock was inferred from auger and spoon refusal, at depths of between of approximately 2.3 and 11 metres at all borehole locations with the exception of Borehole No. 3. The depth and elevation of the inferred bedrock surface at each borehole location is summarised in the following table:

TABLE A
INFERRED BEDROCK DEPTHS AND ELEVATIONS

Borehole No.	Surface Elevation [m]	Inferred Bedrock Depth [m]	Inferred Bedrock Elevation [m]
1	100.81	4.4	96.40
2	98.08	2.3	95.80
3	95.58	>6.7	<88.90

4	100.91	4.8	96.10
5	95.66	9.1	86.60
6	94.13	6.7	87.40
7	93.27	11.0	82.30
8	99.28	6.5	92.80
9	96.07	4.3	91.80

Note: elevations are based on temporary benchmark and are not geodetic.

Based on the bedrock elevations noted above, the bedrock was encountered at elevations of approximately 82.3 to 96.40 metres, however may step to deeper or shallower elevations across the site. From a review of available published information, the bedrock consists of Limestone, Dolostone and Shale of the Shadow Creek formation. The site is also close to a transition to zone of igneous bedrock comprised of granite and gneiss, and so this type of rock may be present. In any case, the bedrock is considered competent to very competent in terms of excavation and foundation requirements for the project, however the upper levels of shale or limestone bedrock are often weathered and fractured. The bedrock was not cored as part of this investigation.

Grain Size Analyses

Grain size analyses were conducted on six [6] 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 B
SUMMARY OF GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH1 SS4	2.3 m	11	70	14	5	10^{-6}	<10
BH3 SS5	3.0 m	32	66	2	0	10^{-7}	<10
BH4 SS4	2.3 m	9	67	24	0	10^{-5}	15
BH6 SS7	6.1 m	10	33	35	22	10^{-7}	10 to 15
BH7 SS6	4.6 m	13	86	1	0	10^{-6}	<10
BH9 SS5	3.0 m	9	88	3	0	10^{-6}	<10

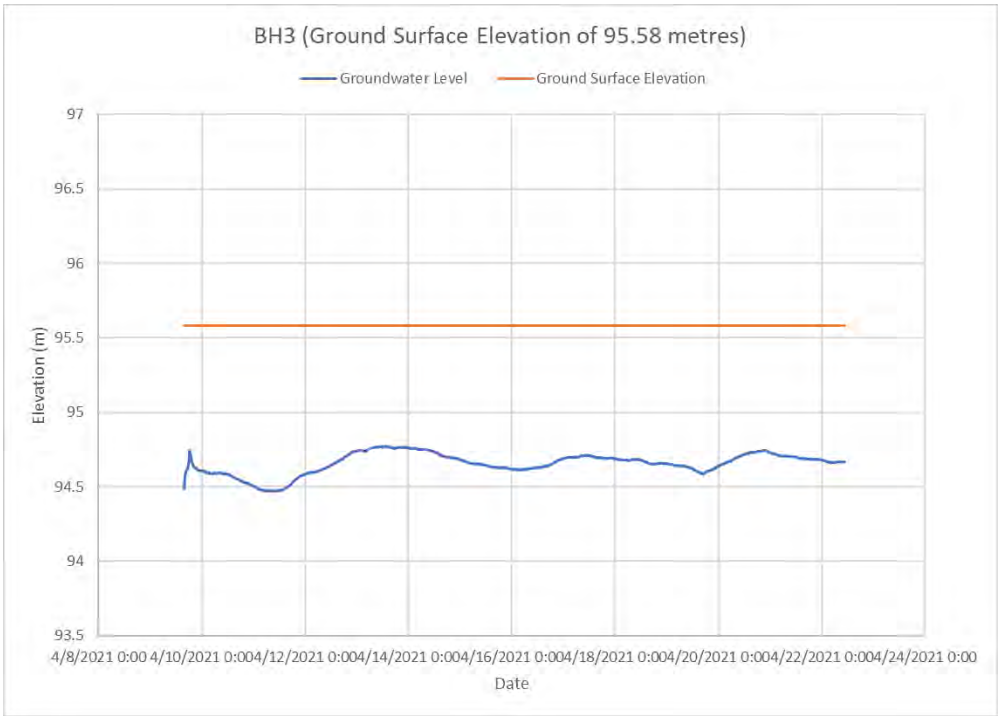
Note 1: Infiltration rate estimated using Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SB-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

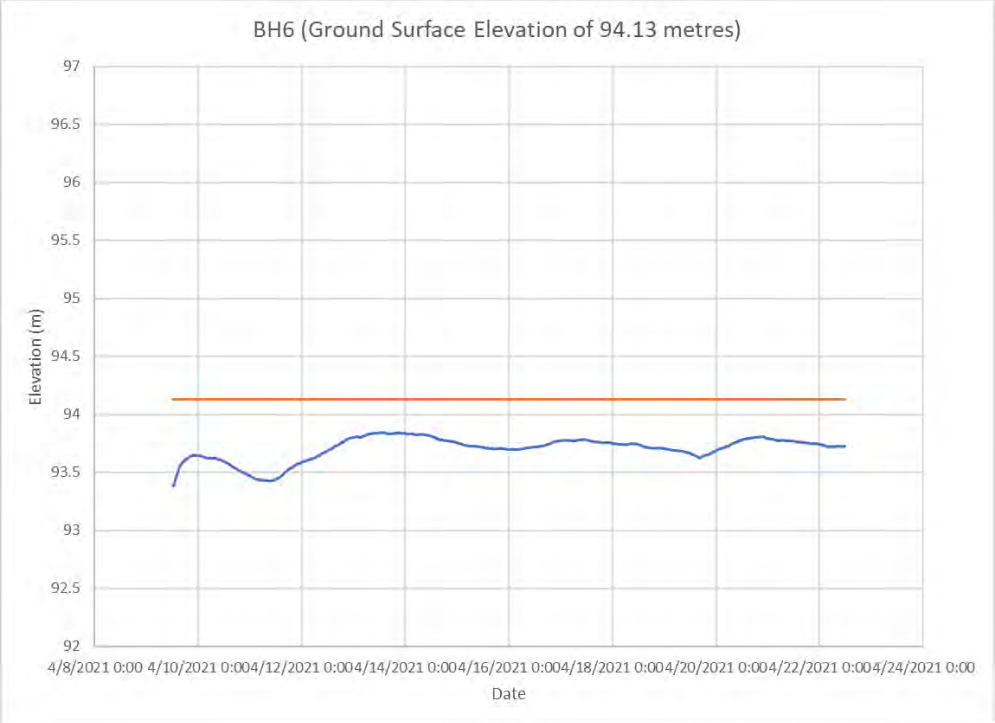
The field and laboratory testing demonstrate the native soils to consist of predominantly silt with trace of to some sand and clay with traces of gravel. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – Inorganic silts and very fine sands, to C.L. – Inorganic clays of low to medium plasticity within the layers containing a higher clay content, to S.C. – clayey sands, sand-clay mixtures. These soils would generally behave as a low permeability material, prone to significant disturbance from groundwater conditions, construction traffic, as well as high frost susceptibility. The more clayey layers, with clay content above about 15 to 20 percent, would tend to be effectively impermeable cohesive soil, and would be well suited for use in constructing and impermeable liner as part of the on-site stormwater management pond.

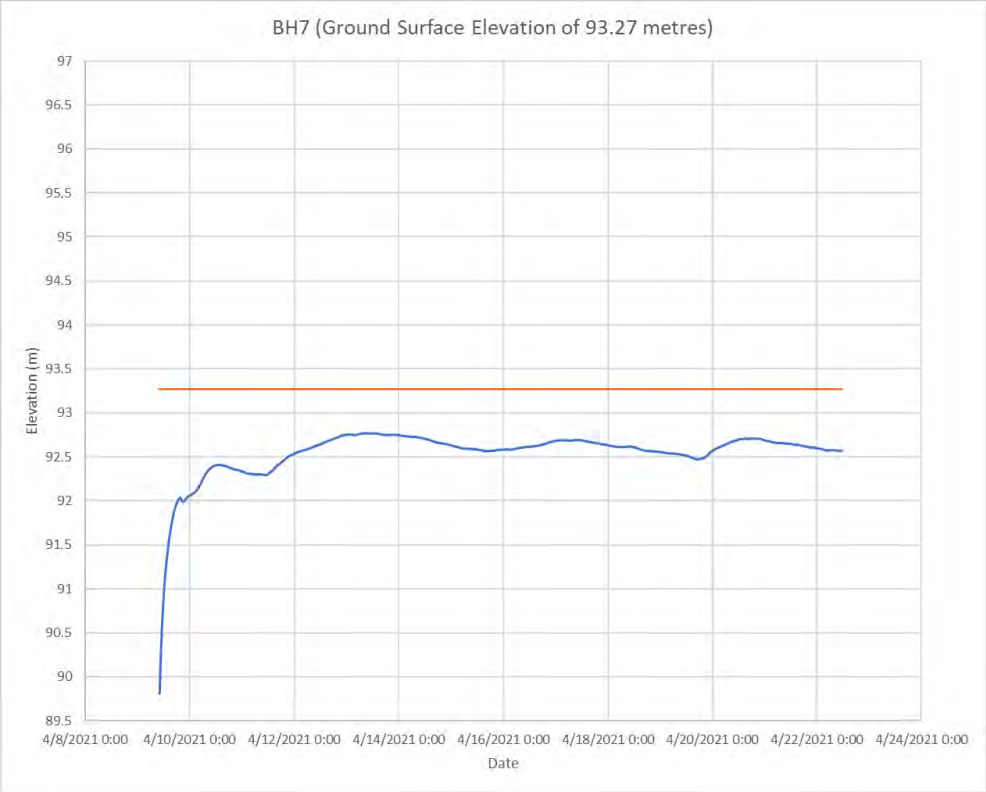
A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to consist of fine-textured glaciolacustrine deposits of silt and clay, with minor sand and gravel to coarse-textured glaciolacustrine deposits of sand and gravel with minor silt and clay. These conditions are consistent with our observations during drilling and laboratory testing. It is also noted that the subject area is in an area noting consist of pockets of natural organic deposits of peat, muck, and organic remains. This would explain the presence of trace black staining at depth in a number of the boreholes, as noted above. While specific deposits of peat or highly organic material were not encountered in the boreholes, they may be present within the area of natural drainage features, or closer to Lake Couchiching.

