



**GEOTECHNICAL INVESTIGATION  
PROPOSED DEVELOPMENT  
WILMOT EMPLOYMENT LANDS  
NEW HAMBURG, ONTARIO**

**for**

**MR. PAT GEORGE  
c/o MTE CONSULTANTS INC.**

PETO MacCALLUM LTD.  
16 FRANKLIN STREET SOUTH  
NEW HAMBURG, ONTARIO  
N2C 1R4  
PHONE: (519) 893-7500  
FAX: (519) 893-0654  
EMAIL: [kitchener@petomacallum.com](mailto:kitchener@petomacallum.com)

**Distribution:**

23 cc: MTE Consultants Inc. (+email - [dhicks@mte85.com](mailto:dhicks@mte85.com))  
(+email - [pgeorge@gamasonry.com](mailto:pgeorge@gamasonry.com))  
1 cc: PML Kitchener

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Mr. Pat George  
c/o Mr. Dave Hicks, C.E.T.  
MTE Consultants Inc.  
520 Bingemans Centre Drive  
Kitchener, Ontario  
N2B 3X9

Dear Mr. Hicks

**Geotechnical Investigation  
Proposed Industrial Development  
Wilmot Employment Lands  
New Hamburg, Ontario**

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation recently completed at the above noted project site. Authorization to proceed with this assignment was provided by Mr. D. Hicks, C.E.T. verbally on February 12, 2018.

In general, the project involves the proposed construction of an industrial subdivision on an existing 47.5 Ha agricultural property located northwest of the Highway 7/8 and Nafziger Road intersection in New Hamburg, Ontario. It is understood that the proposed development will have full municipal servicing including watermain, storm and sanitary sewers, with typical invert depths expected to be to a maximum 3 m depth below existing grade. Based on the preliminary draft plans it is understood that development will include about 3.1 km of new roadways and buried services. In addition, a trunk sanitary sewer will run through the site, connecting a proposed future development situated north of the site to an existing sanitary sewer crossing of Highway 7/8 at the south end of the site. Based on preliminary design information it is understood that the invert levels of the proposed trunk sewer are about 4 to 6 m below existing grade. A storm water management facility will also be constructed at the south side of the development site.

A municipal drainage system servicing neighbouring properties extends across the site. The site also has an extensive agricultural tile drainage system which connects into the municipal drains.

It is understood that a previous geotechnical investigation was carried out at the site in 2010, and reference is given to Appendix A for the borehole logs provided by MTE Consultants Inc. (MTE), and Drawing 1 for the corresponding locations.



The purpose of the current geotechnical investigation was to explore the subsurface soil and ground water conditions at the site and based on this information, to provide geotechnical recommendations for the proposed development. Specific considerations to be addressed in this report include:

- A description of the site and the field investigation procedure;
- A summary of the subsurface soil and ground water conditions encountered;
- Log of borehole sheets, a borehole location plan drawing, and geotechnical laboratory test results;
- Excavation and construction dewatering requirements;
- Foundation design, including bearing resistances, settlement projections and site class for seismic design;
- Slab on grade floors and below grade walls, including compaction requirements and geotechnical suitability of onsite soils for re-use;
- Site servicing (storm, sanitary, water and utilities) including pipe bedding requirements;
- Pavement structure design for new roadways; and,
- Suitability of native soils for infiltration of stormwater.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are for the current project only. Any changes in plans will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and / or investigation. When the project design is complete, the general recommendations given in this report should be reviewed by PML to ensure their applicability.

### **Investigation Procedure**

#### **Geotechnical Investigation**

The field work for this geotechnical investigation was conducted between March 12 and 26, 2018. The investigation program comprised a total of 18 boreholes (101 to 109 and 111 to 119) advanced to between 3.6 and 11.1 m depth, with monitoring wells installed in seven of the boreholes. The borehole locations are shown on the appended Borehole Location Plan, Drawing 1.



The borehole locations were established in the field by PML. The ground surface elevations were interpolated from a topographic survey drawing provided by MTE.

The boreholes were advanced using a Diedrich D-50 track mounted drillrig fitted with continuous flight solid and hollow stem augers and automatic hammer, supplied and operated by a specialist drilling contractor. The work was carried out under the full-time supervision of a PML engineering staff member who directed the drilling and sampling operations, documented the soil stratigraphy, monitored ground water conditions and processed the recovered samples.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard penetration tests (SPT) were carried out during sampling operations of the boreholes using conventional split spoon equipment. Ground water observations were made in the boreholes during and upon completion of drilling. The boreholes were backfilled and compacted in accordance with O.Reg.903 upon completion of drilling.

Pocket penetrometer testing was carried out on the recovered samples to determine the undrained shear strength of the cohesive soils.

Monitoring wells were installed in seven boreholes to more accurately measure ground water levels. The monitoring wells comprised 50 mm diameter PVC pipe, filter sand, bentonite seals, and protective casings. Subsequent water level measurements from the wells were conducted by MTE.

All of the recovered samples were returned to PML's laboratory for detailed visual examination, classification, and routine moisture content determinations. The laboratory testing also included particle size distribution analyses on eight samples of the major soil types encountered.

### **Summarized Subsurface Conditions**

Reference is made to the appended Log of Borehole sheets for details of the field work including soil descriptions, inferred stratigraphy, standard penetration test (SPT) N values, dynamic cone penetration test values, ground water observations and laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth / elevation demarcations on the borehole logs must be viewed as "transitional" zones, and cannot be construed as exact geologic boundaries between layers.



In general, the soil stratigraphy encountered comprised surficial topsoil and localized fill, underlain by an extensive clayey silt deposit containing silt, sandy silt, and silty sand layers.

Surficial topsoil was contacted in all of the boreholes, with the exception of Boreholes 111 and 119. The topsoil was between 50 and 360 mm thick, with an average of 222 mm.

Surficial fill was encountered locally in Boreholes 111 and 119, and extended to 0.45 and 0.75 m depth, respectively.

An extensive clayey silt deposit was encountered below the surficial topsoil and fills deposits, in all of the boreholes, and extended to the 3.6 to 11.1 m borehole termination depths. The cohesive clayey silt deposit was generally firm to very stiff based on standard penetration N values between 4 and 31 blows per 0.3 m penetration of the split spoon sampler. Pocket penetrometer shear strengths of the clayey silt ranged between 25 and 225 kPa. Moisture content ranged between 9 and 32% indicating drier than plastic limit (DTPL) to about plastic limit (APL) conditions in the cohesive clayey silt soils. Localized layers of wet to saturated silt, sandy silt, and silty sand were also encountered within the clayey silt deposit. Reference is given to Figures 1 to 8 for the results of particle size distribution analyses conducted on samples of the clayey silt and silt.

#### Ground Water Conditions

Ground water observations carried out during and upon completion of drilling are presented on the appended Log of Borehole Sheets.

During drilling, wet and saturated conditions were generally encountered in the silt, sandy silt and silty sand layers below 1.5 to 6.1 m depth (Elevation 332.3 to 343.8). Free water was observed during and upon completion of drilling, in Boreholes 104, 107, 108, 109, 113, 117 and 118, below 2.3 to 7.6 m depth (Elevation 332.6 to 339.1).

On April 8, 2018 water level measurements from the monitoring wells installed in Boreholes 101 to 107 ranged between 0.5 to 6.7 m depth below existing grade (about Elevation 327.0 to 338.3).

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns.

The relatively impermeable nature of the clayey silt could contribute to the development of perched water conditions following short term and seasonal precipitation events.



## **Discussion and Recommendations**

The project involves the proposed construction of a industrial and commercial development at Wilmot Employment Lands, in New Hamburg, Ontario. The work will include earthworks grading, construction of 3.1 km of municipal roads and installation of a trunk sanitary sewer (about 4 to 6 m below existing grades).

It is noted that the proposed subdivision road and sewer configuration have changed since completion of PML's field investigation. Consequently, the following recommendations are provided for preliminary design purposes, and a supplemental geotechnical field investigation will be required once design details have been finalized.

The following recommendations are based on design information provided by the client. It is recommended that PML be retained to review the final design for both additions to check that the recommendations presented hereafter have been interpreted correctly and are sufficient and appropriate for the proposed works.

### **Foundations and Earthworks Grading**

Details of the buildings in the proposed industrial subdivision have yet to be established. We have provided the following preliminary foundation design recommendations and earthworks grading recommendations for the development. However, we recommend that a site specific geotechnical investigation be carried out for foundation designs once details of the proposed structures are known

The site is generally underlain by firm to very stiff clayey silt. It is feasible to support buildings on conventional spread or strip footings, or mat foundations founded in the native firm to very stiff clayey silt. Based on the investigation findings, footings founded a minimum 0.3 m into the firm to very stiff native clayey silt deposits, below any surficial fill and topsoil and local surficial soft or loose zones, may be designed for a net bearing resistance of 150 kPa at the serviceability limit state (SLS) and a factored bearing resistance of 225 kPa at the ultimate limit state (ULS).



Alternatively, in areas where grades are to be raised footings maybe placed at higher elevations on engineered structural fill. The existing topsoil and fill must be excavated to the levels of competent native clayey silt deposits in advance of engineered structural fill placement. Engineered structural fill used to establish footing founding subgrade levels should comprise an approved compactable inorganic soil, placed in lifts with a maximum thickness of 300 mm and be compacted to at least 98% standard Proctor maximum dry density (SPMDD). Additional generic recommendations for engineered fill construction are provided in Appendix B. Footings supported on approved engineered structural fill may also be designed using the values for a net factored resistance of 150 at SLS and 225 kPa at ULS. Full time inspection of any structural fill placement by PML personnel is recommended to approve subgrade conditions, fill materials and to verify that the specified compaction levels are being achieved.

The maximum total settlement of foundations designed for the net SLS bearing pressures noted above are not expected to exceed 25 mm. Differential settlements of around 50 to 75% of the total settlement should be anticipated.

All founding surfaces should be examined by PML personnel prior to concrete placement, to check that all loose, frozen, organic or otherwise deleterious materials have been satisfactorily removed and the required bearing capacity is available throughout.

All exterior footings and all footings exposed to seasonal freezing conditions must be provided with frost protection. The minimum frost protection should be 1.2 m of earth cover or the thermal insulation equivalent.

Design provisions for earthquake loading should also be applied. For the soil conditions at the site, a Class D site category may be assumed, in accordance with the 2012 Ontario Building Code.

As noted previously, municipal drains servicing neighbouring properties cross the site. In addition, an extensive agricultural drainage system extends across the site, and connects to the municipal drains. The location and details of these drains should be confirmed prior to construction. Existing drainage pipes which extend into the proposed development lots should be rerouted into easements away from the building areas, or be decommissioned where appropriate.



### Slab on Grade Floors

Preparation of the floor slab subgrade should include stripping of the surficial, topsoil, and other deleterious material, placement and compaction of engineered fill, if necessary, followed by proof rolling of the exposed subgrade with a heavy roller to ensure uniform adequate support. Excessively loose, soft or compressible materials revealed during the proofrolling operations should be subexcavated and replaced with well compacted approved material.

Engineered fill placed under the floor slab to achieve finished subgrade levels or as foundation wall backfill should comprise approved inorganic material having a moisture content within 3% of the optimum value, placed in maximum 200 mm thick lifts, and compacted to at least 95% SPMD. Reference is given to Appendix B for additional engineered fill construction recommendations.

A minimum 150 mm thick layer of Granular A compacted to 98% SPMD is recommended directly beneath the slab-on-grade. A polyethylene vapour barrier should be placed on the surface of the granular base if a moisture sensitive finish is to be placed on the floor. Joints should be saw cut into concrete floor immediately after initial set of the concrete to control potential cracking of the slab.

### Below Grade Walls

Below grade walls and basement walls should be designed as retaining walls to resist the unbalanced horizontal earth pressure imposed by the backfill adjacent to the wall. The unfactored lateral earth pressure,  $p$ , may be computed using the following equation, assuming a triangular pressure distribution:

$$p = K (\gamma h + q)$$

where  $K$  = lateral earth pressure coefficient  
= 0.5 for wall restrained at both  
top and bottom

$\gamma$  = unit weight of free-draining  
granular material  
= 21 kN/m<sup>3</sup>

$h$  = depth below final grade (m)

$q$  = surcharge load (kPa), if present





The excavation adjacent to the basement walls should be backfilled with free-draining granular material satisfying the OPS Granular "B" gradation specification and a weeping tile system installed to minimize the build-up of hydrostatic pressure behind the wall.

The weeping tiles should be surrounded by a properly designed graded granular filter or wrapped with approved geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free sump or outlet.

#### Excavation and Ground Water Control

It is generally envisaged that excavations for the earthworks and site servicing will extend to a maximum 9 m depth within the proposed development.

Excavations for service installations are expected to extend up to about 9 m depth through topsoil and into the native clayey silt deposits containing silt, sandy silt and silty sand, which are classified as Type 3 materials as defined in the OHSA. Subject to inspection and providing adequate ground water control is achieved, excavations within Type 3 soils that are to be entered by workers should be inclined from the base of the excavation at one horizontal to one vertical (1H:1V) or flatter.

It is anticipated that ground water seepage or surface water entering the excavations will be handled readily by conventional sump pumping. The actual dewatering methods should be established at the contractor's discretion within the context of a performance specification for the project. Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure a stable and safe excavation and to facilitate construction. The design of the dewatering system should be specified to maintain and control ground water at least 0.3 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It should be noted that, under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, a Permit to Take Water (PTTW) from the Ministry of Environment, Conservation and Parks (MECP) is required if the dewatering discharge is greater than 50,000 L/day. In accordance with the above noted regulatory requirements and in compliance with the MECP's PTTW Manual (April 2005), and application should be filed to the MECP for the subject property construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/S. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/S) and 400,000 L/day (or about 4.6 L/S) dewatering activities need to be registered on the Environmental Activity and



Sector Registry (EASR). PML would be happy to assist with this process, if required. The depth of excavations for site grading and site servicing are expected to extend to a maximum 9 m depth into clayey silt deposits with wet to saturated layers of silt, sand, sandy silt, and silty sand. Due to the relatively low permeability of the native deposits, typical trenching excavations for utility installation, storm water pond construction and earthworks grading are generally expected to have dewatering rates less than 50,000 L/day, and a PTTW or EASR should not be required.

It is recommended that test pits be carried out during the tendering stage of the project in order that prospective contractors may familiarize themselves with soil and ground water conditions to be contacted. Also, as noted above, the dewatering requirements should be established by the contractor in the context of a performance specification.