Groundwater Observations

All of the boreholes were noted to be in a generally wet condition, with ‘wet’ sample spoons noted below depths of about 1 to 2 metres. Borehole Nos. 3, 6, and 7 were noted to have ‘caved’ to depths of between approximately 3.7 to 4.3 metres and ‘wet’, while Borehole No. 8 was noted to have ‘caved’ and ‘wet’ at a depth of 2.7 metres upon completion. 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. 3, 6, 7, and 9, to allow for future measurements of the static groundwater level. A data logger was installed in the monitoring wells to allow for continuous monitoring of the groundwater level between April 7 and April 22, 2021, the readings of which have been illustrated in the following graphs:


BH3 (Ground Surface Elevation of 95.58 metres)
Groundwater Level
Ground Surface Elevation
97
96.5
96
95.5
95
94.5
94
93.5
Elevation (m)
4/8/2021 0:00
4/10/2021 0:00
4/12/2021 0:00
4/14/2021 0:00
4/16/2021 0:00
4/18/2021 0:00
4/20/2021 0:00
4/22/2021 0:00
4/24/2021 0:00
Date


BH6 (Ground Surface Elevation of 94.13 metres)
97
96.5
96
95.5
95
94.5
94
93.5
93
92.5
92
Elevation (m)
4/8/2021 0:00
4/10/2021 0:00
4/12/2021 0:00
4/14/2021 0:00
4/16/2021 0:00
4/18/2021 0:00
4/20/2021 0:00
4/22/2021 0:00
4/24/2021 0:00
Date


BH7 (Ground Surface Elevation of 93.27 metres)
Elevation (m)
97
96.5
96
95.5
95
94.5
94
93.5
93
92.5
92
91.5
91
90.5
90
89.5
4/8/2021 0:00
4/10/2021 0:00
4/12/2021 0:00
4/14/2021 0:00
4/16/2021 0:00
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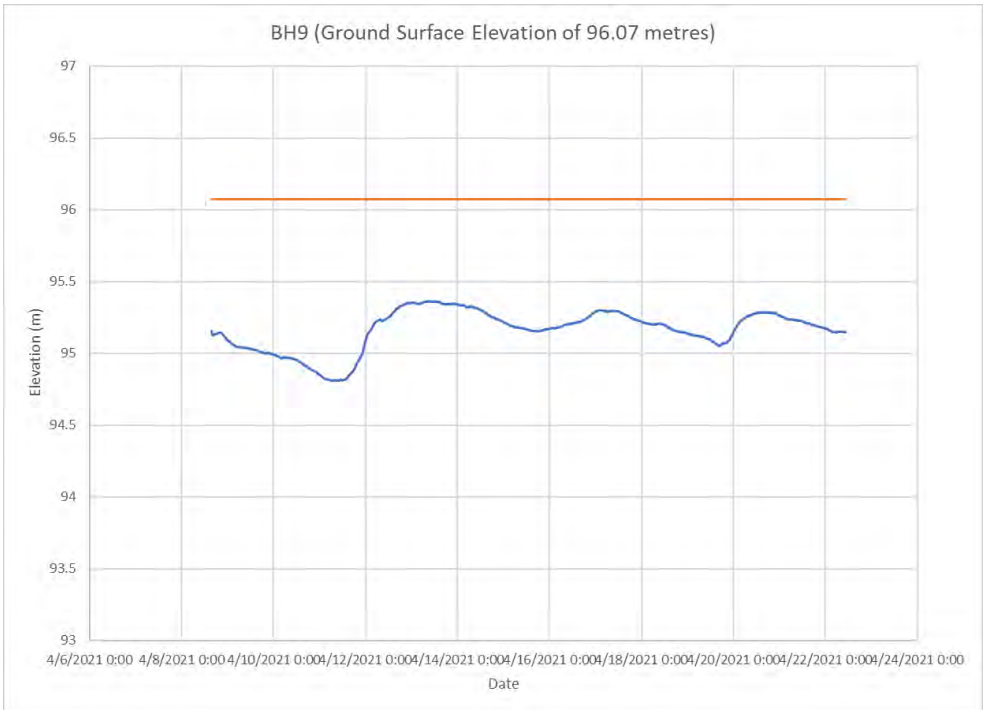
4/20/2021 0:00
4/22/2021 0:00
4/24/2021 0:00
Date


BH9 (Ground Surface Elevation of 96.07 metres)
Elevation (m)
97
96.5
96
95.5
95
94.5
94
93.5
93
4/6/2021 0:00
4/8/2021 0:00
4/10/2021 0:00
4/12/2021 0:00
4/14/2021 0:00
4/16/2021 0:00
4/18/2021 0:00
4/20/2021 0:00
4/22/2021 0:00
4/24/2021 0:00
Date

SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW-3	95.58	0.8 to 1.1	94.5 to 94.8
MW-6	94.13	0.3 to 0.5	93.6 to 93.8
MW-7	93.27	0.6 to 0.8	92.5 to 92.7
MW-9	96.07	0.7 to 1.1	95.0 to 95.4

It is noted that the groundwater elevations indicated are based on reference to a temporary benchmark with an assumed elevation, as noted above, and should be corrected upon determination of the geodetic elevation of the benchmark utilised.

The groundwater level observed indicates a groundwater level on the order of approximately 0.3 to 1.1 metres below the existing grade, at an elevation of roughly 90.5 to 95.5 metres, varying with the physical topography of the land. It is noted that the observed groundwater level in the area may be influenced by the adjacent drainage courses running through the area. Furthermore, given the time of year of monitoring, the measured levels would be considered generally representative of a seasonal 'high' condition. Further long-term monitoring with additional monitoring wells may allow for a more accurate estimate of the static groundwater level over the various seasons of the year. It is noted that the observed high groundwater levels are likely due to the proximity and relative elevation to Lake Couchiching.

Discussion of Site Soil and Groundwater Conditions

As noted above the subsurface conditions are characterized as predominantly silt soils with clayey layers in a saturated state due to relatively high groundwater conditions. The on-site soils over the subject site are generally suitable for the proposed development but will present some challenges. Fine-grained soils such as these are quite susceptible to disturbance due to moisture conditions, and will be further exacerbated due to the relatively high groundwater conditions. As such the silt soils are prone to base instability, disturbance from foot and construction traffic, etc., and will present difficulties for compaction and earthworks. This may require modified or alternative placement and compaction efforts.

Due to the conditions noted above, site servicing and grading, roadway construction, excavations for foundations, and general earthworks will present difficulties, with the south and east half of the site likely to encounter the greatest challenges. This area is notably lower than the north and west half in elevation, and as seen from the groundwater level data will be in a wet to saturated state as shallow as approximately

0.3 metres below the existing ground surface. To account for these conditions, it would be beneficial to raise the grade as much as possible so that the underside of footings are not more than roughly 0.3 to 1.0 metres below the existing ground surface, while also ensuring proper frost coverage. This will be even more prudent in the southern half of the site where groundwater conditions are very high as noted above. Conducting earthworks and engineered fill during the dry summer months of the year would tend to improve the effectiveness of compaction and achieve better results. Conversely, roadway construction during the wet periods would tend to increase the need for subgrade stabilisation.

Additional investigations of the subject site would be prudent, including the advancement of a series of test pits to further assess the effect of the soil and groundwater conditions on the proposed earthworks for the development.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 3 metres below the existing grade. As noted above, efforts to raise the site grade as much as possible and thus reduce the depth of excavation required below the existing grade will help to simplify excavation requirements. Excavations through any surficial fill and the fine-grained silt soils would be expected to remain stable at inclinations of up to 45 degrees to the horizontal. Where wet/more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to 'slough in' to as flat as 3 horizontal to 1 vertical, or flatter. Not withstanding the foregoing, however, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native silt soils anticipated would be considered a Type 3 soil, as outlined in the Ontario Health and Safety Act III – Excavation. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

Depending on the depth of excavation and the weather conditions at the time of construction, stabilisation of the excavation bases may be required. Given the generally wet silt soils some degree of base stabilization should be anticipated, such as additional bedding or ballast stone, or the placement of coarse crushed aggregate 'punched' into the disturbed excavation base. With the excavation base in a stable condition, stabilised where required, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or Township of Severn should be

satisfactory, however as noted above some base stabilisation may be required for deeper excavations. 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.

As noted above the groundwater levels were measured to be on the order of approximately 0.3 to 1.1 metres below the existing ground surface. With some excavations likely extending near or below this level some groundwater infiltration into open excavations should be anticipated. The generally fine grained granular to cohesive soils should yield a relatively low rate of groundwater infiltration such that it should be possible to adequately control groundwater infiltration for the short construction period, in excavations extending a short distance below the groundwater level, using conventional construction dewatering techniques. Surface water should be directed away from the excavations.

Where deeper excavations are required, extending significantly below the groundwater level or into the perched water deposits, or where excavations are required to be open for a longer period of time, some difficulty may be encountered with base and side slope stability, groundwater control, etc. The sides of excavations may tend to slump in to flatter stable inclinations. The base of excavations may have a tendency to become unstable, requiring the placement of coarse ballast stone material, additional bedding material, etc. Additional sumps may be required to control groundwater infiltration, and the use of more sophisticated groundwater control methods may be considered necessary for excavations deeper than about 1 to 2 metres below the present grade, as noted above. The presence of the more ‘silty’ layers will tend to exacerbate the difficulties associated with groundwater infiltration. In this regard it would be prudent to advance a series of test excavations to observe first hand how the groundwater level will impact open excavations, including rate of groundwater infiltration, stability, etc.

Contractors may be successful in undertaking servicing construction ‘in the wet’, anticipating wider trench excavation and the need for base stabilisation. Excavations should begin at the low-end of the sewer alignment to allow drainage away from the working area. The work should be coordinated so that a section of pipe is installed as quickly as possible after excavation and provided with an initial cover of at least 0.6 metres to 0.9 metres of backfill on the same day it is installed.

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, existing dwellings, etc. depending on their proximity to the trench excavations. It is recommended that a pre-condition survey of any existing adjacent structures/dwellings prior to construction.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the silt, clayey silt and sandy silt soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

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. It is also noted that these fine grained granular to cohesive soils will present difficulties in achieving effective compaction where access with compaction equipment is restricted. The on-site soils encountered are generally considered to be 'wet' of their standard Proctor optimum moisture content, and often in a saturated condition. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these 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. It may also be necessary to modify the compaction methods based on the material condition, adjusting the lift thickness and reducing the use of vibration. In this regard, conducting earthworks during the dry summer months of the year will tend to help achieve a more effective compaction process.

It is anticipated that excavations for the installation of site services will extend approximately near or below the groundwater table, depending on the final grading of the site. Such excavations will have the potential for intercepting the shallow groundwater and thus creating a "French Drain" within the bedding material, with possible local affect to the groundwater level. Consequently, if groundwater is

encountered during digging of the service trenches, measures may need to be implemented to mitigate/eliminate groundwater interference. These would include clay 'cut-offs' within the service trench fill encasing the pipe/service. Such clay cut-offs should be installed in accordance with OPSD 802.095, using a suitable clay soil or alternatively a blend of 1 part bentonite chips to 3 parts OPSS Granular A.

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 the fill structure 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 fine grained to cohesive 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 backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise 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 per cent 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'. 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 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent 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, stabilised 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 compaction of the fill around these structures is not adequate, causing 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 100 per cent of its standard Proctor maximum dry density. A geofabric separator should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 100 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent 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 subexcavated 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. It may also be prudent to consider the provision of a heavy geofabric over the subgrade to act as a separator between the subgrade and granular base where the subgrade is wet and saturated.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface

water and to prevent 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 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 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. Based on the established site soil and groundwater conditions, the need for additional subgrade preparation should be anticipated, such as additional granular material, the use of geogrid products, etc.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. For this project, a recommended minimum pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 65 millimetres of HL8 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Notwithstanding, the pavement structure should conform to the relevant Township of Severn requirements where they are to be assumed by the Town. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or Township of Severn requirements. 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 raking 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 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 AND TOWNHOUSE CONSTRUCTION

Based on the observed groundwater conditions, it is recommended that the design founding level for residential dwellings and townhouse blocks be limited to depths of no greater than 0.3 to 1.0 metres below the existing grade, perhaps less pending a more detailed assessment of the seasonal variation in groundwater level across the site. 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, or otherwise unsuitable materials. This typically considers a nominal design bearing pressure of 75 kPa [~1,500 psf]. 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.

It is anticipated that the site grading works will require engineered fill below founding elevations over portions of the site; where this is the case 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. On a preliminary basis 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, pending confirmation based on monitoring and testing of the engineered fill works.

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 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 minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This 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 millimeters from the top of the foundation walls at a minimum, depending on 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 continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

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. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an ‘oversized’ reservoir and a ‘back-flow’ prevention valve so that the sump pump will not cycle repeatedly within short time periods. In addition, consideration should be given to the installation of an automatic back-up system in order to ensure operation in the event of loss of power or mechanical failure of the primary pump.

All footings exposed to the environment must be provided with a minimum of 1.5 meters 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. ENVIRONMENTAL CONSIDERATIONS

As noted above, six [6] representative samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background analytical testing for a standard panel of metal and inorganic parameters as well as petroleum hydrocarbons [PHCs] and volatile organic compounds [VOCs]. The purpose of this testing was to characterise the subsurface soils and provide comments with respect to the off-site disposal of surplus soil during construction. The results of this testing are presented in the attached AGAT Certificate of Analysis [21T733225].

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 parameters tested.
2. The submitted samples were found to meet the Table 2.1 and 3.1 [RPI] Standards all the parameters tested.
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. No hydrocarbon staining or odours were observed during the fieldwork. If any significant changes are noted, i.e., odours, staining etc., SOIL-MAT should be contacted to reassess the environmental characteristics of the soil.

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, surplus material may be accepted at an off-site Table 1 property, including property subject to a Record of Site Condition or MECP Certificate of Authorisation, pending approval of the receiving property owner.
- As the tested material has been shown to meet the Table 2.1 and 3.1 [RPI] Standards, surplus material may reasonably be accepted at an off-site RPI property, pending approval of the receiving property owner.
- As the tested material has been shown to meet the Table 2.1 and 3.1 [ICC] Standards, surplus material may reasonably be accepted at an off-site ICC property, pending approval of the receiving property owner.
- 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 where surplus soil is identified to be removed from the site, it may be necessary to undertake additional testing as a function of volume, as outlined in Regulation 406/19, in order to satisfy the requirements of a given receiving site. Likewise, where it is required for fill material to be imported to the site, it would be necessary to develop a Fill Management Plan in accordance with the requirements of Regulation 406/19.

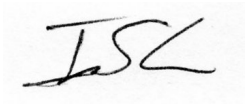
10. GENERAL COMMENTS

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, B.Eng., EIT.



Ian Shaw, P. Eng., QP_{ESA}
Senior Engineer

Enclosures: Drawing No.1, Borehole Location Plan
Log of Borehole Nos. 1 to 9, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction
AGAT Certificate of Analyses [21T733225]

Distribution: LIV Communities [1, plus pdf]

LEGEND

Borehole Location
BH#

Temporary Benchmark
Base of hydro pole.
TBM Assumed elevation of 100.00 metres

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Geotechnical Report SM 301553-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Shadow Creek Residential Development
Highway 11 and Menoke Beach Road
Orillia, Ontario

Borehole Location Plan

Project No. SM 301553-G

Date: April 2021

Drawn: SW	Checked: IS

SM 301553-G Borehole Location Plan

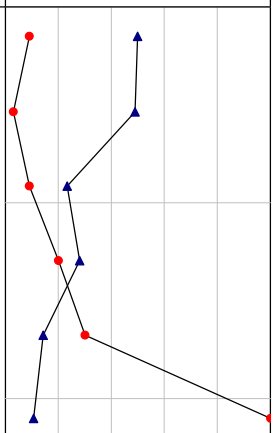
Drawing No. 1

Log of Borehole No. 1

Project No: SM 301553-G
Project Manager: Ian Shaw, P. Eng.
Project: Proposed Residential Development
Borehole Location: See Drawing No. 1
Location: Highway 11 and Menoke Beach Road
UTM Coordinates - N: 4949733
Client: LIV Communities
E: 626783

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		100.81	Ground Surface							
0	0		**Topsoil** Approximately 150 millimetres of topsoil.	SS	1	3 4 5 7	9			
3	1	99.30	**Silt** Brown, trace sand and gravel, with some clay, firm to hard.	SS	2	3 2 1 5	3			
6	2	98.50	Cobbles and gravel	SS	3	5 5 4 45	9			
9	3		Transition to grey	SS	4	5 9 11 16 wet spoon	20			
12	4	96.40		SS	5	40 17 13 25	30			
15	5		End of Borehole Practical auger and spoon refusal on assumed bedrock	SS	6	50/2"	100			
18	6									
21	7									
24	8									
27	9									
30	10									
33	11									
36	12									
39										

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



NOTES:

1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to practical auger and spoon refusal on assumed bedrock at a depth of 4.4 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: April 8, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949897
E: 626787

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		98.08	Ground Surface							
0	0	97.78	**Topsoil** Approximately 300 millimetres of topsoil.	SS	1	2 1 1 1	2			
3	1		**Silt** Greyish brown, trace sand and gravel, with some clay, firm to hard.	SS	2	5 7 7 4 moist spoon	14			
7	2	95.80		SS	3	1 1 1 16 wet spoon	2			
			End of Borehole Practical auger and spoon refusal on assumed bedrock	SS	4	50/2" wet spoon	100			

NOTES:

1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to practical auger and spoon refusal on assumed bedrock at a depth of 2.3 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.

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

Drill Method: Solid Stem Augers
Drill Date: April 8, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

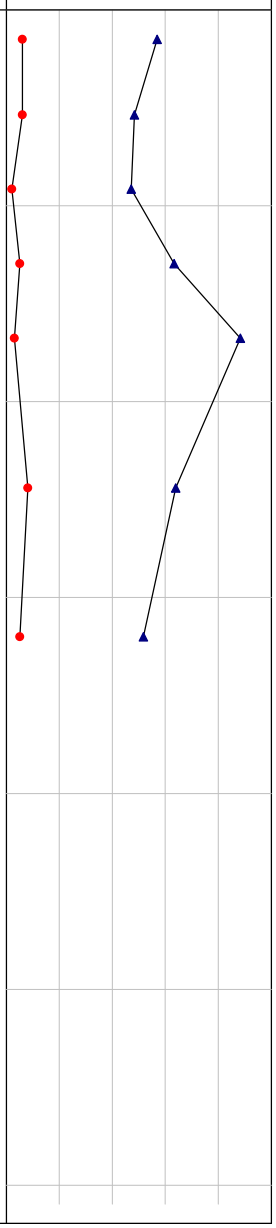
Log of Borehole No. 3

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949948
E: 626945

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	95.58	Ground Surface							
0 / 0	95.33	**Topsoil** Approximately 250 millimetres of topsoil.							
3 / 1		**Silt** Greyish brown, trace sand and gravel, with some clay, traces of black staining, firm to hard.	SS	1	2 1 5 5	6			
			SS	2	4 3 3 5 moist spoon	6			
6 / 2			SS	3	2 1 1 0 moist spoon	2			
9 / 3	92.60		SS	4	2 2 3 2 moist spoon	5			
		Clayey Silt/Silt Greyish brown, trace sand, soft to firm.	SS	5	2 2 1 3 moist spoon	3			
13 / 4	91.50	Transition to grey							
16 / 5			SS	6	3 3 5 6 moist spoon	8		<1.0	
20 / 6									
21 / 6	88.90		SS	7	3 2 3 3 moist spoon	5		<1.0	
22 / 7		End of Borehole							

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open until 3.7 metres and 'wet' 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 at this location upon completion and equipped with a data logger to monitor long-term groundwater fluctuations.