#### Pipe Bedding and Cover

It is expected that the proposed water and sewer pipes will be founded on competent native clayey silt deposits, or engineered fill. Providing adequate ground water control is achieved, bearing problems are not anticipated for conduits founded on the native mineral soils or engineered fill. It may be necessary to increase the bedding thickness if excessively loose, soft or wet conditions are present at the pipe subgrade. The need for this is best determined during construction.

Conventional bedding and cover constructed in accordance with applicable Ontario Provincial Standard Drawings (OPSD) will be suitable. Material containing stones larger than 50 mm size should not be used in the bedding layer. The bedding and cover material should be placed in 150 mm lifts compacted to at least 95% SPMDD. Compaction should be provided beneath the pipe haunches to provide uniform support. Over-compaction should be avoided as damage to the pipe could result.

Trench backfill material should comprise approved material placed in uniform 200 mm thick lifts within 3% of the optimum moisture content and compacted to at least 95% SPMDD.



It is anticipated that the excavated material will primarily comprise clayey silt. The insitu moisture content of the clayey silt typically ranges from 9 to 32%. Based on our experience with similar types of material, the upper limit of placement moisture content compatible with efficient compaction is expected to be about 15%. Therefore, the excavated clayey silt containing wet and saturated soils are considered suitable for reuse only if the work is carried out during the dry summer months and the construction schedule is flexible to permit air drying to reduce the moisture content closer to the optimum value.

Excavated materials intended for backfilling purposes should not be exposed to the elements for prolonged time periods, as they might be rendered unsuitable for reuse. Organic soil, topsoil, deleterious or excessively wet material should not be used as backfill. Should construction start during the winter season, particular attention must be given to ensure that frozen material is not used as backfill for service trenches. Topsoil may be reused for landscape purposes only.

It should also be noted that the insitu clayey silt materials will tend to retain a voided structure when placed as backfill. Sufficient compaction must be applied to breakdown all lumps / clods within the fill matrix to achieve a non-voided condition. Significant post construction settlement could otherwise result.

The trenching and backfilling operations should be carried out in a manner which minimizes the length of trench left open yet accommodates efficient pipe laying and compaction activities.

#### Storm Water Management and Soil Infiltration

A storm water pond is proposed at the south side of the site, near Boreholes 101, 102 and 103. Design details of the pond have yet to be finalized. However, it is understood that the pond will have a permanent pool at elevation 334.55 and active storage to about elevation 337.85. Typical soils at the pond site comprise clayey silt with occasional silt layers. Although the clayey silt is considered to be relatively impermeable, the silt, sandy silt and silty sand layers which are interlayered with the clayey silt are more permeable. Therefore, it will be necessary to line the base of the pond to maintain the permanent pool water level.



The earthen liner should comprise clayey silt soils having a hydraulic conductivity of no more than  $1 \times 10^{-6}$  cm/s. The native clayey silt has a permeability  $< 1 \times 10^{-6}$  cm/sec, however, inspection and testing during construction will be required to confirm if excavated materials are suitable for reuse as the earth liner.

Fill used for earth liner construction at the pond, should be placed in lifts with a maximum 300 mm thickness, and compacted to at least 95% standard Proctor maximum dry density (SPMDD). General recommendations for fill subgrade preparation and engineered fill construction are provided in Appendix B.

Berms should be constructed using select soil placed in maximum 300 mm thick lifts compacted to 95% SPMDD. Finished slopes of the ponds should not be steeper than five horizontal to one vertical (5H:1V) for the interior. Slopes should be provided with vegetation cover or other means for erosion protection.

Full-time inspection should be carried out by PML personnel to examine and approve backfill, fill placement operations, and to check the compaction by in situ density testing using nuclear gauges.

It is understood that onsite storm water infiltration parameters are required. The following table provides hydraulic conductivity and infiltration design parameters for the major onsite soils encountered. An appropriate factor of safety should also be used for design.

<b>SOIL</b>	<b>HYDRAULIC CONDUCTIVITY (cm/s)</b>	<b>INFILTRATION RATE (mm/hr)</b>
Clayey silt	Less than $1 \times 10^{-6}$	Less than 0.04
Silt/Sandy Silt/Silty Sand	$1 \times 10^{-4}$	5

Cognizant of the low permeability and infiltration rates and considering the limited nature of silt/sandy silt/silty sand seams, the amount of onsite infiltration is expected to be negligible.



## Pavement Design

As noted previously, approximately 3.1 km of new roadway will be constructed at the site. Based on the proposed pavement usage, frost susceptibility, and strength of the expected subgrade soils, the following pavement component thicknesses are considered suitable for the proposed industrial subdivision roadways.

<b>PAVEMENT COMPONENT</b>	<b>THICKNESS (mm)</b>
Asphalt	100
Granular A Base	150
Granular B Subbase	600

The pavement design considers that construction will be carried out during the drier time of the year and that the subgrade is stable, as determined by proofrolling and inspection by PML personnel. If the subgrade is wet and unstable, subexcavation and placement of additional granular subbase material will be required.

In areas where the subgrade is sensitive to disturbance or construction is to occur outside of the drier time of year, then consideration can be given to thickening the granular subbase or using a geotextile separator between the pavement structure and subbase, in lieu of additional granular subbase. The geotextile separator envisaged should provide reinforcement, filtration and separation of the granular subbase from the anticipated clayey silt / clayey silt fill subgrade soils, and a woven geotextile such Terrafix's 200 W (or equivalent) is envisaged.

The pavement materials should conform to current OPS and municipal specifications. The Granular A base and Granular B subbase courses should be placed in thin lifts and be compacted to a minimum of 100% SPMDD, and asphalt should be placed to a minimum of 92% of the material's maximum relative density (MRD) and reference is made to OPS Specification 310.

During construction, testing should be conducted to confirm the gradation and compactibility characteristics of the granular base materials and the mix design properties of the asphalt.

Proofrolling procedures and the placement and compaction of all the granular materials and asphalt for the pavement construction should be inspected on a continuous basis by PML personnel.



The pavement subgrade materials will lose strength to support traffic loads if allowed to become wet. Moreover, the silty clay subgrade soils are considered frost susceptible and the roadway may heave during freezing and thawing periods. Drainage of the pavement structure is essential to maintain structural integrity and limit frost heave. In this regard, installation of longitudinal subdrains is recommended. The longitudinal subdrains should comprise a minimum 100 mm diameter perforated plastic pipe, set below the subbase level, and outlet to ditching, or catch basins. Subdrain pipes should be surrounded by appropriate filter media such as clear stone wrapped in geotextile, or alternatively the pipes should be wrapped in filter cloth and surrounded by concrete sand.

#### Geotechnical Review and Construction Inspection and Testing

When development design is complete, it is recommended that the design drawings be submitted to PML for general geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and recommendations provided in the report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary, particularly where service trenches exist. Geotechnical review during construction should be on going to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

This report is subject to the Statement of Limitations that is included in Appendix C, which must be read in conjunction with the report.

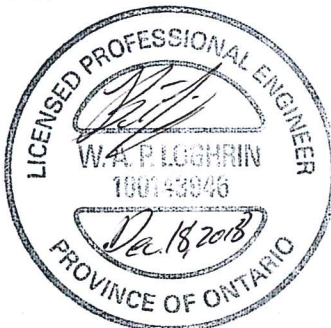


**Closure**

We trust the information presented in this report is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.



William Lohrin, P.Eng.  
Project Engineer, Geotechnical Services



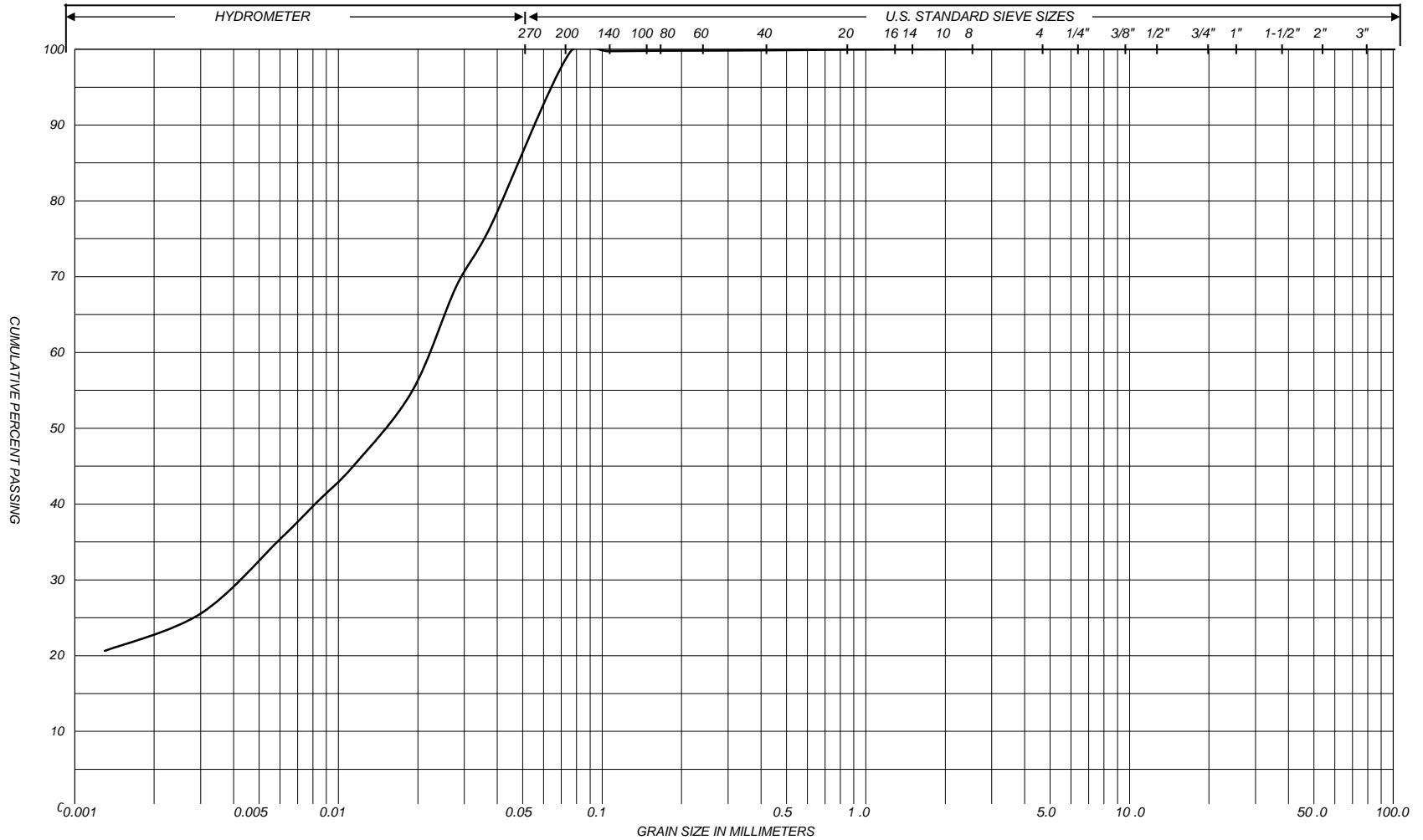
Gerry Mitchell, MEng, P.Eng.  
Senior Consultant

WL/GM:wI

**Enclosures:**

- Figures 1 to 3 - Particle Size Distribution Charts
- List of Abbreviations
- Log of Boreholes 1 to 6
- Drawing 1 - Borehole Location Plan
- Appendix A - MTE Boreholes and Site Plan
- Appendix A – Engineered Fill
- Appendix B – Statement of Limitations

## PARTICLE SIZE DISTRIBUTION CHART



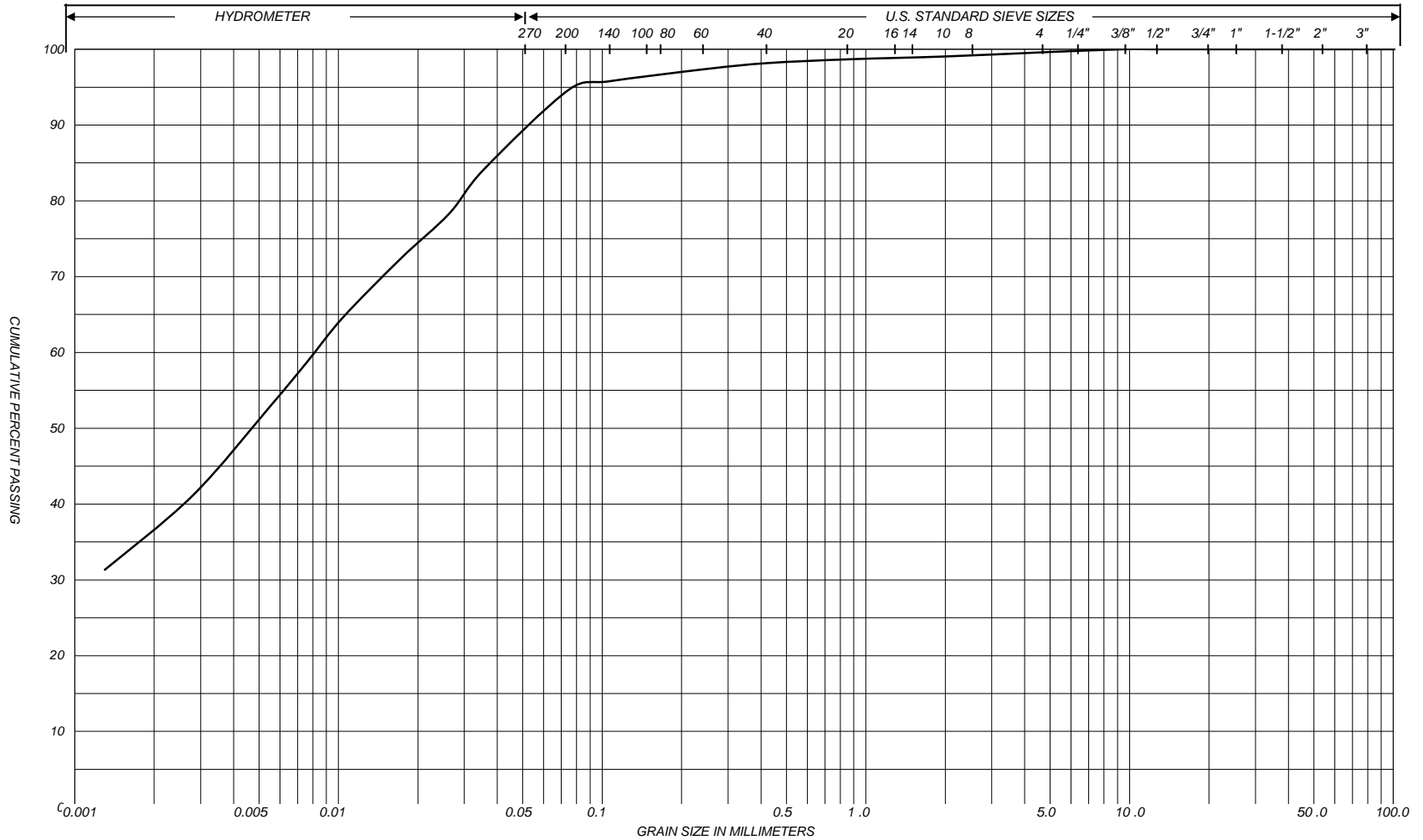
SILT & CLAY			FINE SAND		MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	UNIFIED
CLAY	FINE SILT	MEDIUM SILT	COARSE SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	M.I.T.
CLAY	SILT		VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL			U.S. BUREAU