Drill Method: Solid Stem Augers
Drill Date: April 8, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949593
E: 626704

Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		100.91	Ground Surface							
0	0		**Topsoil** Approximately 100 millimetres of topsoil.							
1			**Silt** Greyish brown, trace sand and gravel, with some clay, traces of black staining, firm to hard.	SS	1	2 2 4 5	6			
2	1			SS	2	2 3 3 4 moist spoon	6			
3				SS	3	5 9 10 12 moist spoon	19			
4	2			SS	4	9 14 20 28 moist spoon	34			
5				SS	5	18 18 21 26 moist spoon	39			
6	3									
7		96.10		SS	6	7 50/3" moist spoon	100			
8	4		End of Borehole Practical auger and spoon refusal on assumed bedrock							
9			NOTES: 1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to termination at a depth of 4.8 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.							
10	5									
11										
12	6									
13										
14	7									
15										
16	8									
17										
18	9									
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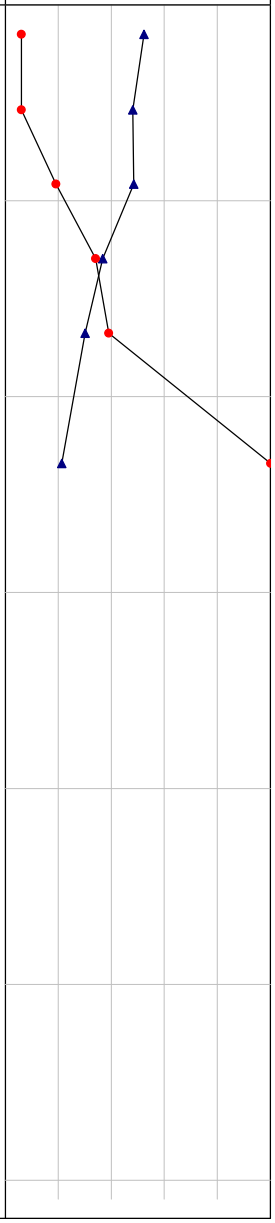
Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



Drill Method: Solid Stem Augers
Drill Date: April 8, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949250
E: 626858

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	95.66	Ground Surface								
0 / 0	95.41	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	1 2 3 5	5			
3 / 1		**Silt** Greyish brown, trace sand and gravel, with some clay, traces of black staining, firm.		SS	2	0 0 0 1 moist spoon	0			
6 / 2	93.90	Increased clay content		SS	3	2 1 1 3 moist spoon	2		<1.0	
9 / 3				SS	4	2 1 2 1 moist spoon	3		<1.0	
12 / 4				SS	5	2 1 2 3 moist spoon	3		<1.0	
13 / 4	91.60	Transition to grey								
15 / 5	91.10	High clay content		SS	6	3 1 3 3 moist spoon	4		<1.0	
21 / 6				SS	7	2 5 2 2 moist spoon	7		<1.0	
29 / 9	86.60	End of Borehole Practical auger refusal on assumed bedrock								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to practical auger refusal at a depth of 9.1 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: April 8, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 6

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

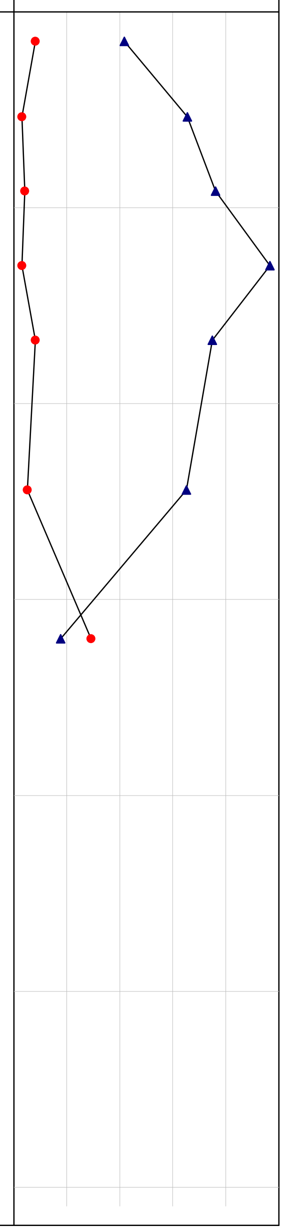
Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949096
E: 626907

Soil-Mat

Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	PP (kgf/cm2)
0	94.13	Ground Surface					
		Topsoil Approximately 150 millimetres of topsoil.	SS	1	2 3 5 7	8	
		Silt Greyish brown, trace sand and gravel, with some clay, traces of black staining, firm to very stiff.	SS	2	2 1 2 3 moist spoon	3	
	92.60	Increased clay content	SS	3	2 2 2 2 wet spoon	4	
			SS	4	2 2 1 2 wet spoon	3	<1.0
	90.90	Transition to grey	SS	5	4 3 5 4 wet spoon	8	
			SS	6	2 3 2 3 wet spoon	5	
	87.40		SS	7	4 8 21 50/4" wet spoon	29	
		End of Borehole Spoon refusal on assumed bedrock					

Columns also include: Symbol, Well Data, Recovery, U.Wt.(kN/m3)

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open until 4.3 metres and 'wet' 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 at this location upon completion and equipped with a data logger to monitor long-term groundwater fluctuations.

Drill Method: Solid Stem Augers
Drill Date: April 9, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 7

Project No: SM 301553-G
Project: Proposed Residential Development
Location: Highway 11 and Menoke Beach Road
Client: LIV Communities

Project Manager: Ian Shaw, P. Eng.
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4949329
E: 627095

Depth (ft / m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	93.27	Ground Surface							
		Topsoil Approximately 150 millimetres of topsoil.	SS	1	2 2 4 6	6			
		Silt Greyish brown, trace sand and gravel, with some clay, traces of black staining, firm to very stiff.	SS	2	1 1 1 1	2			
			SS	3	1 2 2 2	4		<1.0	
			SS	4	1 1 3 3	4		<1.0	
10 / 3	89.90	Transition to grey	SS	5	2 3 4 6 wet spoon	7		<1.0	
			SS	6	2 3 2 4 wet spoon	5			
		NOTES: 1. Borehole was advanced using solid stem auger equipment on April 8, 2021 to termination at a depth of 6.7 metres. A dynamic cone was then driven to a depth of approximately 11.0 metres. 2. Borehole was recorded as open until 4.0 metres and 'wet' 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 at this location upon completion and equipped with a data logger to monitor long-term groundwater fluctuations.	SS	7	1 0 2 3 wet spoon	2			
			DC	8		4			
			DC	8		3			
			DC	9		5			
			DC	10		7			
			DC	11		6			
			DC	12		8			
			DC	13		12			
			DC	14		23			
			DC	15		12			
			DC	16		16			
			DC	17		14			
			DC	18		13			
			DC	19		18			
36 / 11	82.30	End of Borehole Dynamic cone refusal on assumed bedrock	DC	20		28			

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)

Drill Method: Solid Stem Augers
Drill Date: April 9, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker 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

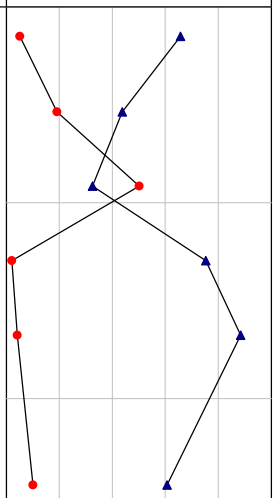
Datum: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 8

Project No: SM 301553-G
Project Manager: Ian Shaw, P. Eng.
Project: Proposed Residential Development
Borehole Location: See Drawing No. 1
Location: Highway 11 and Menoke Beach Road
UTM Coordinates - N: 4949384
Client: LIV Communities
E: 626701

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.28	Ground Surface								
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	1 2 3 5	5			
3 / 1	98.20	**Silt** Greyish brown, trace sand and gravel, with some clay, hard to firm.		SS	2	5 8 11 15	19			
6 / 2		Transition to grey		SS	3	15 23 27 17 moist spoon	50			
7 / 2	97.00	Increased clay content		SS	4	2 1 1 2 wet spoon	2		<1.0	
10 / 3				SS	5	2 1 3 2 wet spoon	4		<1.0	
16 / 5				SS	6	7 5 5 7 wet spoon	10		<1.0	
21 / 6	92.80	End of Borehole Practical auger refusal on assumed bedrock								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on April 9, 2021 to practical auger refusal at a depth of 6.5 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 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.

Drill Method: Solid Stem Augers
Drill Date: April 9, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker Drilling

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T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Log of Borehole No. 9

Project No: SM 301553-G
Project Manager: Ian Shaw, P. Eng.
Project: Proposed Residential Development
Borehole Location: See Drawing No. 1
Location: Highway 11 and Menoke Beach Road
UTM Coordinates - N: 4949700
Client: LIV Communities
E: 626905

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	96.07	Ground Surface								
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 3 6 7	9			
3 / 1		**Silt** Greyish brown, trace sand and gravel, with some clay, firm to stiff.		SS	2	2 3 3 4 wet spoon	6			
6 / 2	93.90	Transition to grey		SS	3	4 6 6 5 wet spoon	12			
9 / 3	93.20	Increased clay content		SS	4	3 4 6 6 wet spoon	10			
13 / 4	91.80			SS	5	4 3 3 6 wet spoon	6			
14 / 5		End of Borehole Practical auger and spoon refusal on assumed bedrock								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on April 9, 2021 to termination at a depth of 4.3 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.

4. A monitoring well was installed at this location upon completion and equipped with a data logger to monitor long-term groundwater fluctuations.