REMARKS Borehole 101, Sample SS9, Depth 9.1 to 9.6 m

CLAYEY SILT



**PARTICLE SIZE DISTRIBUTION CHART**

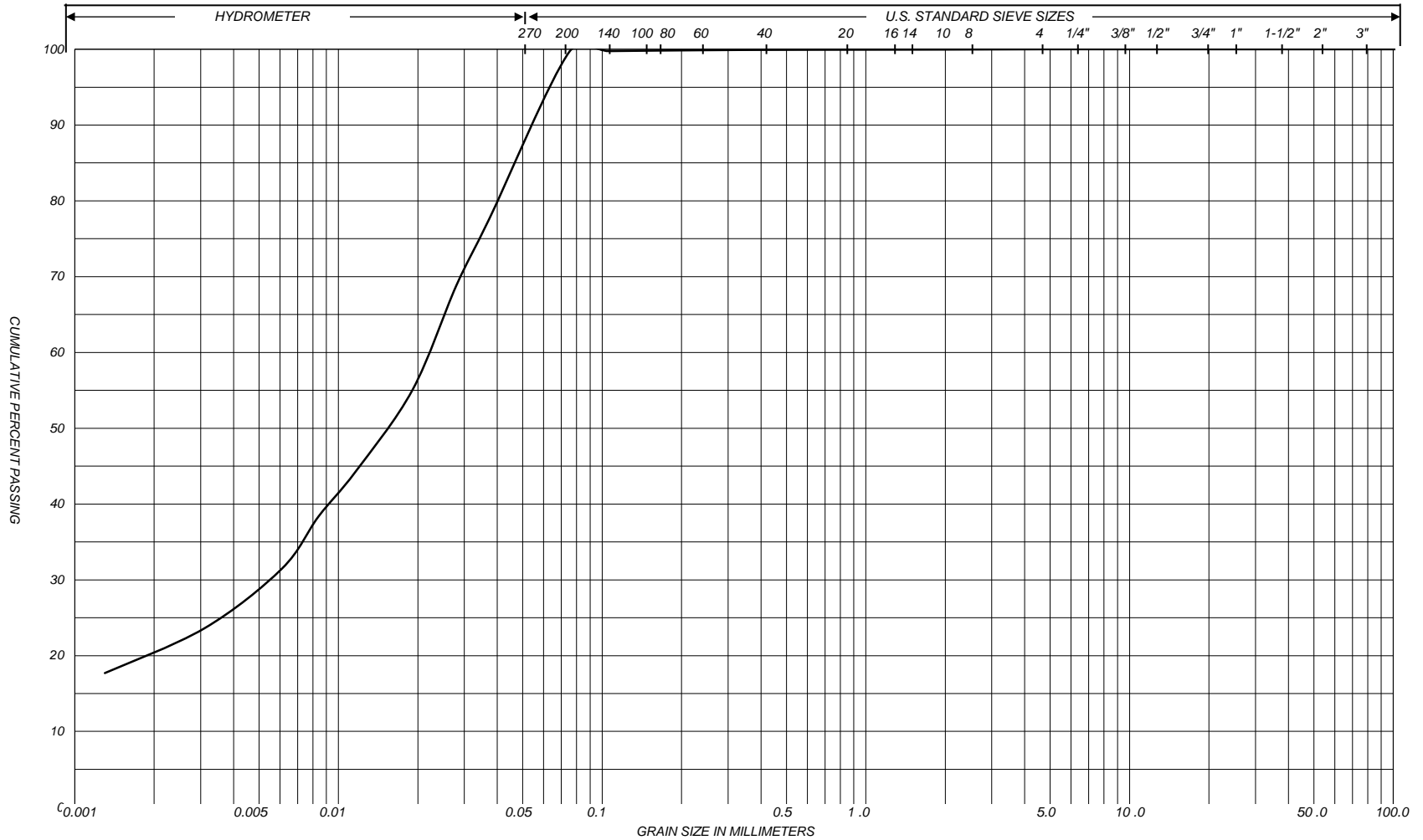


SILT & CLAY			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL			COBBLES	UNIFIED				
CLAY	FINE SILT		COARSE SILT			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL		COBBLES	M.I.T.		
	CLAY		SILT			VERY FINE SAND			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL		COBBLES

REMARKS Borehole 102, Sample SS8, Depth 6.0 to 6.5 m

CLAYEY SILT

**PARTICLE SIZE DISTRIBUTION CHART**

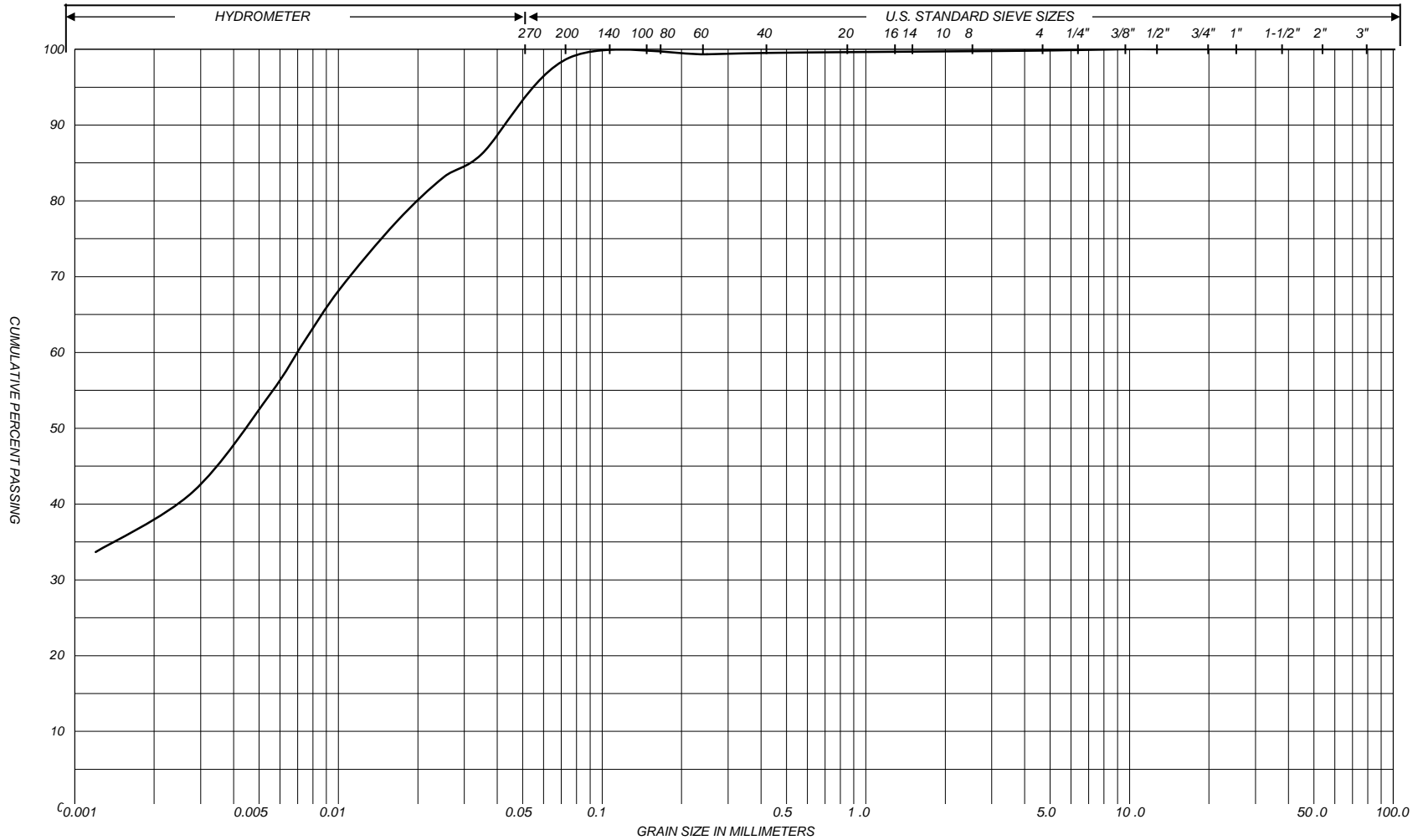


SILT & CLAY			FINE SAND		MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	UNIFIED
CLAY	FINE SILT	MEDIUM SILT	COARSE SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	M.I.T.
CLAY	SILT		VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL			U.S. BUREAU

REMARKS Borehole 103, Sample 3, Depth 1.5 to 2.0 m

CLAYEY SILT

**PARTICLE SIZE DISTRIBUTION CHART**

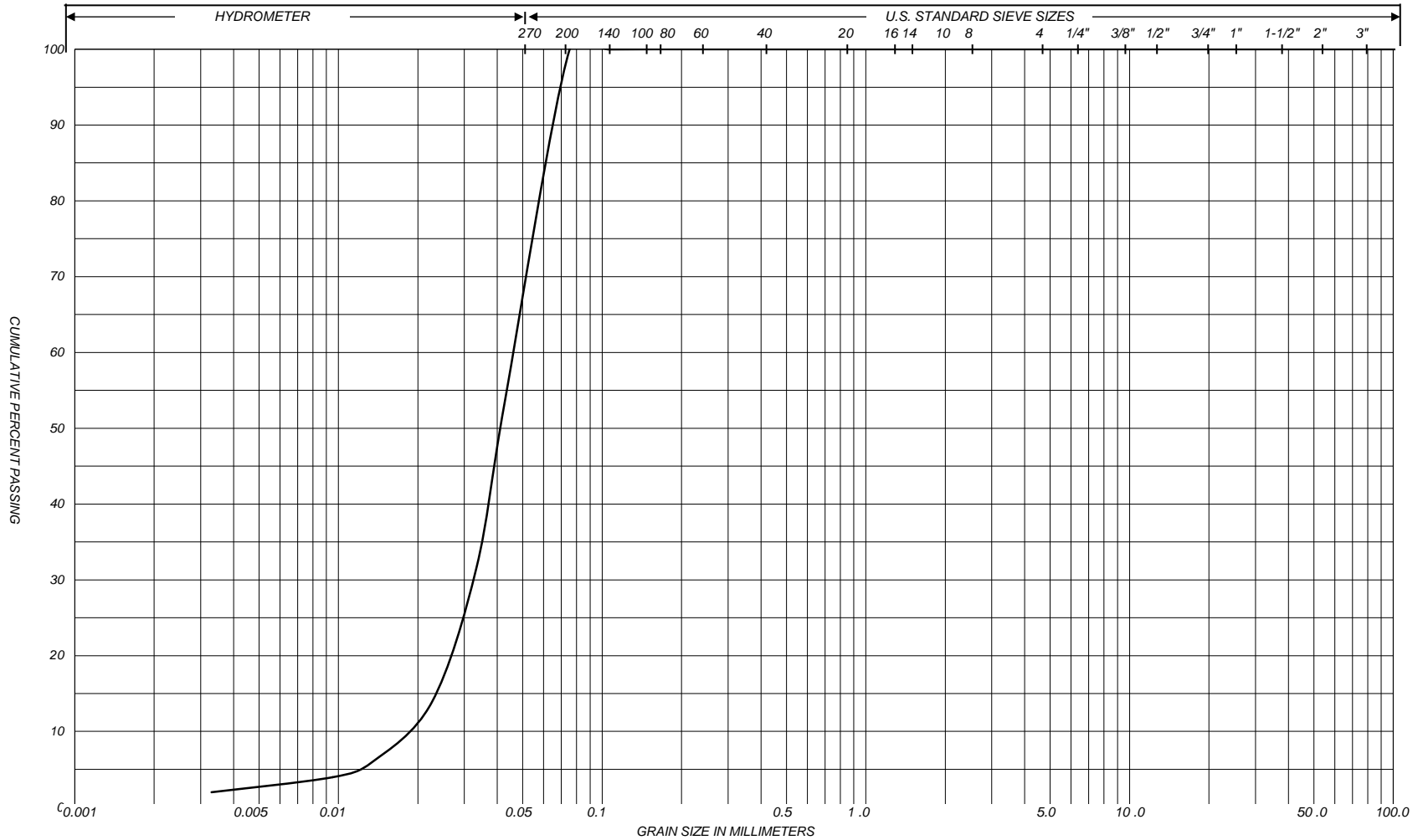


SILT & CLAY			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL			COBBLES	UNIFIED				
CLAY	FINE SILT		MEDIUM SILT		COARSE SILT			FINE SAND			MEDIUM SAND			COARSE SAND		GRAVEL			COBBLES	M.I.T.
CLAY		SILT				VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND		GRAVEL						U.S. BUREAU			