Drill Method: Solid Stem Augers
Drill Date: April 9, 2021
Hole Size: 150 millimetres
Drilling Contractor: Walker Drilling

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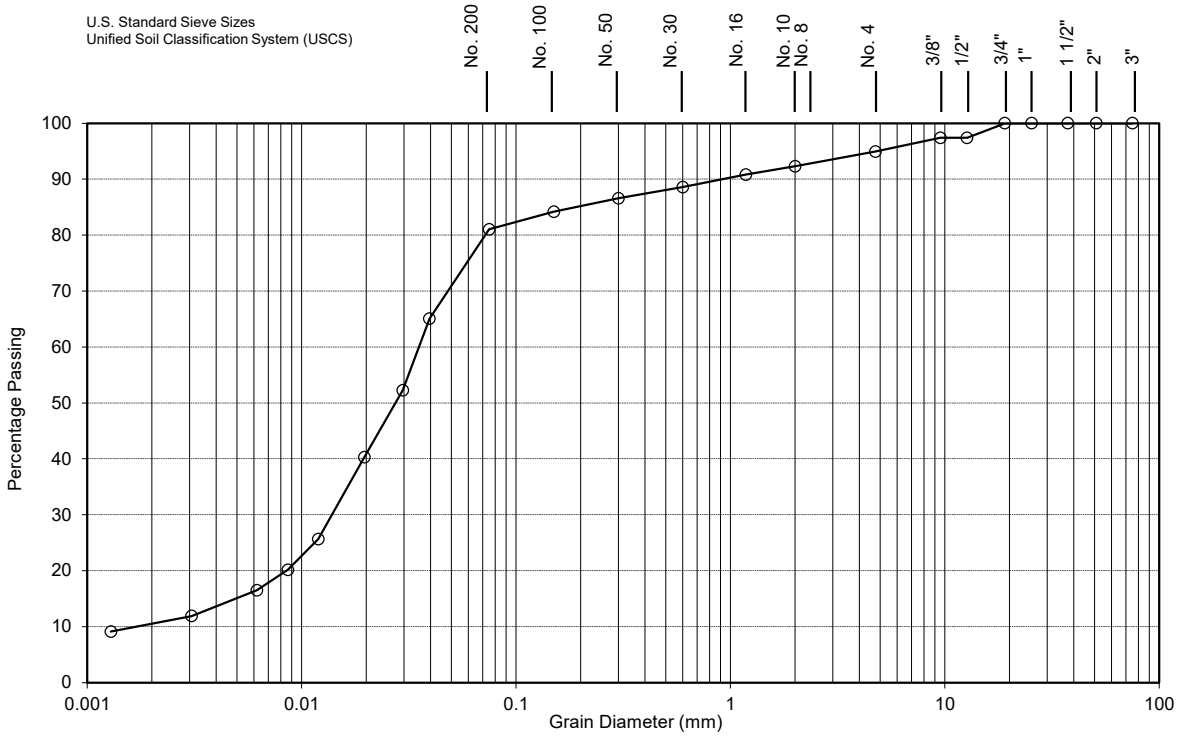
Datum: Temporary
Field Logged by: SW
Checked by: IS
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**21-143**	Notes: Depth 7.5'			
Sample No.:	SS4				
Borehole No.:	1				
CLAY [%]:	**11**	Soil Description:	**Brown Silt w/ some Sand and Clay and traces of Gravel**		
SILT [%]:	**70**		**M.L. - Inorganic silts and very fine Sands, silty fine sands**		
SAND [%]:	**14**				
GRAVEL [%]:	**5**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0018**	Coefficient of Uniformity C_U:	**19.4**	Coefficient of Curvature C_C:	**3.6**

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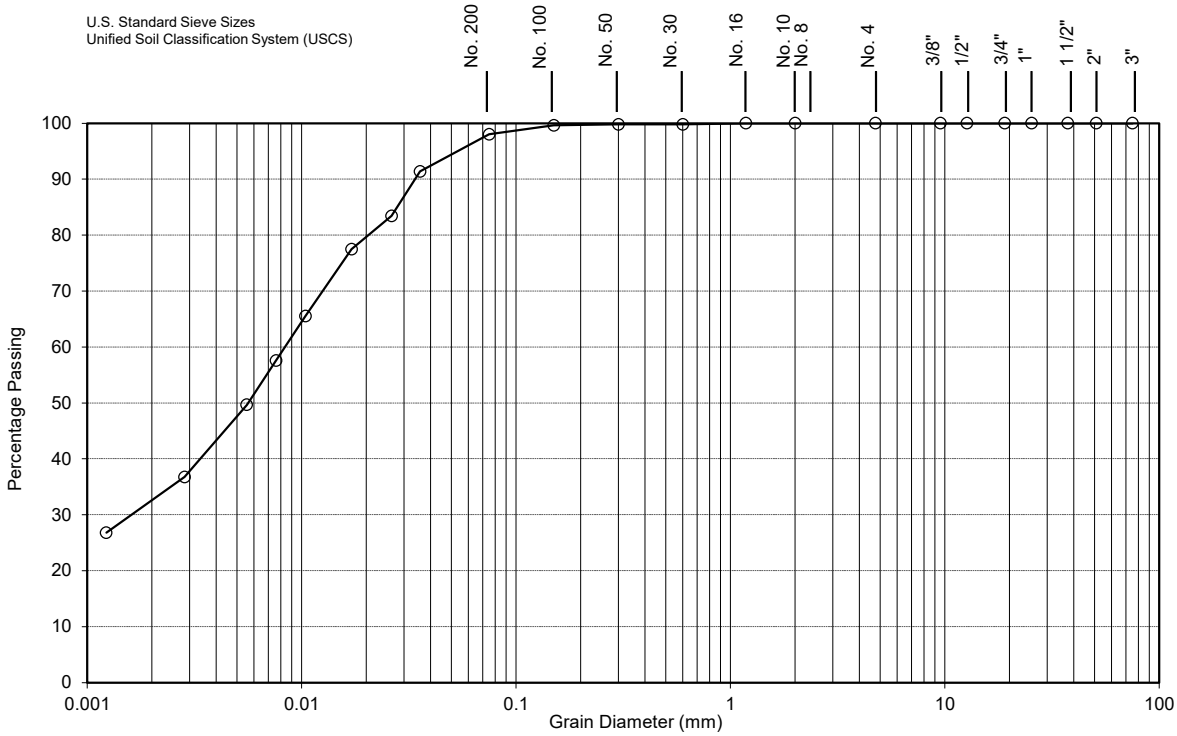
Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 1**	**Project No.: SM 301553-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

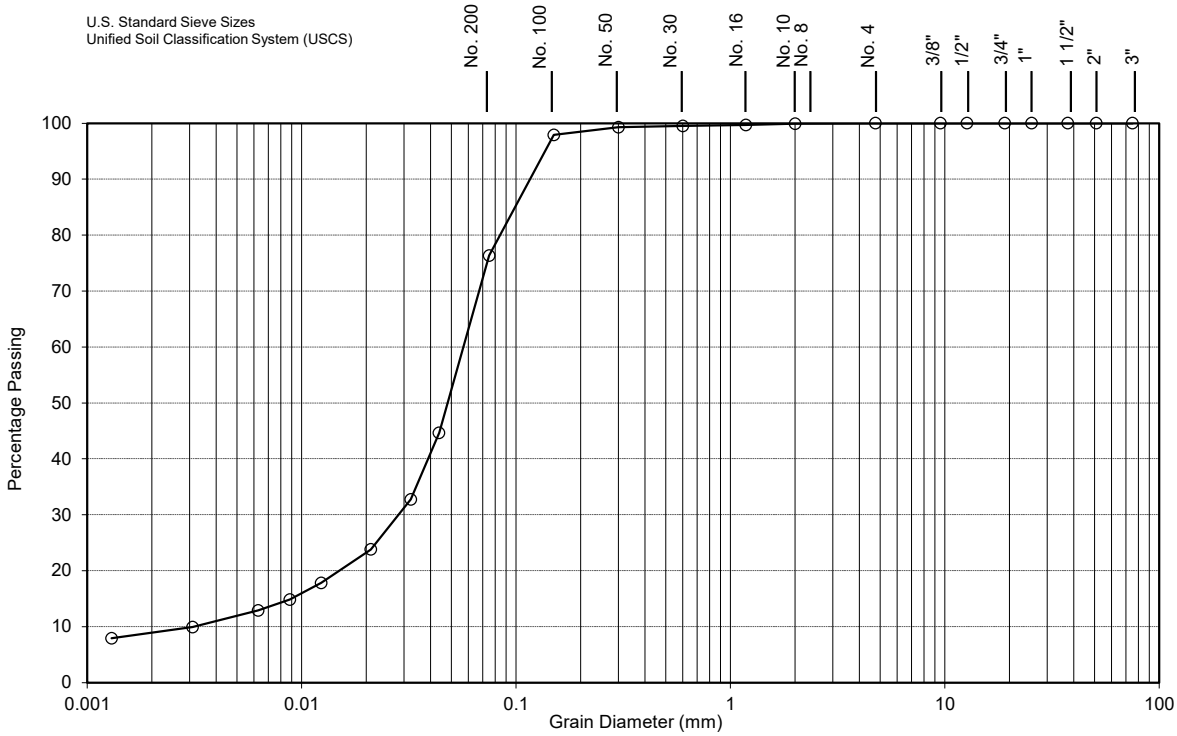
Lab No.:	**21-141**	Notes: Depth 10'			
Sample No.:	SS5				
Borehole No.:	3				
CLAY [%]:	**32**	Soil Description: **Brown Clayey Silt w/ traces of Sand**			
SILT [%]:	**66**	**M.L. - Inorganic silts, clayey silts with slight plasticity to C.L. - Inorganic clays of low to meduim plasticity**			
SAND [%]:	**2**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0008**	Coefficient of Uniformity C_U:	**10.6**	Coefficient of Curvature C_C:	**0.4**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 2**	**Project No.: SM 301553-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

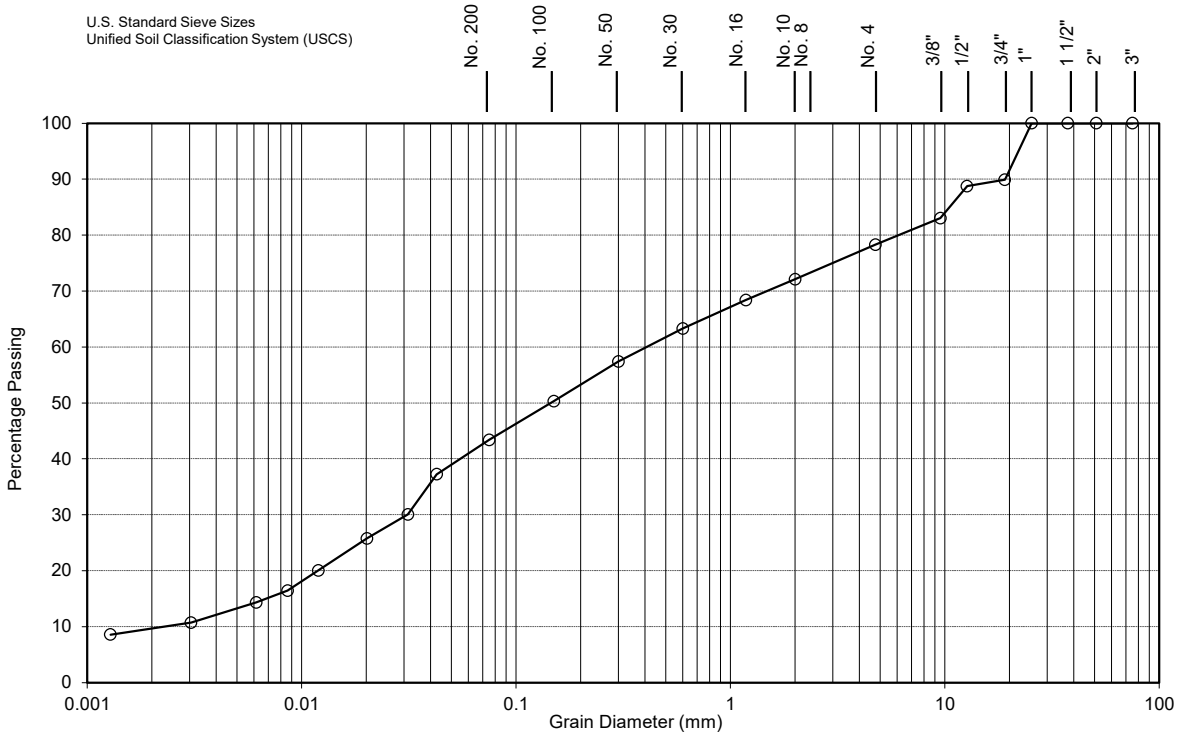
Lab No.:	**21-144**	Notes: Depth 7.5'			
Sample No.:	SS4				
Borehole No.:	4				
CLAY [%]:	**9**	Soil Description:	**Brown Sandy Silt w/ traces of Clay**		
SILT [%]:	**67**		**M.L. - Inorganic silts and very fine Sands, silty fine sands**		
SAND [%]:	**24**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**15**	Estimated Permeability, k [cm/s]	**10^{-5}**
D_{10} (Effective Diam. in mm):	**0.003**	Coefficient of Uniformity C_U:	**19.0**	Coefficient of Curvature C_C:	**4.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 3**	**Project No.: SM 301553-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

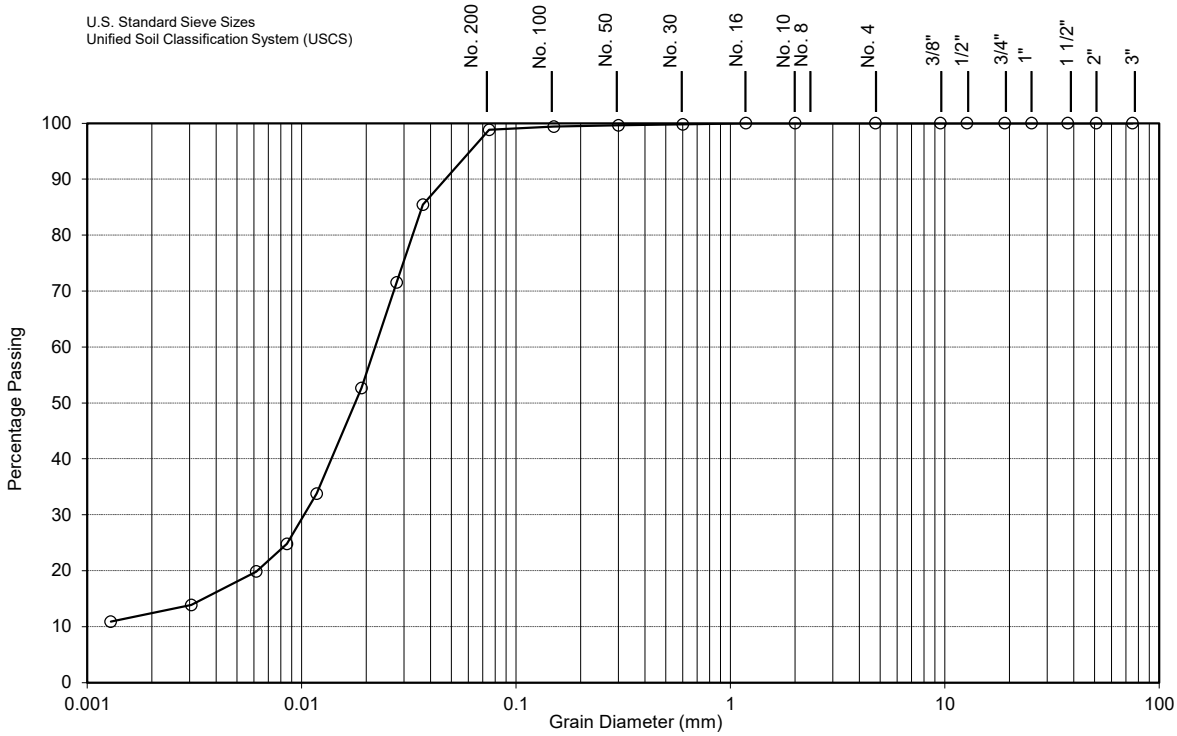
Lab No.:	**21-142**	Notes: Depth 20'			
Sample No.:	SS7				
Borehole No.:	6				
CLAY [%]:	**10**	Soil Description: **Brown Gravelly Silty Sand w/ some Clay**			
SILT [%]:	**33**	**M.L. - Inorganic silts and very fine Sands, silty fine sands; to S.C. - clayey sands, sand-clay mixtures**			
SAND [%]:	**35**	**to S.C. - clayey sands, sand-clay mixtures**			
GRAVEL [%]:	**22**	Estimated Infiltration Rate [mm/hr] :	**12**	Estimated Permeability, k [cm/s]	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.002**	Coefficient of Uniformity C_U:	**200.0**	Coefficient of Curvature C_C:	**1.1**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 4**	**Project No.: SM 301553-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

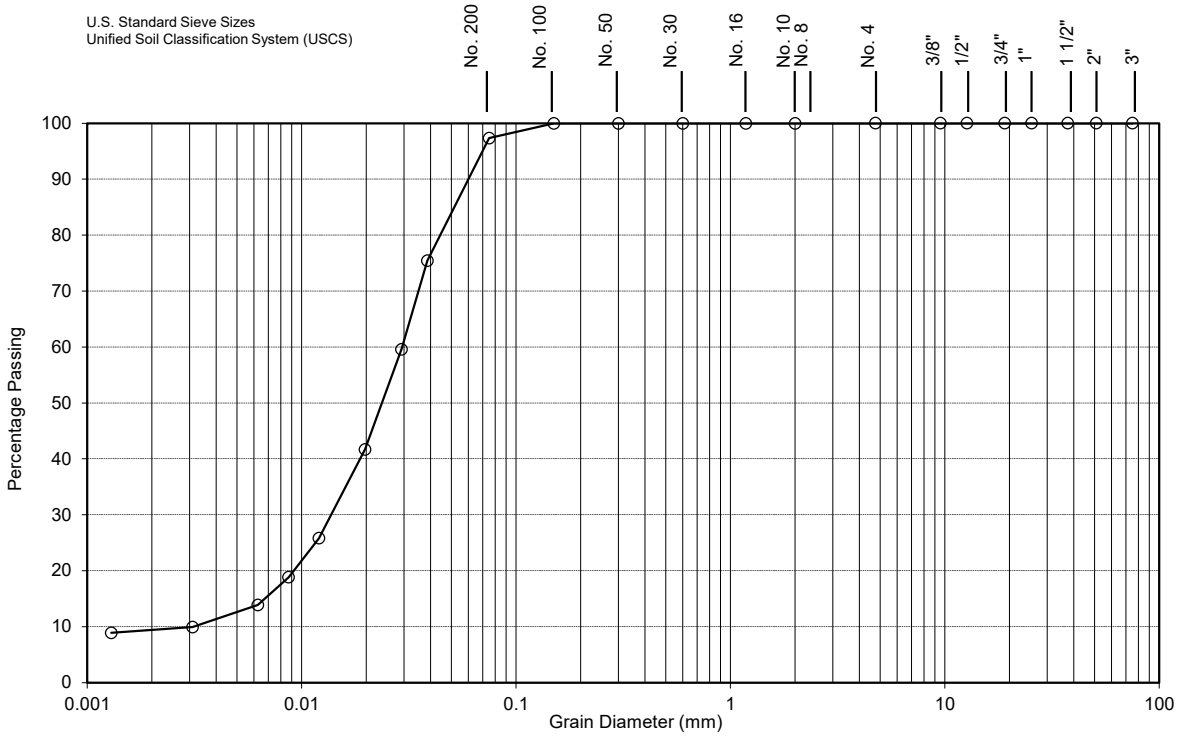
Lab No.:	**21-140**	Notes: Depth 15'			
Sample No.:	SS6				
Borehole No.:	7				
CLAY [%]:	**13**	Soil Description:	**Brown Silt w/ some Clay and traces of Sand**		
SILT [%]:	**86**		**M.L. - Inorganic silts, clayey silts with slight plasticity**		
SAND [%]:	**1**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0012**	Coefficient of Uniformity C_U:	**18.3**	Coefficient of Curvature C_C:	**4.6**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 5**	**Project No.: SM 301553-T**