REMARKS Borehole 103, Sample SS8, Depth 6.1 to 6.6 m

CLAYEY SILT

**PARTICLE SIZE DISTRIBUTION CHART**

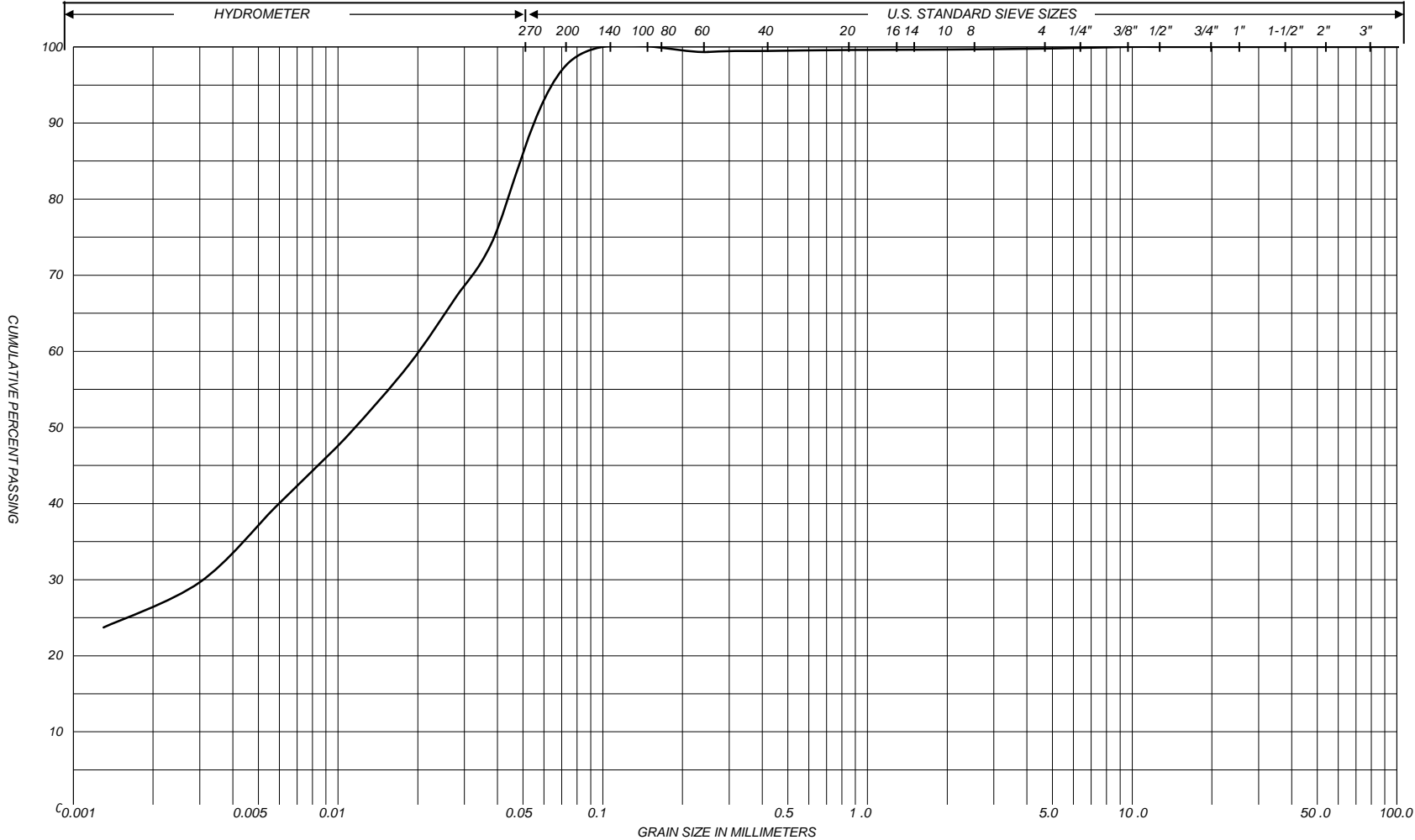


SILT & CLAY			FINE SAND		MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	UNIFIED
CLAY	FINE SILT	MEDIUM SILT	COARSE SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	M.I.T.
CLAY	SILT		VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL			U.S. BUREAU

REMARKS Borehole 104, Sample SS3, Depth 1.5 to 2.0 m

SILT

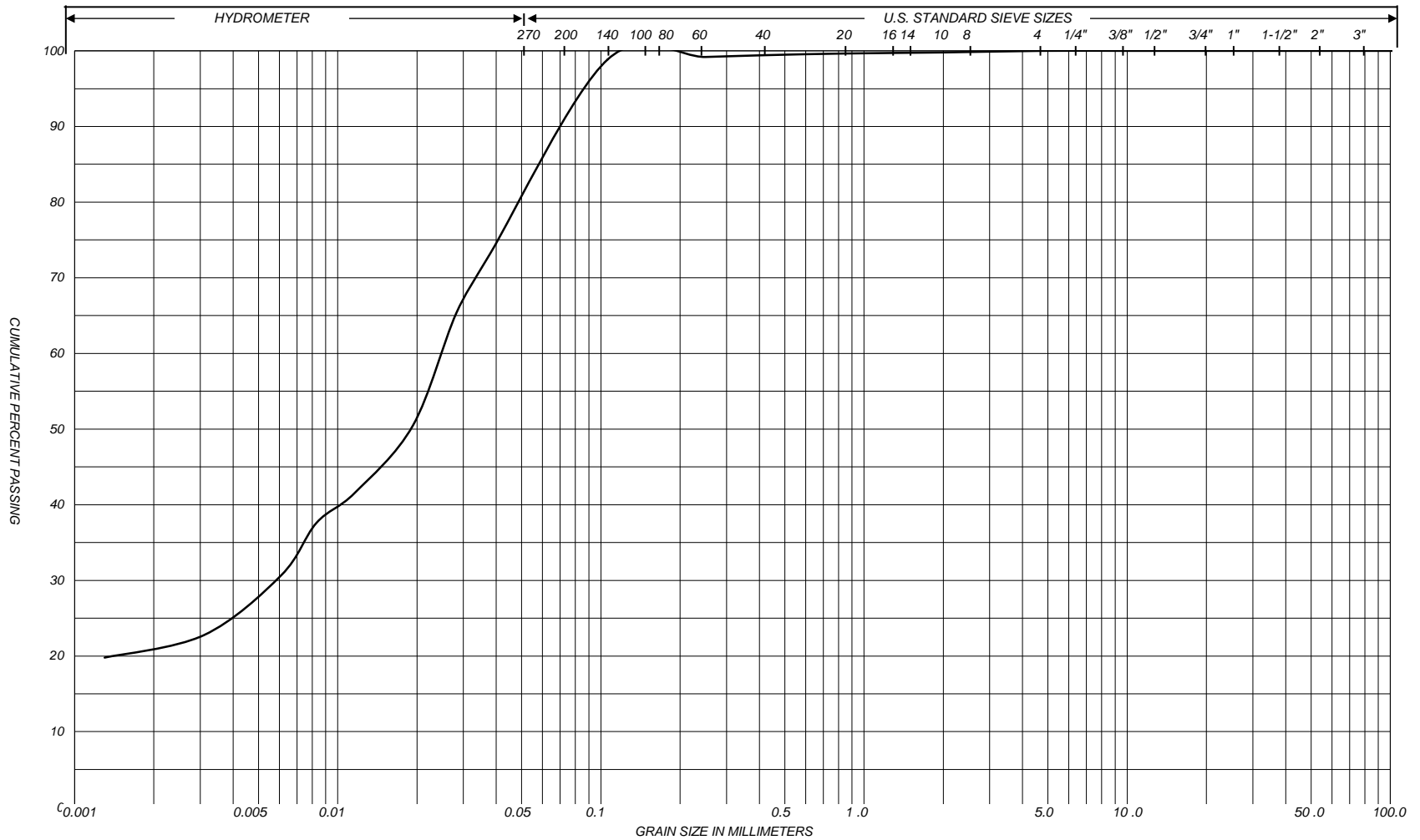
### PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE SAND			MEDIUM SAND	COARSE SAND	GRAVEL			COBBLES	UNIFIED
CLAY	FINE SILT	MEDIUM SILT	COARSE SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL			COBBLES	M.I.T.	
CLAY	SILT		VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL				U.S. BUREAU	

REMARKS Borehole 104, Sampler SS9, Depth 9.1 to 9.6 m  
CLAYEY SILT

## PARTICLE SIZE DISTRIBUTION CHART

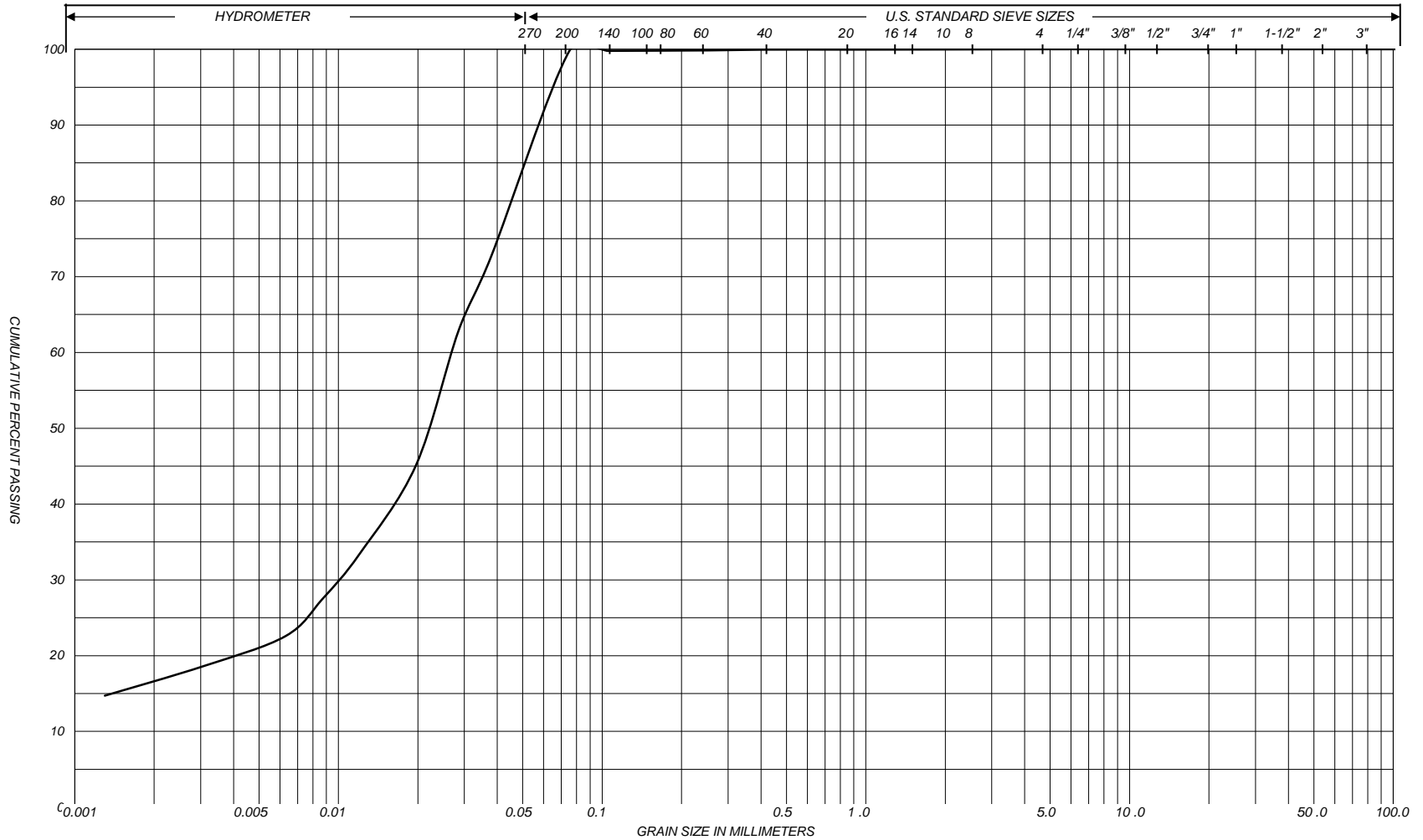


SILT & CLAY			FINE SAND			MEDIUM SAND			COARSE SAND			GRAVEL			COBBLES	UNIFIED				
CLAY	FINE SILT		MEDIUM SILT		COARSE SILT			FINE SAND			MEDIUM SAND			COARSE SAND		GRAVEL			COBBLES	M.I.T.
CLAY		SILT				VERY FINE SAND	FINE SAND		MEDIUM SAND		COARSE SAND		GRAVEL						COBBLES	U.S. BUREAU

REMARKS Borehole 107, Sample SS3, Depth 1.5 to 2.0 m

CLAYEY SILT

## PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE SAND		MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	UNIFIED
CLAY	FINE SILT	MEDIUM SILT	COARSE SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL		COBBLES	M.I.T.
CLAY	SILT		VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL			U.S. BUREAU

REMARKS Borehole 107, Sample SS7, Depth 6.1 to 6.6 m

CLAYEY SILT

# LIST OF ABBREVIATIONS



## PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. - Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

## DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

<u>CONSISTENCY</u>	<u>N (blows/0.3 m)</u>	<u>c (kPa)</u>	<u>DENSENESS</u>	<u>N (blows/0.3 m)</u>
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		
WTPL	Wetter Than Plastic Limit			
APL	About Plastic Limit			
DTPL	Drier Than Plastic Limit			

## TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample	USS	Undisturbed Shear Strength
PH	Sample Advanced Hydraulically	RSS	Remoulded Shear Strength
PM	Sample Advanced Manually		

## SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		



## LOG OF BOREHOLE NO. 101

**PROJECT** Proposed Development - Wilmot Employment Lands

**LOCATION** New Hamburg, Ontario

**BORING METHOD** Continuous Flight Hollow Stem Augers

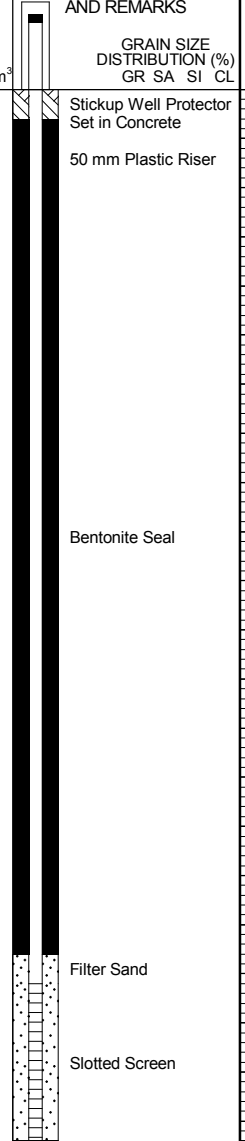
**BORING DATE** March 13, 2018

**PML REF.** 18KF009

**ENGINEER** W. Loghrian

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS	
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	Δ TORVANE	○ Qu	▲ POCKET PENETROMETER	○ Q	W <sub>p</sub>	w			W <sub>L</sub>
						DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST				WATER CONTENT (%)					
						20	40	60	80		10	20	30	40	
0.0	SURFACE ELEVATION 338.59														
338.54	TOPSOIL: Dark brown clayey silt, frozen CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL		1	SS	8					▲					
			2	SS	19					▲					
1.0			3	SS	25					▲					
2.0			4	SS	28					▲					
3.0	3.0 335.6 becoming stiff, grey, APL		5	SS	9					▲					
4.0			6	SS	10					▲					
5.0			7	SS	21					▲					
6.0	6.1 332.5 becoming very stiff, occasional silt layers, wet		8	SS	18					▲					
7.0			9	SS	18					▲					
8.0			10	SS	23					▲					
9.0															
10.0															
11.0	11.1 327.5 BOREHOLE TERMINATED AT 11.1 m														



**NOTES**

Upon completion of drilling, no free water in cased borehole

Water Level Readings:  
Initial Depth: 10.6 m  
Elevation: 327.99

2018-04-08:  
Depth: 1.03 m  
Elevation: 337.56

## LOG OF BOREHOLE NO. 102

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 14, 2018

**ENGINEER** W. Loghrian

**BORING METHOD** Continuous Flight Hollow Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT kN/m <sup>3</sup>	GROUND WATER OBSERVATIONS AND REMARKS		
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	Δ TORVANE						○ Qu	○ Q
						DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST		WATER CONTENT (%)						
						20	40	60	80	10	20	30	40	
0.0	SURFACE ELEVATION 336.06													
0.33	TOPSOIL: Dark brown clayey silt topsoil, frozen		1	SS	6									Stickup Well Protector Set in Concrete 50 mm Plastic Riser  Bentonite Seal  Filter Sand Slotted Screen
335.73	CLAYEY SILT: Firm brown clayey silt, some sand, APL		2	SS	4									
1.0														
1.5	becoming stiff, layered with brown silt, some fine sand, wet		3	SS	14									
334.6			4	SS	25									
2.0														
3.0			5	SS	13									
333.1	becoming grey clayey silt, trace sand, DTPL, occasional sand partings		6	AS										
4.0														
5.0			7	SS	13									
6.0														
7.0			8	SS	11									
8.0														
8.1	BOREHOLE TERMINATED AT 8.1 m		9	SS	22									
328.0														

Upon completion of drilling, no free water in cased borehole

Water Level Readings:  
Initial: Dry

2018-04-08:  
Depth: 0.93 m  
Elevation: 335.13

**NOTES**

## LOG OF BOREHOLE NO. 103

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 14, 2018

**ENGINEER** W. Loughrin

**BORING METHOD** Continuous Flight Hollow Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT kN/m <sup>3</sup>	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q				LIMIT	MOISTURE CONTENT	LIMIT		
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●								
						50	100	150	200	w <sub>p</sub>	w	w <sub>L</sub>		
0.0	SURFACE ELEVATION 333.72													
0.25	TOPSOIL: Dark brown clayey silt, frozen													
333.47	CLAYEY SILT: Firm brown clayey silt, trace sand, moist		1	SS	6									Stickup Well Protector Set in Concrete  50 mm Plastic Riser   Bentonite Seal   Filter Sand  Slotted Screen
0.76	SILT: Loose brown sandy silt, trace clay, moist		2	SS	8									
332.96	SILT: Loose brown sandy silt, trace clay, moist													
1.0	becoming compact, occasional clayey lenses		3	SS	11									
1.5														
332.2			4	SS	16									
2.0														
3.0														
330.7	CLAYEY SILT: Stiff grey clayey silt, trace sand, APL		5	SS	14									
4.0			6	GS										
5.0			7	SS	12									
6.0			8	SS	13									
7.0														
8.0			9	SS	12									
8.1	BOREHOLE TERMINATED AT 8.1 m													
325.6														

**NOTES**

Upon completion of drilling, no free water in cased borehole

Water Level Readings:  
Initial: Dry

2018/04/08:  
Depth: 6.73 m  
Elevation: 326.99

## LOG OF BOREHOLE NO. 104

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

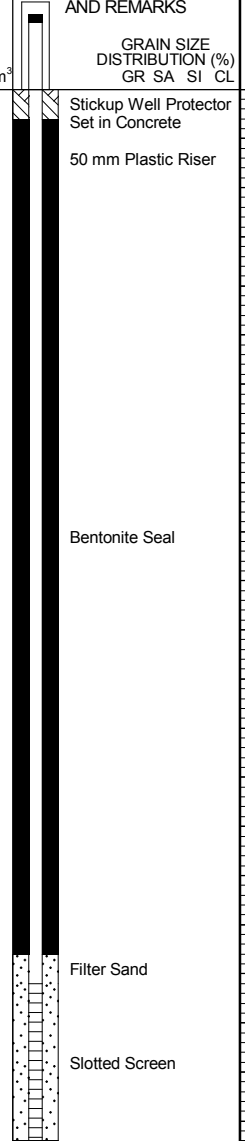
**BORING DATE** March 13, 2018

**ENGINEER** W. Loghlin

**BORING METHOD** Continuous Flight Hollow Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS		
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	△ TORVANE						○ Qu	○ Q <sub>u</sub>
						DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST		WATER CONTENT (%)						
						20	40	60	80	10	20	30	40	
0.0	SURFACE ELEVATION 339.03													
0.25	TOPSOIL: Dark brown clayey silt, frozen		1	SS	8									
338.78	CLAYEY SILT: Firm to very stiff brown clayey silt, trace sand, moist		2	SS	13									
1.0														
1.5	numerous wet silt layers		3	SS	12									
337.5														
2.0														
3.0														
3.0	SILT: Compact grey silt, some sand, occasional clayey lenses, saturated		5	SS	18									
336.0														
4.0														
5.0														
6.0														
7.0														
7.6	becoming dense		8	SS	31									
331.4														
9.0														
9.1	CLAYEY SILT: Very stiff grey clayey silt, APL, numerous saturated silt layers		9	SS	21									
329.9														
10.0														
11.0														
11.1	BOREHOLE TERMINATED AT 11.1 m		10	SS	26									
327.9														



During drilling sampler wet from SS4 to completion  
Water Level Readings:  
 Initial Depth: 10.4 m  
 Elevation: 328.63 m  
  
 2018-04-08:  
 Depth: 0.76 m  
 Elevation: 338.27

**NOTES**

## LOG OF BOREHOLE NO. 105

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

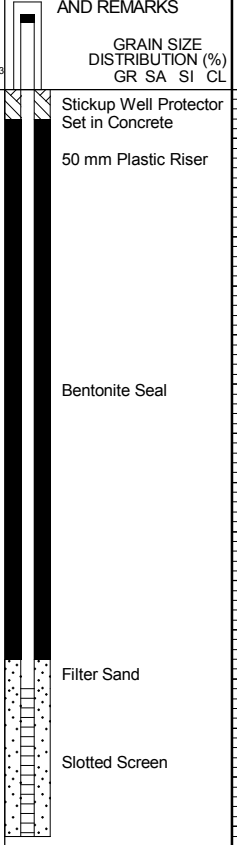
**BORING DATE** March 14, 2018

**ENGINEER** W. Loghrian

**BORING METHOD** Continuous Flight Hollow Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS	
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	Δ TORVANE	○ Qu	▲ POCKET PENETROMETER	○ Q	W <sub>p</sub>	w			W <sub>L</sub>
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●				WATER CONTENT (%)					
						20	40	60	80		10	20	30	40	
0.0	SURFACE ELEVATION 340.48														
0.36	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	5										
340.12	CLAYEY SILT: Firm brown clayey silt, some sand, APL		2	SS	7										
1.0			3	SS	6										
2.0			4	SS	12										
2.3	becoming stiff, grey, no zones		5	SS	12										
338.2			6	SS	16										
4.5	SANDY SILT: Compact grey sandy silt, saturated, occasional clayey lenses		7	SS	17										
336.0			8	SS	19										
6.1	CLAYEY SILT: Very stiff grey clayey silt, trace sand, DTPL, occasional silt lenses, wet														
334.4															
8.1	BOREHOLE TERMINATED AT 8.1 m														
332.4															



Upon completion of drilling no free water in cased borehole

Water Level Readings:  
Initial Depth: 5.7 m  
Elevation: 334.78

2018-04-08:  
Depth: 0.85 m  
Elevation: 339.63

**NOTES**

## LOG OF BOREHOLE NO. 106

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 14, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT kN/m <sup>3</sup>	GROUND WATER OBSERVATIONS AND REMARKS	
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q				LIMIT	MOISTURE CONTENT	LIMIT			
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●									WATER CONTENT (%)
						50	100	150	200	w <sub>p</sub>	w	w <sub>L</sub>			
0.0	SURFACE ELEVATION 339.91														
0.25 339.66	TOPSOIL: Dark brown clayey silt, trace sand, frozen CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL		1	SS	9										Stickup Well Protector Set in Concrete
1.0			2	SS	17										50 mm Plastic Riser
2.0			3	SS	18										
3.0			4	SS	18										Bentonite Seal
4.5			5	SS	12										
4.5 335.4	becoming firm, grey, occasional silt layers, wet		6	SS	7										Filter Sand
6.1															
6.1 333.8	SILT: Compact grey silt, some sand, trace clay, wet, occasional clayey layers		7	SS	13										Slotted Screen
6.5 333.4	BOREHOLE TERMINATED AT 6.5 m														Upon completion of drilling no free water in cased borehole
7.0															<u>Water Level Readings:</u> Initial Depth: 4.5 m Elevation: 335.41
8.0															<u>2018-04-08:</u> Depth: 2.76 m Elevation: 337.15
9.0															
10.0															
11.0															
12.0															
13.0															
14.0															
15.0															

**NOTES**

## LOG OF BOREHOLE NO. 107

**PROJECT** Proposed Development - Wilmot Employment Lands

**LOCATION** New Hamburg, Ontario

**BORING METHOD** Continuous Flight Hollow Stem Augers

**BORING DATE** March 13, 2018

**PML REF.** 18KF009

**ENGINEER** W. Loghrian

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT			NATURAL MOISTURE CONTENT			LIQUID LIMIT			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	FIELD VANE (+) TORVANE (Δ) POCKET PENETROMETER (▲)	Qu (○) Q (○)	W <sub>p</sub>	w	W <sub>L</sub>	W <sub>p</sub>	w	W <sub>L</sub>	W <sub>p</sub>	w	W <sub>L</sub>		
0.0	SURFACE ELEVATION 338.38																	
0.27 338.11	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	8													Stickup Well Protector Set in Concrete
	CLAYEY SILT: Firm brown clayey silt, some sand, APL		2	SS	7													50 mm Plastic Riser
1.5 336.9	becoming stiff, layered with brown silt, some sand, trace clay, moist		3	SS	9													
2.3 2.5 335.9	becoming very stiff/compact becoming grey, no layers		4	SS	28													
			5	SS	25													Bentonite Seal
			6	SS	14													
6.0 332.4	becoming very stiff, occasional silt layers		7	SS	16													Filter Sand
			8	SS	9													Slotted Screen
7.6 330.8	becoming stiff																	
8.1 330.3	BOREHOLE TERMINATED AT 8.1 m																	During drilling sampler wet at SS4 and SS5
																		Water Level Readings: Initial Depth: 7.4 m Elevation: 330.98
																		2018-04-08: Depth: 0.46 m Elevation: 337.84

**NOTES**

## LOG OF BOREHOLE NO. 108

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 12, 2018

**ENGINEER** W. Loghrin

**BORING METHOD** Continuous Flight Hollow Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT		NATURAL MOISTURE CONTENT		LIQUID LIMIT		UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE ▲ POCKET PENETROMETER	△ TORVANE ○ Qu ○ Q	w <sub>p</sub>	w	w <sub>L</sub>	WATER CONTENT (%)		kN/m <sup>3</sup>		
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●									
0.0	SURFACE ELEVATION 340.05														
0.20	TOPSOIL: Dark brown clayey silt, trace sand, frozen CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL	[Strat Plot]	1	SS	10		▲	○							
339.85			2	SS	11	339		▲	○						
1.5	becoming very stiff, occasional silty sand layers	[Strat Plot]	3	SS	16		▲	○							
338.6			4	SS	14	338			○						
2.3	SILT: Compact grey silt, some sand, trace clay, wet	[Strat Plot]	5	SS	10			○							
337.8			6	SS	10	337			○						
3.5	CLAYEY SILT: Stiff grey clayey silt, trace sand, APL	[Strat Plot]	7	SS	15			○							
336.6			8	SS	13	336		▲	○						
5.0	becoming APL, numerous silt layers, wet	[Strat Plot]	9	SS	17			○							
335.5			10	SS	14	335			○						
7.6	becoming APL, numerous silt layers, wet	[Strat Plot]	8	SS	13		▲	○							
332.5			9	SS	17	332			○						
11.1	BOREHOLE TERMINATED AT 11.1 m	[Strat Plot]	10	SS	14			○							
329.0			11	SS	14	329			○						

Sampler wet from 7.6 m to completion

Upon completion of augering Open  
No free water

**NOTES**



## LOG OF BOREHOLE NO. 109

**PROJECT** Proposed Development - Wilmot Employment Lands

**LOCATION** New Hamburg, Ontario

**BORING METHOD** Continuous Flight Hollow Stem Augers

**BORING DATE** March 12, 2018

**PML REF.** 18KF009

**ENGINEER** W. Loghryn

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT		NATURAL MOISTURE CONTENT		LIQUID LIMIT		UNIT WEIGHT kN/m <sup>3</sup>	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	△ TORVANE	○ Qu	○ Q	W <sub>p</sub>	w	W <sub>L</sub>	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
0.0	SURFACE ELEVATION 337.86														
0.21 337.65	TOPSOIL: Dark brown clayey silt, some sand, frozen		1	SS	9										
	CLAYEY SILT: Firm brown clayey silt, trace sand, APL		2	SS	5										
1.0			3	SS	4										
2.3 335.6	becoming stiff, DTPL, occasional sand seams, wet		4	SS	14										Sampler wet at 2.3 m
			5	SS	14										
4.5 333.4	SILTY SAND: Compact grey silty sand, trace clay, saturated		6	SS	26										Sampler wet at 4.5 m
6.0 331.9	CLAYEY SILT: Very stiff grey clayey silt, trace sand, APL		7	SS	20										
8.1 329.8	occasional sand seams, wet		8	SS	22										Sampler wet at 8.1 m
			9	SS	17										
11.1 326.8	BOREHOLE TERMINATED AT 11.1 m		10	SS	14										Upon completion of augering Open Free water at 6.0 m
12.0															
13.0															
14.0															
15.0															