Mechanical & Hydrometer Analyses



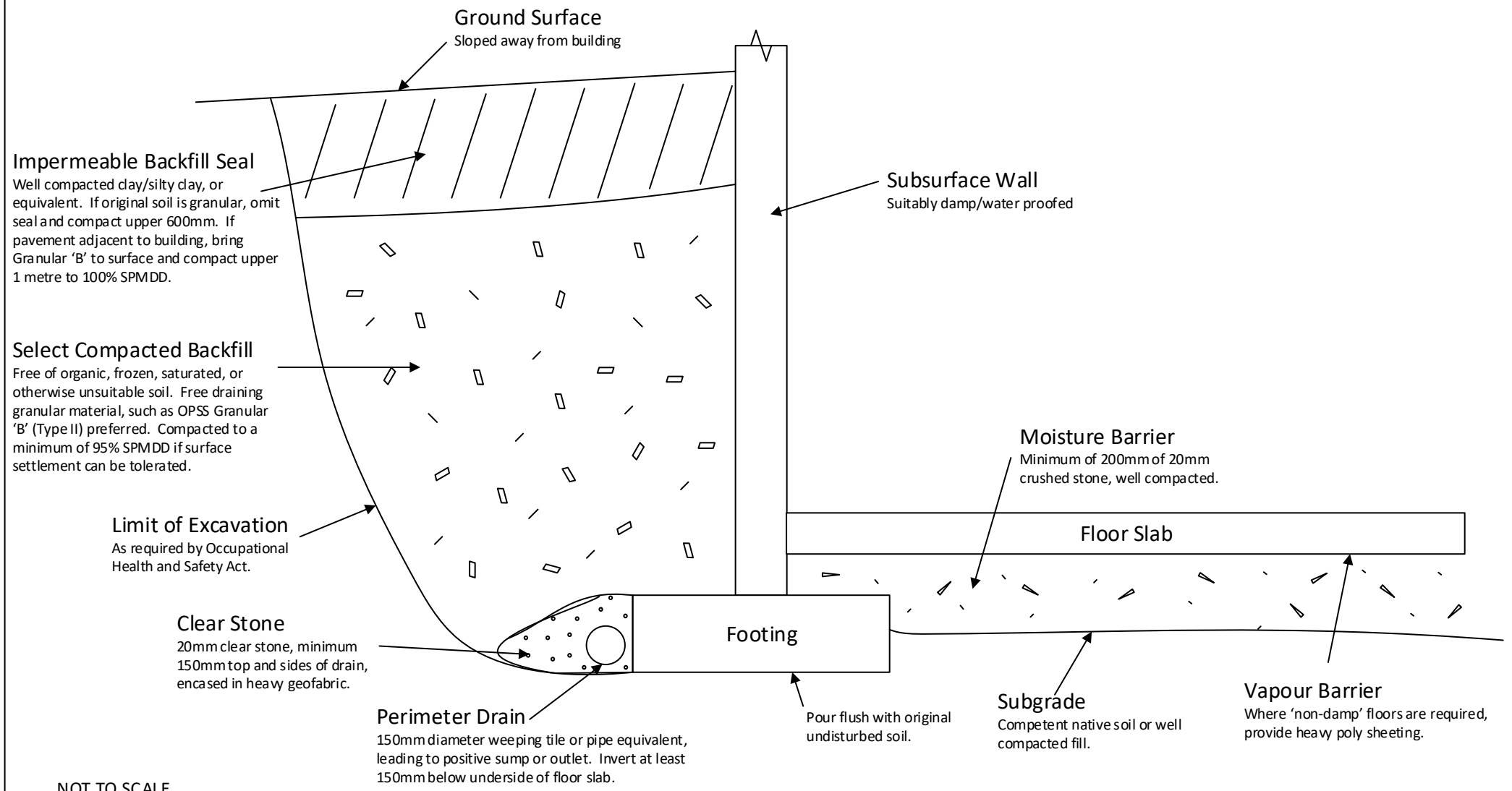
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**21-145**	Notes: Depth 10'			
Sample No.:	SS5				
Borehole No.:	9				
CLAY [%]:	**9**	Soil Description:	**Brown Silt w/ traces of Clay and Sand**		
SILT [%]:	**88**		**M.L. - Inorganic silts, silts with slight plasicity**		
SAND [%]:	**3**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0032**	Coefficient of Uniformity C_U:	**14.5**	Coefficient of Curvature C_C:	**3.9**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Shadow Creek, Township of Severn, Ontario

April 2020	**Grain Size Analysis No. 6**	**Project No.: SM 301553-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301553-G
Date:	May 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

AGAT Laboratories

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

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

ATTENTION TO: Ian Shaw

PROJECT: Shadow Creek, Orillia

AGAT WORK ORDER: 21T733225

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Apr 19, 2021

PAGES (INCLUDING COVER): 14

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.

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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TEL (905)712-5100
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Certificate of Analysis

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

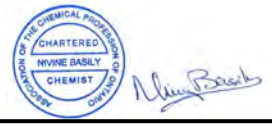
O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-04-13

DATE REPORTED: 2021-04-19

		SAMPLE DESCRIPTION:		BH1 SS2	BH3 SS2	BH4 SS2	BH6 SS2	BH7 SS2	BH9 SS2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2021-04-08	2021-04-08	2021-04-08	2021-04-09	2021-04-09	2021-04-09 12:00
Parameter	Unit	G / S	RDL	2342511	2342512	2342513	2342514	2342515	2342516
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	2	2	2	2	1
Barium	µg/g	220	2.0	61.3	66.9	78.4	73.0	51.5	38.4
Beryllium	µg/g	2.5	0.4	<0.4	0.4	0.4	0.4	<0.4	<0.4
Boron	µg/g	36	5	<5	5	<5	7	<5	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	20	27	24	26	20	16
Cobalt	µg/g	21	0.5	4.6	5.9	6.1	7.0	5.6	4.0
Copper	µg/g	92	1.0	11.9	10.7	13.6	15.2	12.5	9.6
Lead	µg/g	120	1	2	3	3	4	3	2
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	8	13	12	14	11	8
Selenium	µg/g	1.5	0.8	<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	<0.5
Thallium	µg/g	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g	2.5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	41.4	38.8	50.6	46.5	37.8	35.8
Zinc	µg/g	290	5	26	26	35	33	27	19
Chromium, Hexavalent	µg/g	0.66	0.2	<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	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.194	0.128	0.169	0.090	0.051	0.080
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	N/A	0.247	0.286	0.506	0.210	0.207	0.207
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.32	7.20	7.10	7.14	6.74	7.38

Certified By:



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5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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Certificate of Analysis

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2021-04-13

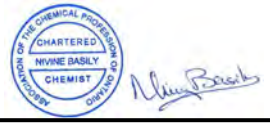
DATE REPORTED: 2021-04-19

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.

2342511-2342516 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:



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5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
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Certificate of Analysis

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2021-04-13 **DATE REPORTED: 2021-04-19**

				SAMPLE DESCRIPTION:	BH1 SS2	BH3 SS2	BH4 SS2	BH6 SS2	BH7 SS2	BH9 SS2
				SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED:	2021-04-08	2021-04-08	2021-04-08	2021-04-09	2021-04-09	2021-04-09 12:00
Parameter	**Unit**	**G / S**	**RDL**		**2342511**	**2342512**	**2342513**	**2342514**	**2342515**	**2342516**
F1 (C6 - C10)	µg/g		5		<5	<5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5		<5	<5	<5	<5	<5	<5
F2 (C10 to C16)	µg/g	10	10		<10	<10	<10	<10	<10	<10
F3 (C16 to C34)	µg/g	240	50		<50	<50	<50	<50	<50	<50
F4 (C34 to C50)	µg/g	120	50		<50	<50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50		NA	NA	NA	NA	NA	NA
Moisture Content	%		0.1		18.8	19.7	19.8	19.1	18.2	21.6
Surrogate	**Unit**	**Acceptable Limits**								
Toluene-d8	% Recovery	50-140			88	93	100	91	98	73
Terphenyl	%	60-140			87	82	62	93	75	72

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.

2342511-2342516 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is 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 without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popowkolof

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

O. Reg. 406/19 - VOCs (Soil)

DATE RECEIVED: 2021-04-13 **DATE REPORTED: 2021-04-19**

SAMPLE DESCRIPTION:				BH1 SS2	BH3 SS2	BH4 SS2	BH6 SS2	BH7 SS2	BH9 SS2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2021-04-08	2021-04-08	2021-04-08	2021-04-09	2021-04-09	2021-04-09 12:00
Parameter	Unit	G / S	RDL	2342511	2342512	2342513	2342514	2342515	2342516
Dichlorodifluoromethane	µg/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bromomethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g	0.25	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acetone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g	0.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g	0.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chloroform	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzene	ug/g	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Trichloroethylene	ug/g	0.05	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Bromodichloromethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g	0.5	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Toluene	ug/g	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethylene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Chlorobenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g	0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Certified By: N Popowkolof

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

Certificate of Analysis

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

O. Reg. 406/19 - VOCs (Soil)

DATE RECEIVED: 2021-04-13 **DATE REPORTED: 2021-04-19**

				SAMPLE DESCRIPTION:	BH1 SS2	BH3 SS2	BH4 SS2	BH6 SS2	BH7 SS2	BH9 SS2
				SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED:	2021-04-08	2021-04-08	2021-04-08	2021-04-09	2021-04-09	2021-04-09 12:00
Parameter	**Unit**	**G / S**	**RDL**		**2342511**	**2342512**	**2342513**	**2342514**	**2342515**	**2342516**
m & p-Xylene	ug/g		0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bromoform	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Styrene	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g		0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	ug/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g	0.05	0.04		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
n-Hexane	µg/g	0.05	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate	**Unit**	**Acceptable Limits**								
Toluene-d8	% Recovery	50-140			96	99	83	98	98	85
4-Bromofluorobenzene	% Recovery	50-140			95	104	102	93	92	84

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.