**NOTES**

## LOG OF BOREHOLE NO. 111

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghrin

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** W. Loghrin

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS	
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	Δ TORVANE						○ Qu
						ELEVATION SCALE		W <sub>p</sub> — w — W <sub>L</sub>		WATER CONTENT (%)		GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
						50	100	150	200	20	40		60
0.0	SURFACE ELEVATION 347.31												
0.45	FILL: 150 mm dark brown silt, over dark brown clayey silt, DTPL-APL	XXXX	1	SS	10	347							
346.86	CLAYEY SILT: Very stiff brown clayey silt, trace sand, trace gravel, DTPL		2	SS	15	346							
1.0			3	SS	21	345							
2.0													
2.9	becoming grey/brown, APL												
344.4			4	SS	14	344							
3.6	BOREHOLE TERMINATED AT 3.6 m												
343.7													
4.0													Upon completion of augering Open No free water
5.0													
6.0													
7.0													
8.0													
9.0													
10.0													
11.0													
12.0													
13.0													
14.0													
15.0													

**NOTES**

## LOG OF BOREHOLE NO. 112

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS		
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE	Δ TORVANE	○ Qu	▲ POCKET PENETROMETER	○ Q	W <sub>p</sub>	w			W <sub>L</sub>	kN/m <sup>3</sup>
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●				WATER CONTENT (%)						
						50	100	150	200		10	20	30	40		
0.0	SURFACE ELEVATION 344.26															
344.16	TOPSOIL: Dark brown clayey silt, some sand, moist		1	SS	12	344										
1.0	CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL		2	SS	18	343										
2.0			3	SS	17	342										
3.0			4	SS	13	341										
341.3	becoming stiff, APL, occasional silt seams, wet															
3.7	BOREHOLE TERMINATED AT 3.7 m															
340.6																
4.0															Upon completion of augering Open No free water	
5.0																
6.0																
7.0																
8.0																
9.0																
10.0																
11.0																
12.0																
13.0																
14.0																
15.0																

**NOTES**

## LOG OF BOREHOLE NO. 113

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q	LIMIT	MOISTURE CONTENT	LIMIT		
						50 100 150 200		w <sub>p</sub>	w	w <sub>L</sub>		
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●		WATER CONTENT (%)				GRAIN SIZE DISTRIBUTION (%)
						20 40 60 80		10 20 30 40				GR SA SI CL
0.0	SURFACE ELEVATION 342.07											
0.33	TOPSOIL: Dark brown clayey silt, trace sand, moist		1	SS	7							
341.74	CLAYEY SILT: Stiff brown clayey silt, some sand, trace gravel, DTPL to APL, occasional silt zones		2	SS	9							
1.0												
2.0												
3.0			3	SS	10							
339.1	SILT: Dense grey silt, some sand, saturated		4	SS	32							
3.7	BOREHOLE TERMINATED AT 3.7 m											
338.4												Upon completion of augering Wet Cave at 3.0 m

**NOTES**

## LOG OF BOREHOLE NO. 114

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghrin

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q	LIMIT	MOISTURE CONTENT	LIMIT		
						50 100 150 200		W <sub>p</sub>	w	W <sub>L</sub>		
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●		WATER CONTENT (%)				GRAIN SIZE DISTRIBUTION (%)
						20 40 60 80		10 20 30 40			kN/m <sup>3</sup>	GR SA SI CL
0.0	SURFACE ELEVATION 340.11											
0.20	TOPSOIL: Dark brown clayey silt, moist		1	SS	7							
339.91	CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL to APL		2	SS	9							
1.0												
2.0												
2.0	SILT: Compact brown silt, some sand, wet, occasional clayey zones		3	SS	14							
338.1												
3.0												
3.7			4	SS	17							
336.4	BOREHOLE TERMINATED AT 3.7 m											
4.0												Upon completion of augering Open No free water
5.0												
6.0												
7.0												
8.0												
9.0												
10.0												
11.0												
12.0												
13.0												
14.0												
15.0												

**NOTES**

## LOG OF BOREHOLE NO. 115

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 14, 2018

**ENGINEER** W. Lohrin

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)				PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS	
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE				LIMIT	MOISTURE CONTENT	LIMIT			WATER CONTENT (%)
						50	100	150	200						
						DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST							GRAIN SIZE DISTRIBUTION (%)		
						20	40	60	80				GR SA SI CL		
0.0	SURFACE ELEVATION 336.82														
0.15 336.67	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	9										
	SILT: Loose brown silt, some sand, trace clay, moist		2	SS	6										
1.0			3	SS	11										
2.0			4	SS	10										
2.3 334.5	CLAYEY SILT: Stiff brown clayey silt, trace sand, APL, occasional sand layers		5	SS	11										
3.0 333.8	becoming grey		6	SS	12										
4.0			7	SS	10										
4.5 332.3	becoming layered with grey silt, some sand, wet														
6.0															
6.5 330.3	BOREHOLE TERMINATED AT 6.5 m														
7.0															Upon completion of augering Open No free water
8.0															
9.0															
10.0															
11.0															
12.0															
13.0															
14.0															
15.0															

**NOTES**

## LOG OF BOREHOLE NO. 116

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q	LIMIT	MOISTURE CONTENT	LIMIT		
						50 100 150 200		$w_p$	$w$	$w_L$		
						20 40 60 80	×	WATER CONTENT (%)				
							●				kN/m <sup>3</sup>	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	SURFACE ELEVATION 338.96											
0.20	TOPSOIL: Dark brown clayey silt, APL		1	SS	5							
0.60	CLAYEY SILT: Firm brown clayey silt, trace sand, trace gravel, APL		2	SS	15	338						
338.36	becoming very stiff, DTPL											
1.0												
2.0												
3.0			3	SS	23	337						
3.0	becoming hard, grey											
336.0												
3.7			4	SS	47	336						
335.3	BOREHOLE TERMINATED AT 3.7 m											
4.0												Upon completion of augering Open No free water
5.0												
6.0												
7.0												
8.0												
9.0												
10.0												
11.0												
12.0												
13.0												
14.0												
15.0												

**NOTES**

## LOG OF BOREHOLE NO. 117

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q	LIMIT	MOISTURE CONTENT	LIMIT		
						50 100 150 200		w <sub>p</sub>	w	w <sub>L</sub>		
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●		WATER CONTENT (%)				GRAIN SIZE DISTRIBUTION (%)
						20 40 60 80		10 20 30 40				GR SA SI CL
0.0	SURFACE ELEVATION 339.58											
0.20	TOPSOIL: Dark brown clayey silt, APL		1	SS	5							
339.38	CLAYEY SILT: Firm brown clayey silt, some sand, APL		2	SS	6							
1.0												
1.5	occasional sand seams, wet											
338.1												
2.0												
3.0			3	SS	4							Sampler wet at 3.0 m
336.6	becoming hard, DTPL, occasional sand partings		4	SS	54							
3.7												
335.9	BOREHOLE TERMINATED AT 3.7 m											Upon completion of augering Open Free water at 2.4 m
4.0												
5.0												
6.0												
7.0												
8.0												
9.0												
10.0												
11.0												
12.0												
13.0												
14.0												
15.0												

**NOTES**



## LOG OF BOREHOLE NO. 118

**PROJECT** Proposed Development - Wilmot Employment Lands  
**LOCATION** New Hamburg, Ontario  
**BORING METHOD** Continuous Flight Solid Stem Augers

**BORING DATE** March 26, 2018

**PML REF.** 18KF009  
**ENGINEER** W. Lohgrin  
**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT kN/m <sup>3</sup>	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q					
						ELEVATION SCALE		WATER CONTENT (%)			GRAIN SIZE DISTRIBUTION (%)	
						50 100 150 200		10 20 30 40			GR SA SI CL	
						20 40 60 80						
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●						
0.0	SURFACE ELEVATION 341.51											
0.20	TOPSOIL: Dark brown clayey silt, trace sand, moist		1	SS	10							
341.31	CLAYEY SILT: Stiff brown clayey silt, some sand, trace gravel, APL		2	SS	10							
1.0												
1.5	becoming very stiff, DTPL											
340.0												
2.0												
3.0												
3.0	becoming hard, grey, occasional sand layers, wet		3	SS	22							
338.5												
3.7	BOREHOLE TERMINATED AT 3.7 m		4	SS	38							
337.8												
4.0												Upon completion of augering Wet cave at 3.0 m
5.0												
6.0												
7.0												
8.0												
9.0												
10.0												
11.0												
12.0												
13.0												
14.0												
15.0												

**NOTES**

## LOG OF BOREHOLE NO. 119

**PROJECT** Proposed Development - Wilmot Employment Lands

**PML REF.** 18KF009

**LOCATION** New Hamburg, Ontario

**BORING DATE** March 26, 2018

**ENGINEER** W. Loghryn

**BORING METHOD** Continuous Flight Solid Stem Augers

**TECHNICIAN** D. Brice

SOIL PROFILE			SAMPLES			SHEAR STRENGTH (kPa)		PLASTIC NATURAL LIQUID			UNIT WEIGHT	GROUND WATER OBSERVATIONS AND REMARKS
DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	+ FIELD VANE Δ TORVANE ○ Qu	▲ POCKET PENETROMETER ○ Q	LIMIT	MOISTURE CONTENT	LIMIT		
						ELEVATION SCALE		W <sub>p</sub> — w — W <sub>L</sub>				
						DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●		WATER CONTENT (%)				GRAIN SIZE DISTRIBUTION (%)
						20 40 60 80		10 20 30 40				GR SA SI CL
0.0	SURFACE ELEVATION 345.30											
345.22	FILL: Dark brown clayey silt topsoil, trace sand, damp		1	SS	19	345						
0.75	becoming brown silt, some sand, some gravel, trace clay, damp											
344.55	CLAYEY SILT: Stiff brown clayey silt, trace sand, trace gravel, DTPL		2	SS	15	344						
1.5												
343.8	becoming APL, occasional silt layers, moist to wet											
2.0												
3.0			3	SS	10	343						
3.7			4	SS	10	342						
341.6	BOREHOLE TERMINATED AT 3.7 m											
4.0												Upon completion of augering Open No free water
5.0												
6.0												
7.0												
8.0												
9.0												
10.0												
11.0												
12.0												
13.0												
14.0												
15.0												

**NOTES**





**APPENDIX A**  
MTE BOREHOLES AND SITE PLAN

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH1

Job Number: 34896-100

Drill Date: November 29, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
0.0	0.00	<b>TOPSOIL</b>							
2.0	-0.61 0.61	<b>SILT CLAY</b> Light brown sandy silt and clay, fine grained, loose, moist, no staining or odour		1	SS	21			
4.0	-1.52 1.52	<b>Silty SAND</b> Light brown silty sand, some clay @ 6', fine grained, stiff, moist to wet @ 7', saturated below 7', no staining or odour		2	SS	40			
6.0				3	SS	55			
8.0				4	SS	75			
10.0									
12.0									
14.0									
16.0	-4.88 4.88	<b>Sandy SILT</b> Grey sandy silt, trace clay, fine grained, stiff, saturated		5	SS	63			
18.0									
20.0	-6.10 6.10	<b>SILT TILL</b> Grey sandy silt till, small stones, no staining or odour		6	SS	51			
22.0									
24.0									
26.0	-8.08 8.08	<b>Sandy SILT</b> Light grey sandy silt, some silty clay @ 22', fine grained, stiff, no staining or odour, wet, dry @ 22'		7	SS	31			
28.0									
30.0	-8.99 8.99	<b>CLAY</b> Grey clay, trace silt, dry, no staining or odour		8	SS	39			
32.0									
34.0									
		<b>SILT</b> Grey silt, fine grained, dry							

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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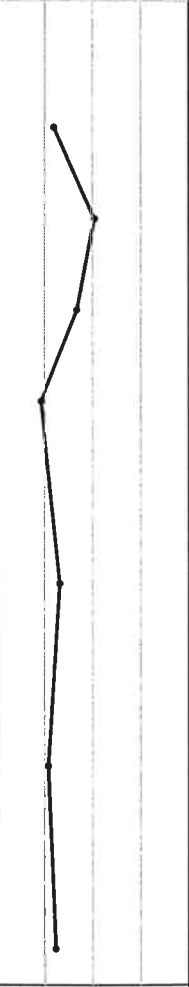


Sheet: 1 of 1

Client: Wilnot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilnot lands

Borehole Number: BH2

Job Number: 34896-100

Drill Date: November 30, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
	0.00	<b>TOPSOIL</b>							
2.0	-0.61	<b>SILT</b> Light brown clayey silt, fine grained, stiff, dry, no staining or odour. Light brown sandy silt @ 7'		1	SS	30			
4.0	0.61			2	SS	51			
6.0	-2.29	<b>Silty CLAY</b> Grey-brown silty clay, fine grained, stiff, dry, no staining or odour		3	SS	42			
8.0	2.29			4	SS	23			
10.0	-3.05	<b>CLAY</b> Grey clay, fine, stiff, dry, trace sand @ 17', no staining or odour		5	SS	33			
12.0	3.05			6	SS	27			
16.0				7	SS	31			
20.0									
22.0									
24.0									
26.0									
28.0	-8.23								
30.0	8.23								
32.0									
34.0									

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:



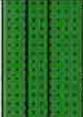
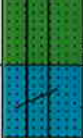

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Sheet: 1 of 1

**Client:** Wilmot Employment Lands  
**Project:** Hydrogeological Investigations  
**Location:** Wilmot lands

**Borehole Number:** BH3  
**Job Number:** 34896-100  
**Drill Date:** November 30, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph			Headspace (ppm)	Borehole
							25	50	75		
0.0	0.00	Ground Elevation									
	0.00	<b>TOPSOIL</b>									
2.0	-0.61	<b>SILT</b> Light brown clayey silt, trace sand, dry, no staining or odour		1	SS	31					
	0.61										
6.0	-1.52	<b>Sandy SILT</b> Light brown sandy silt with clay, fine grained, stiff, dry, slightly moist @ 8'		2	SS	49					
	1.52										
8.0				3	SS	38					
10.0	-3.05	<b>Silty CLAY</b> Grey silty clay with sand, fine grained, stiff, dy, no staining or odour		4	SS	32					
	3.05										
12.0	-3.66	<b>Silty SAND</b> Grey silty sand, trace clay seams, fine grained, stiff, no staining or odour, dry to wet		5	SS	45					
	3.66										
16.0				6	SS	20					
20.0											
22.0				7	SS	54					
24.0											
26.0											
28.0	-8.23										
	8.23										
30.0											
32.0											
34.0											

**Reviewed By:** RBM  
**Method:** Hollow Stem Auguring/Split Spoon  
**Notes:**

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Client: Wilnot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilnot lands

Borehole Number: BH4

Job Number: 34896-100

Drill Date: November 30, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
0.0	0.00	<b>TOPSOIL</b>							
2.0	-0.61 0.61	<b>SILT</b> Dark brown sandy silt with clay, light brown silty clay @ 4'dry, no staining or odour		1	SS	28			
4.0	-1.52 1.52	<b>SILT TILL</b> Light brown clayey silt till, some small stones, dry, no staining or odour		2	SS	36			
8.0	-2.13 2.13	<b>Silty SAND</b> Light brown silty sand, loose, fine, moist to wet @8', light brown dry clay @ 9,		3	SS	23			
12.0	-3.05 3.05	<b>CLAY</b> Grey clay, trace silt, fine grained, stiff, no staining or odour, slightly moist		4	SS	21			
16.0	-6.10 6.10	<b>Sandy SILT</b> Grey sandy silt, fine grained, saturated, no staining or odour		5	SS	23			
20.0	-7.62 7.62	<b>CLAY</b> Grey clay, fine grained, stiff, no staining or odour, dry		6	SS	49			
24.0	-8.23 8.23			7	SS	47			
28.0									
30.0									
32.0									
34.0									

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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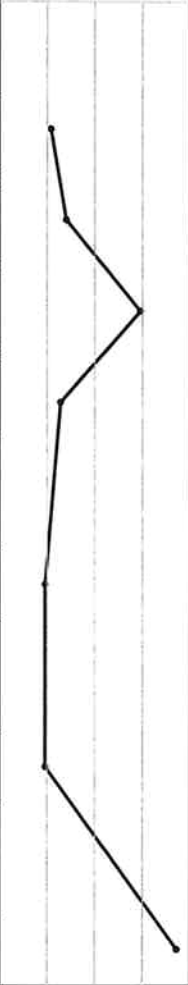




Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

**Borehole Number: BH5**

Job Number: 34896-100

Drill Date: December 01, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
	0.00	<b>TOPSOIL</b>							
2.0	-0.61	<b>Clayey SILT</b> Grey to light brown silt and clay, fine grained, soft, moist, no staining or odour		1	SS	27			
4.0	-1.52								
6.0	1.52	<b>Silty CLAY</b> Light grey to grey silty clay, trace sand, fine grained, stiff, silty wet sand seam @ 21', damp to moist, no staining or odour		2	SS	35			
8.0				3	SS	74			
10.0				4	SS	32			
12.0									
14.0				5	SS	24			
16.0									
18.0		6	SS	24					
20.0									
22.0									
24.0									
26.0	-7.62	<b>CLAY TILL</b> Grey silty clay till, trace sand, trace stone, stiff, moist to slight moist		7	SS	93			
28.0	-8.23								
30.0	8.23								
32.0									
34.0									

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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 N2B 3X9  
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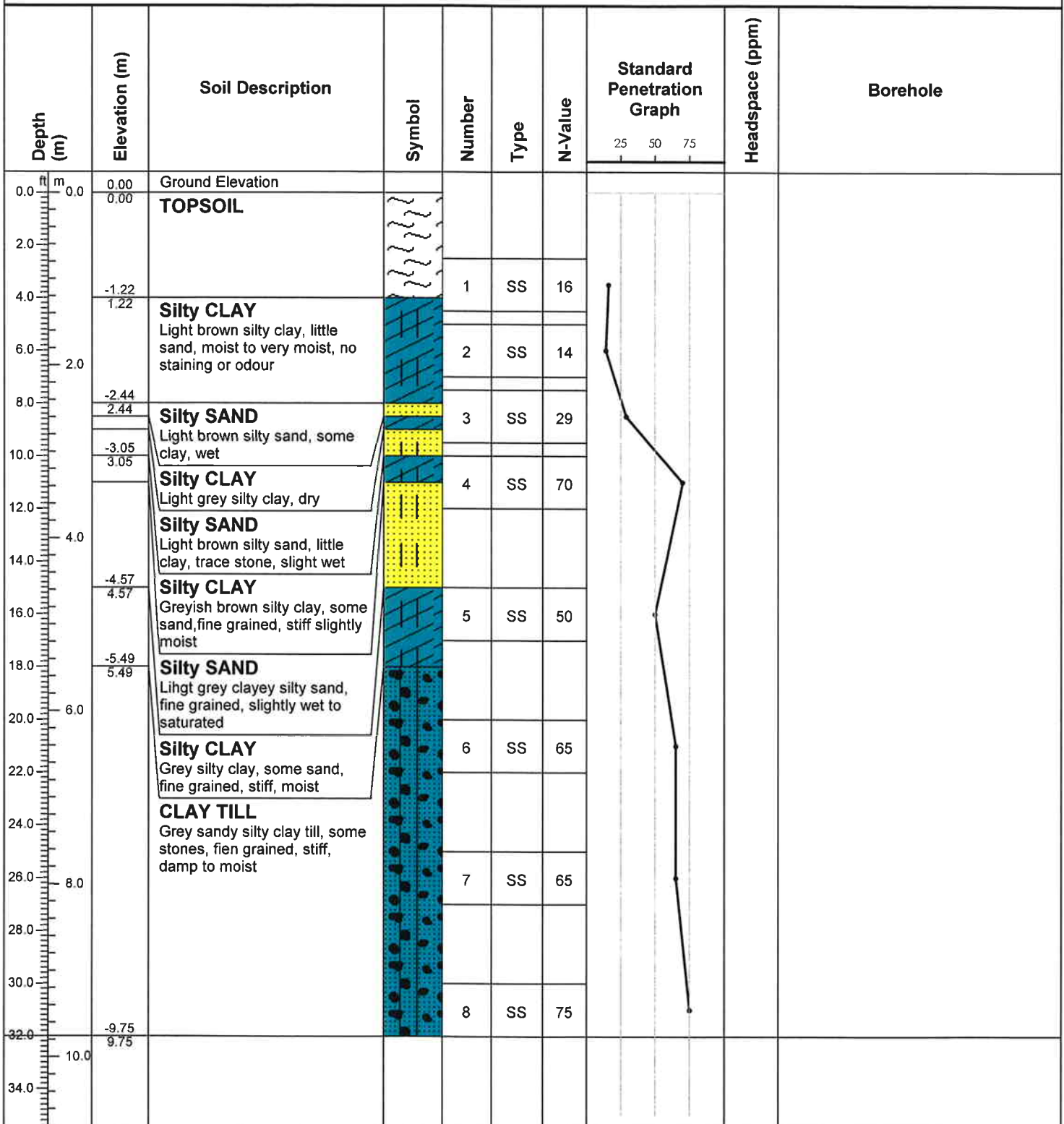
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Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH6

Job Number: 34896-100

Drill Date: December 01, 2010



Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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 520 Bingemans Centre Drive  
 Kitchener, Ontario  
 N2B 3X9  
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 Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH7  
 Job Number: 34896-100  
 Drill Date: December 01/02, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
0.0	0.00	<b>TOPSOIL</b>							
2.0	-0.76	<b>Silty CLAY</b> Light brown silty clay, little sand, stiff, damp to moist, no staining or odour		1	SS	52			
4.0	0.76			2	SS	57			
6.0				3	SS	52			
8.0				4	SS	46			
12.0	-3.66	<b>SILT TILL</b> Light brown to grey clayey silt till, some sand, some small stones, fine grained, some pebbles @ 16', dry							
14.0	3.66			5	SS	71			
16.0									
18.0									
20.0				6	SS	92			
22.0									
24.0									
26.0	-8.23			7	SS	50			
28.0	8.23								
30.0									
32.0									
34.0									

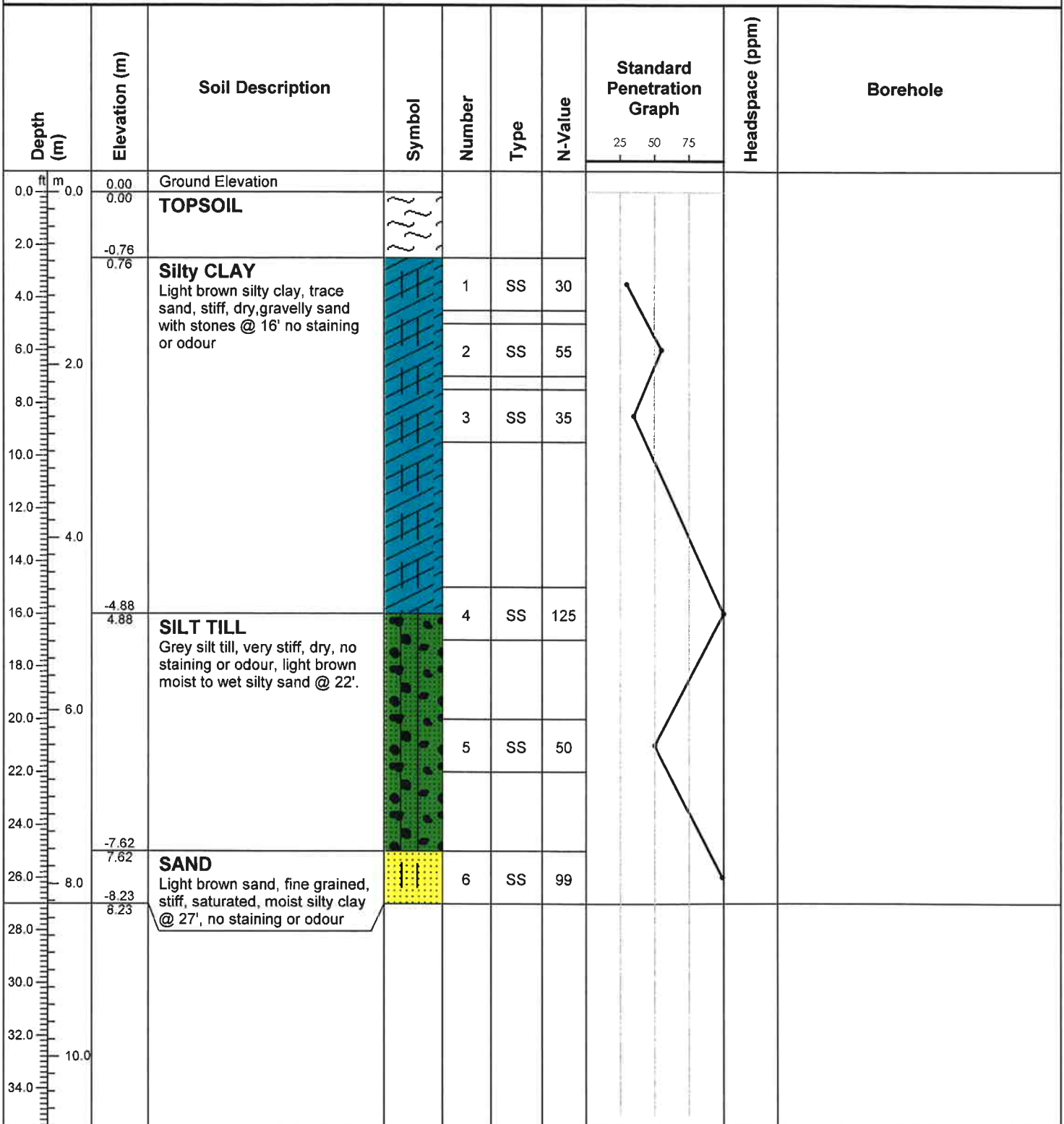
Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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 Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH8  
 Job Number: 34896-100  
 Drill Date: December 01/02, 2010



Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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Logged By: YXM  
 Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH9  
 Job Number: 34896-100  
 Drill Date: December 01/02, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
	0.00	<b>TOPSOIL</b>							
4.0	-1.07	<b>Sandy SILT</b> Light brown sandy silt with clay, some stones, moist, no staining or odour		1	SS	25			
6.0	-2.29	<b>Silty CLAY</b> Grey silty clay, trace sand, soft, slightly moist, no staining or odour, water coming out @ 13'		2	SS	18			
8.0	-4.57			3	SS	27			
12.0	-8.23	<b>CLAY</b> Grey clay, soft, fine grained, slightly moist, no staining or odour		4	SS	25			
14.0	-4.57			5	SS	30			
20.0	-8.23			6	SS	39			
26.0	-8.23			7	SS	42			
28.0	-8.23								
30.0									
32.0									
34.0									

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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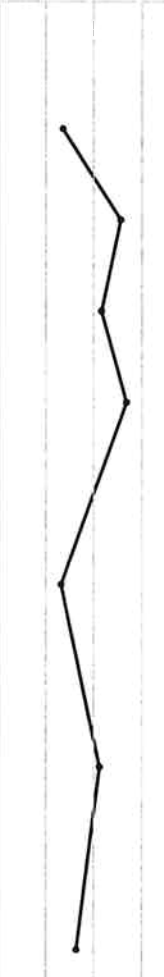
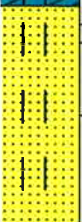

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 Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH10

Job Number: 34896-100

Drill Date: December 01/02, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph	Headspace (ppm)	Borehole
							25 50 75		
0.0	0.00	Ground Elevation							
	0.00	<b>TOPSOIL</b>							
2.0	-0.76	<b>Clayey SILT</b> Light brown clayey silt, trace sand, fine grained, stiff, dry, no staining or odour		1	SS	34			
4.0	0.76			2	SS	64			
6.0				3	SS	54			
8.0	-2.74	<b>Silty SAND</b> Grey silty sand, fine grained, moist to wet, no staining or odour		4	SS	67			
10.0	2.74								
12.0		<b>CLAY</b> Grey clay, trace sand, soft, dry, no staining or odour		5	SS	33			
14.0	-4.57			6	SS	53			
16.0	4.57								
18.0				7	SS	41			
20.0									
22.0									
24.0									
26.0	-8.23								
28.0	8.23								
30.0									
32.0									
34.0									