2342511-2342516 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: N Popowkolof

AGAT Laboratories

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

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Apr 19, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	2353732		<0.8	<0.8	NA	< 0.8	134%	70%	130%	99%	80%	120%	85%	70%	130%
Arsenic	2353732		2	2	NA	< 1	120%	70%	130%	96%	80%	120%	97%	70%	130%
Barium	2353732		52.5	54.1	3.0%	< 2.0	96%	70%	130%	103%	80%	120%	103%	70%	130%
Beryllium	2353732		<0.4	<0.4	NA	< 0.4	113%	70%	130%	102%	80%	120%	105%	70%	130%
Boron	2353732		<5	5	NA	< 5	93%	70%	130%	113%	80%	120%	101%	70%	130%
Boron (Hot Water Soluble)	2342511	2342511	<0.10	<0.10	NA	< 0.10	84%	60%	140%	94%	70%	130%	96%	60%	140%
Cadmium	2353732		<0.5	<0.5	NA	< 0.5	89%	70%	130%	105%	80%	120%	104%	70%	130%
Chromium	2353732		17	17	NA	< 5	112%	70%	130%	108%	80%	120%	111%	70%	130%
Cobalt	2353732		4.1	3.9	5.0%	< 0.5	114%	70%	130%	107%	80%	120%	106%	70%	130%
Copper	2353732		7.6	7.5	1.3%	< 1.0	96%	70%	130%	103%	80%	120%	98%	70%	130%
Lead	2353732		17	15	12.5%	< 1	106%	70%	130%	104%	80%	120%	95%	70%	130%
Molybdenum	2353732		0.7	0.7	NA	< 0.5	117%	70%	130%	103%	80%	120%	108%	70%	130%
Nickel	2353732		7	7	0.0%	< 1	113%	70%	130%	105%	80%	120%	103%	70%	130%
Selenium	2353732		0.9	<0.8	NA	< 0.8	126%	70%	130%	100%	80%	120%	105%	70%	130%
Silver	2353732		<0.5	<0.5	NA	< 0.5	111%	70%	130%	109%	80%	120%	106%	70%	130%
Thallium	2353732		<0.5	<0.5	NA	< 0.5	102%	70%	130%	100%	80%	120%	96%	70%	130%
Uranium	2353732		<0.50	<0.50	NA	< 0.50	106%	70%	130%	102%	80%	120%	97%	70%	130%
Vanadium	2353732		34.2	34.1	0.3%	< 0.4	125%	70%	130%	107%	80%	120%	110%	70%	130%
Zinc	2353732		41	41	0.0%	< 5	104%	70%	130%	103%	80%	120%	101%	70%	130%
Chromium, Hexavalent	2342516	2342516	<0.2	<0.2	NA	< 0.2	96%	70%	130%	93%	80%	120%	84%	70%	130%
Cyanide, Free	2342511		<0.040	<0.040	NA	< 0.040	96%	70%	130%	100%	80%	120%	94%	70%	130%
Mercury	2353732		<0.10	<0.10	NA	< 0.10	111%	70%	130%	104%	80%	120%	102%	70%	130%
Electrical Conductivity (2:1)	2342511	2342511	0.194	0.195	0.5%	< 0.005	97%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	2342511	2342511	0.247	0.247	0.0%	NA									
pH, 2:1 CaCl2 Extraction	2343168		7.56	7.63	0.9%	NA	101%	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.

Certified By:

AGAT Laboratories

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

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Apr 19, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Soil)															
F1 (C6 - C10)	2341196		<5	<5	NA	< 5	106%	60%	140%	109%	60%	140%	92%	60%	140%
F2 (C10 to C16)	2342512	2342512	< 10	< 10	NA	< 10	110%	60%	140%	85%	60%	140%	80%	60%	140%
F3 (C16 to C34)	2342512	2342512	< 50	< 50	NA	< 50	109%	60%	140%	82%	60%	140%	79%	60%	140%
F4 (C34 to C50)	2342512	2342512	< 50	< 50	NA	< 50	102%	60%	140%	81%	60%	140%	85%	60%	140%
O. Reg. 406/19 - VOCs (Soil)															
Dichlorodifluoromethane	2343181		< 0.05	< 0.05	NA	< 0.05	86%	50%	140%	97%	50%	140%	108%	50%	140%
Vinyl Chloride	2343181		< 0.02	< 0.02	NA	< 0.02	106%	50%	140%	88%	50%	140%	108%	50%	140%
Bromomethane	2343181		< 0.05	< 0.05	NA	< 0.05	81%	50%	140%	78%	50%	140%	93%	50%	140%
Trichlorofluoromethane	2343181		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	89%	50%	140%	100%	50%	140%
Acetone	2343181		< 0.50	< 0.50	NA	< 0.50	90%	50%	140%	76%	50%	140%	106%	50%	140%
1,1-Dichloroethylene	2343181		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	78%	60%	130%	85%	50%	140%
Methylene Chloride	2343181		< 0.05	< 0.05	NA	< 0.05	109%	50%	140%	109%	60%	130%	96%	50%	140%
Trans- 1,2-Dichloroethylene	2343181		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	100%	60%	130%	93%	50%	140%
Methyl tert-butyl Ether	2343181		< 0.05	< 0.05	NA	< 0.05	86%	50%	140%	80%	60%	130%	109%	50%	140%
1,1-Dichloroethane	2343181		< 0.02	< 0.02	NA	< 0.02	109%	50%	140%	113%	60%	130%	114%	50%	140%
Methyl Ethyl Ketone	2343181		< 0.50	< 0.50	NA	< 0.50	87%	50%	140%	85%	50%	140%	104%	50%	140%
Cis- 1,2-Dichloroethylene	2343181		< 0.02	< 0.02	NA	< 0.02	90%	50%	140%	105%	60%	130%	96%	50%	140%
Chloroform	2343181		< 0.04	< 0.04	NA	< 0.04	104%	50%	140%	96%	60%	130%	92%	50%	140%
1,2-Dichloroethane	2343181		< 0.03	< 0.03	NA	< 0.03	85%	50%	140%	105%	60%	130%	93%	50%	140%
1,1,1-Trichloroethane	2343181		< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	100%	60%	130%	81%	50%	140%
Carbon Tetrachloride	2343181		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	89%	60%	130%	87%	50%	140%
Benzene	2343181		< 0.02	< 0.02	NA	< 0.02	99%	50%	140%	108%	60%	130%	113%	50%	140%
1,2-Dichloropropane	2343181		< 0.03	< 0.03	NA	< 0.03	87%	50%	140%	108%	60%	130%	113%	50%	140%
Trichloroethylene	2343181		< 0.03	< 0.03	NA	< 0.03	110%	50%	140%	90%	60%	130%	96%	50%	140%
Bromodichloromethane	2343181		< 0.05	< 0.05	NA	< 0.05	73%	50%	140%	95%	60%	130%	86%	50%	140%
Methyl Isobutyl Ketone	2343181		< 0.50	< 0.50	NA	< 0.50	102%	50%	140%	102%	50%	140%	113%	50%	140%
1,1,2-Trichloroethane	2343181		< 0.04	< 0.04	NA	< 0.04	91%	50%	140%	99%	60%	130%	98%	50%	140%
Toluene	2343181		< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	109%	60%	130%	96%	50%	140%
Dibromochloromethane	2343181		< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	79%	60%	130%	87%	50%	140%
Ethylene Dibromide	2343181		< 0.04	< 0.04	NA	< 0.04	105%	50%	140%	88%	60%	130%	114%	50%	140%
Tetrachloroethylene	2343181		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	93%	60%	130%	94%	50%	140%
1,1,1,2-Tetrachloroethane	2343181		< 0.04	< 0.04	NA	< 0.04	97%	50%	140%	111%	60%	130%	92%	50%	140%
Chlorobenzene	2343181		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	108%	60%	130%	87%	50%	140%
Ethylbenzene	2343181		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	92%	60%	130%	89%	50%	140%
m & p-Xylene	2343181		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	101%	60%	130%	108%	50%	140%
Bromoform	2343181		< 0.05	< 0.05	NA	< 0.05	75%	50%	140%	78%	60%	130%	74%	50%	140%
Styrene	2343181		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	87%	60%	130%	97%	50%	140%
1,1,2,2-Tetrachloroethane	2343181		< 0.05	< 0.05	NA	< 0.05	92%	50%	140%	95%	60%	130%	96%	50%	140%
o-Xylene	2343181		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	92%	60%	130%	93%	50%	140%

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Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Apr 19, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,3-Dichlorobenzene	2343181		< 0.05	< 0.05	NA	< 0.05	108%	50%	140%	107%	60%	130%	108%	50%	140%
1,4-Dichlorobenzene	2343181		< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	110%	60%	130%	115%	50%	140%
1,2-Dichlorobenzene	2343181		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	109%	60%	130%	111%	50%	140%
n-Hexane	2343181		< 0.05	< 0.05	NA	< 0.05	91%	50%	140%	103%	60%	130%	92%	50%	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: N Popowkolof

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
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QA Violation

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

RPT Date: Apr 19, 2021

PARAMETER	Sample Id	Sample Description	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
				Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)											
Antimony		BH1 SS2	134%	70%	130%	99%	80%	120%	85%	70%	130%

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.

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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

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 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
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
Moisture Content	ORG-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035C and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS

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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T733225

PROJECT: Shadow Creek, Orillia

ATTENTION TO: Ian Shaw

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	EPA SW-846 5035 & 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Soil - Mat Engineers
Contact: Ian Shaw
Address: 130 Lancing Dr. Hamilton, ON
Phone: Fax:
Reports to be sent to:
1. Email: swylie@soilmat.ca
2. Email: ishaw@soilmat.ca

Project Information:

Project: Shadow Creek, Orillia
Site Location: Orillia
Sampled By: Scott Wylie
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis

Invoice Information:

Bill To Same: Yes ☐ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

☐ No Regulatory Requirement
(Please check all applicable boxes) Table 406.

☐ Regulation 153/04
Table _____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region _____ *Indicate One*
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Laboratory Use Only

Work Order #: 21T733225
Cooler Quantity:
Arrival Temperatures: 8.2 | 8 | 7.6
6.4 | 6 | 6.8
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides))	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr⁶⁺ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☒ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use							Potentially Hazardous or High Concentration (Y/N)
BH1 SS2	Apr 8/21	AM	3	Soil			X					X	X															
BH3 SS2	Apr 8/21	AM	3				X					X	X															
BH4 SS2	Apr 8/21	AM	3				X					X	X															
BH6 SS2	Apr 9/21	AM	3				X					X	X															
BH7 SS2	Apr 9/21	AM	3				X					X	X															
BH9 SS2	Apr 9/21	pm	3				X					X	X															

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign): Neil Ramnaraign	Date Apr. 13	Time 3:00
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign): Neil Ramnaraign	Date Apr. 13	Time 4:40
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page _____ of _____
N°: T 102325