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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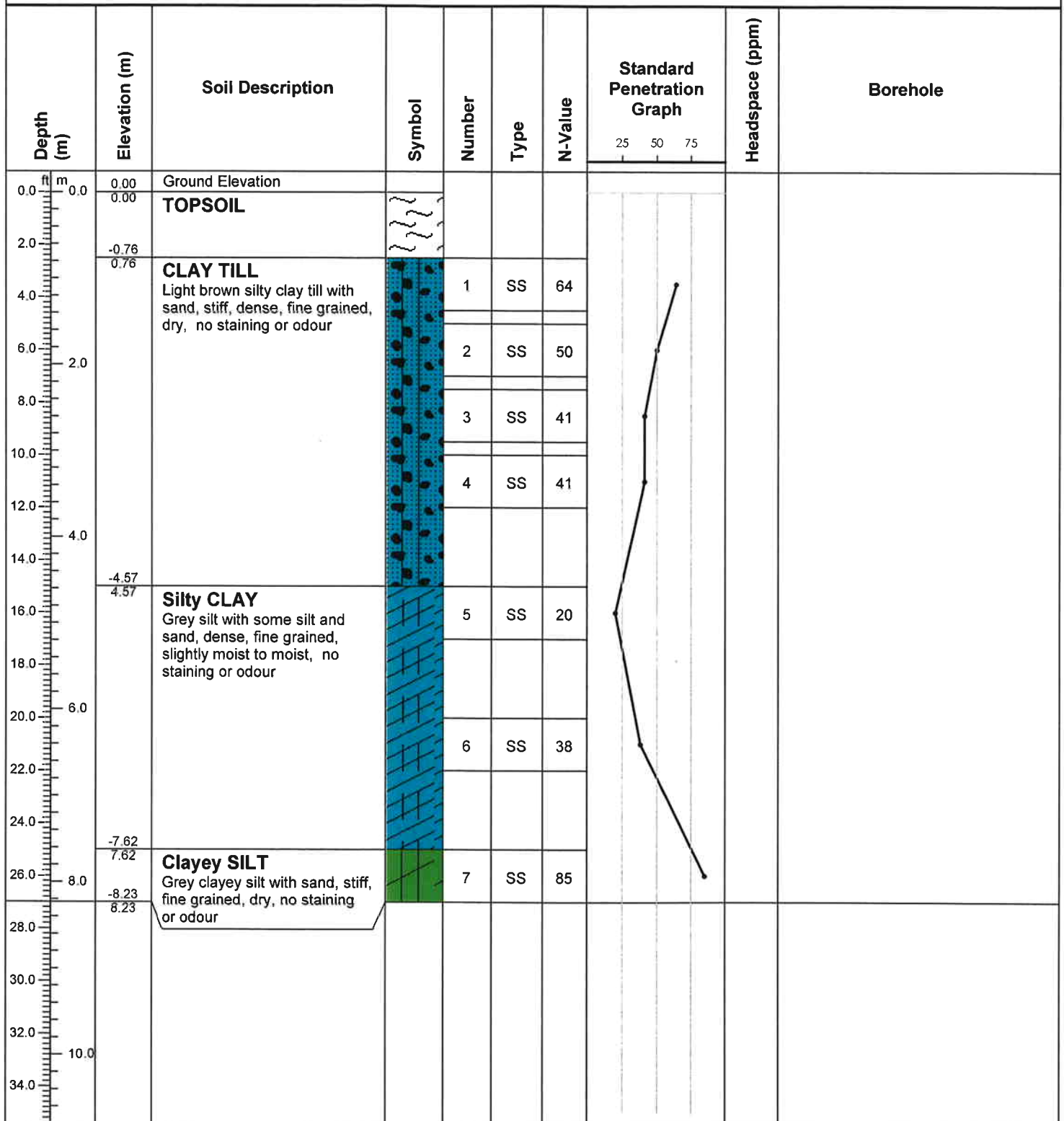
Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH11

Job Number: 34896-100

Drill Date: December 03, 2010



Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot lands

Borehole Number: BH12

Job Number: 34896-100

Drill Date: December 03, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph			Headspace (ppm)	Borehole
							25	50	75		
0.0	0.00	Ground Elevation									
	0.00	<b>TOPSOIL</b>									
2.0	-0.76	<b>CLAY TILL</b> Light brown silty clay till with sand, stiff, fine grained, dry, no staining or odour		1	SS	38					
4.0	0.76			2	SS	37					
6.0	-1.98	<b>Sandy SILT</b> Light brown sandy silt, trace clay, dry, moist to wet @ 8', no staining or odour									
8.0	1.98			3	SS	53					
10.0	-2.74	<b>Silty CLAY</b> Light brown silty clay, moist to wet, no staining or odour									
12.0	2.74			4	SS	35					
14.0		<b>Silty SAND</b> Grey silty sand with clay, fine grained, loose, moist, wet to saturated @ 16', no staining or odour									
16.0				5	SS	52					
18.0											
20.0	-6.40	<b>Silty CLAY</b> Grey silty clay, stiff, dense, fine grained, slightly moist, no staining or odour									
22.0	6.40			6	SS	45					
24.0											
26.0	-8.23										
28.0	8.23										
30.0											
32.0											
34.0											

Reviewed By: RBM  
 Method: Hollow Stem Auguring/Split Spoon  
 Notes:

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Client: Wilmot Employment Lands



Project: Hydrogeological Investigations

Location: Wilmot Lands

Test Trench Number: TT1

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
0.0	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, wood pieces, soft, damp					No seepage observed during excavation Caving @ 3 feet
2.0	-0.76 0.76	<b>Silty CLAY</b> Brown silty clay, sand seam @ 3-3.5 feet, soft, sticky, moist to very moist					
4.0							
6.0							
8.0							
10.0							
12.0	-3.20 3.20						

Reviewed By: RBM

Method: Backhoe

Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT2

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets of corn, soft, damp					No seepage observed during excavation
	-0.46	<b>Clayey SILT</b> Brown silt and clay, some sand, damp to very moist, soft, no staining or odour					
	-1.37	<b>Silty CLAY</b> Brown silty clay, little sand, sticky, moist, no staining or odour					
	-2.44	<b>Sandy SILT</b> Grey sandy silt, clayey, fine grained, moist to slight wet					
	-3.35						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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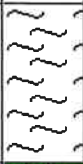


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 Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT3

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
0.0	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets of corn, soft, damp					No seepage observed during excavation
2.0	-0.46 0.46	<b>SILT</b> Brown ssandy clayey silt, loose, damp, no staining or odour					
4.0	-1.07 1.07	<b>Silty CLAY</b> Brown to dark brown silty clay, little sand, hard, moist to damp, no staining or odour					
12.0	-3.35 3.35						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT4

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
0.0	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					No seepage observed during excavation
2.0	-0.46 0.46	<b>Silty CLAY</b> Brown silty clay, little sand, damp to moist, changing to grey below 8' and damp to dry with trace sand, no staining or odour					
12.0	-3.35 3.35						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT5

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					No seepage observed during excavation
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					
	-0.46	<b>Sandy SILT</b> Brown to dark brown sandy clayey silt, few big stones @ 2-2.5', trace gry sand @ 2.5', no staining or odour					
	0.46	<b>Silty CLAY</b> Brown to dark brown silty clay, trace sand, hard, sticky, damp, no staining or odour					
	-0.91						
	0.91						
	-3.20						
	3.20						
2.0							
4.0							
6.0							
8.0							
10.0							
12.0							

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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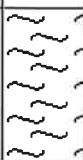

Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT6

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					
	-0.46	<b>Silty CLAY</b> Brown silty clay, trace sand, sticky, trace stones @ 4' and getting hard and dry below 4', more stones and clayey @ 7', no staining or odour					No seepage observed during excavation
	0.46						
2.0							
4.0							
6.0							
8.0							
10.0	-3.05						
	3.05						
12.0							

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT7

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					
2.0	-0.61 0.61	<b>Sandy SILT</b> Brown sandy clayey silt, gravelly, loose, dry to moist, no staining or odour					
4.0	-1.22 1.22	<b>Silty CLAY</b> Brown to dark brown silty clay, hard, sticky, damp to moist, no staining or odour					
6.0	-1.68 1.68	<b>SAND AND GRAVEL</b> Brown sand and gravel, some clay, saturated, no staining or odour					Seepage observed during excavation @6'
8.0	-2.13 2.13	<b>Silty CLAY</b> Brown silty clay, gravelly, moist, no staining or odour					
10.0	-3.20 3.20						
12.0							

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Sheet: 1 of 1

**Client:** Wilmot Employment Lands  
**Project:** Hydrogeological Investigations  
**Location:** Wilmot Lands

**Test Trench Number:** TT8

**Job Number:** 34896-100

**Date:** December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					No seepage observed during excavation
	-0.46	<b>Silty CLAY</b> Brown silty clay, little sand, stones @ and below 6' (few big boulders), damp to little moist, no staining or odour moist, getting dry and hard below 4', more stones @ 7', more clayey and sticky below 7', no staining or odour					
	0.46						
	-2.59	Grey to dark grey silty clay, hard, damp					
	2.59						
	-3.20						
	3.20						

**Reviewed By:** RBM  
**Method:** Backhoe  
**Notes:**

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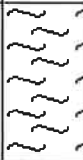




Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT9

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					No seepage observed during excavation
	-0.46	<b>Sandy SILT</b> Brown sandy silt, clayey, fine grained, loose, damp, no staining or odour					
	-0.91	<b>Silty CLAY</b> Brown silty clay, little sand, soft, damp to slight moist					
	-3.35						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT10

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
0.0	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					
2.0	-0.46	<b>Clayey SILT</b> Brown clayey silt, some sand, loose, fine grained, moist to wet, no staining or odour					
4.0	-1.22	<b>Silty CLAY</b> Brown silty clay, little sand, soft, moist, no staining or odour					Seepage observed during excavation @ 3.5'
12.0	-3.20						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Test Trench Number: TT11

Job Number: 34896-100

Date: December 21, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Headspace (ppm)	Comments
0.0	0.00	Ground Elevation					
	0.00	<b>TOPSOIL</b> Dark brown topsoil, rootlets, soft, damp					No seepage observed during excavation
	-0.46	<b>Sandy SILT</b> Brown sandy silt, clayey, fine grained, loose, moist, no staining or odour					
	-1.22	<b>SILT AND CLAY</b> Brown silt and clay, some sand, very moist, no staining or odour					
	-2.13	<b>Clayey SILT</b> Grey clayey sandy silt, fine grained, loose, slight wet, no staining or odour					
	-3.35						

Reviewed By: RBM  
 Method: Backhoe  
 Notes:

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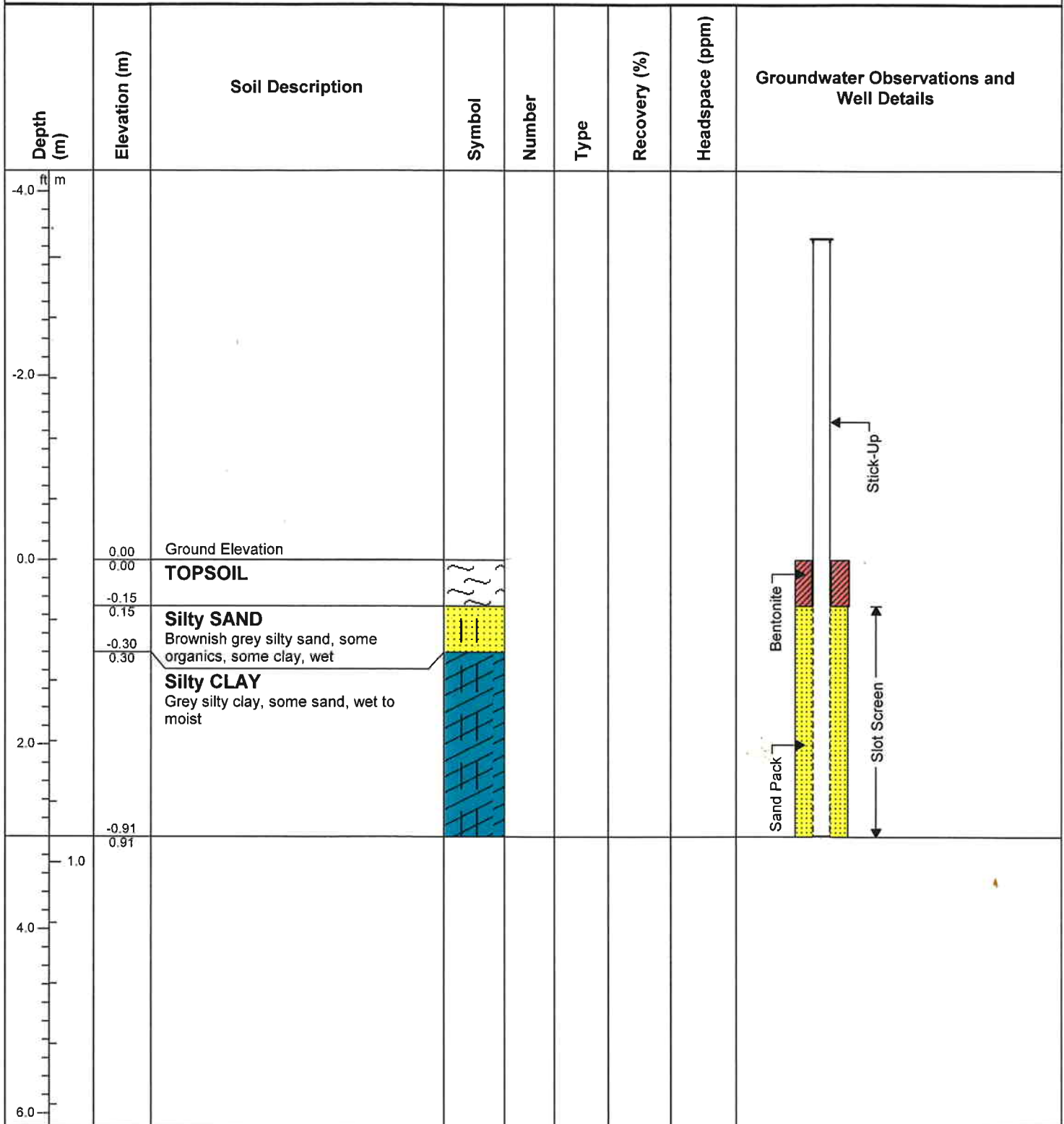
Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Mini-Piezometer: MP1-11

Job Number: 34896-100

Drill Date: January 11, 2011



Reviewed By: RBM  
 Method: Hand Augering  
 Notes:

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Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Mini-Piezometer: MP2-11

Job Number: 34896-100

Drill Date: January 11, 2011

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Recovery (%)	Headspace (ppm)	Groundwater Observations and Well Details
ft m								
-4.0								
	0.00 0.00	Ground Elevation <b>TOPSOIL</b>						
	-0.15 0.15	<b>Silty CLAY</b> Greyish brown silty clay, little to trace sand, very moist						
2.0	-0.61 0.61	<b>Clayey SILT</b> Greyish brown clayey silt, some sand, moist to wet						
	-0.84 0.84	<b>Silty CLAY</b> Grey silty clay, hard, moist						
1.0								
4.0								

Reviewed By: RBM  
 Method: Hand Augering  
 Notes:

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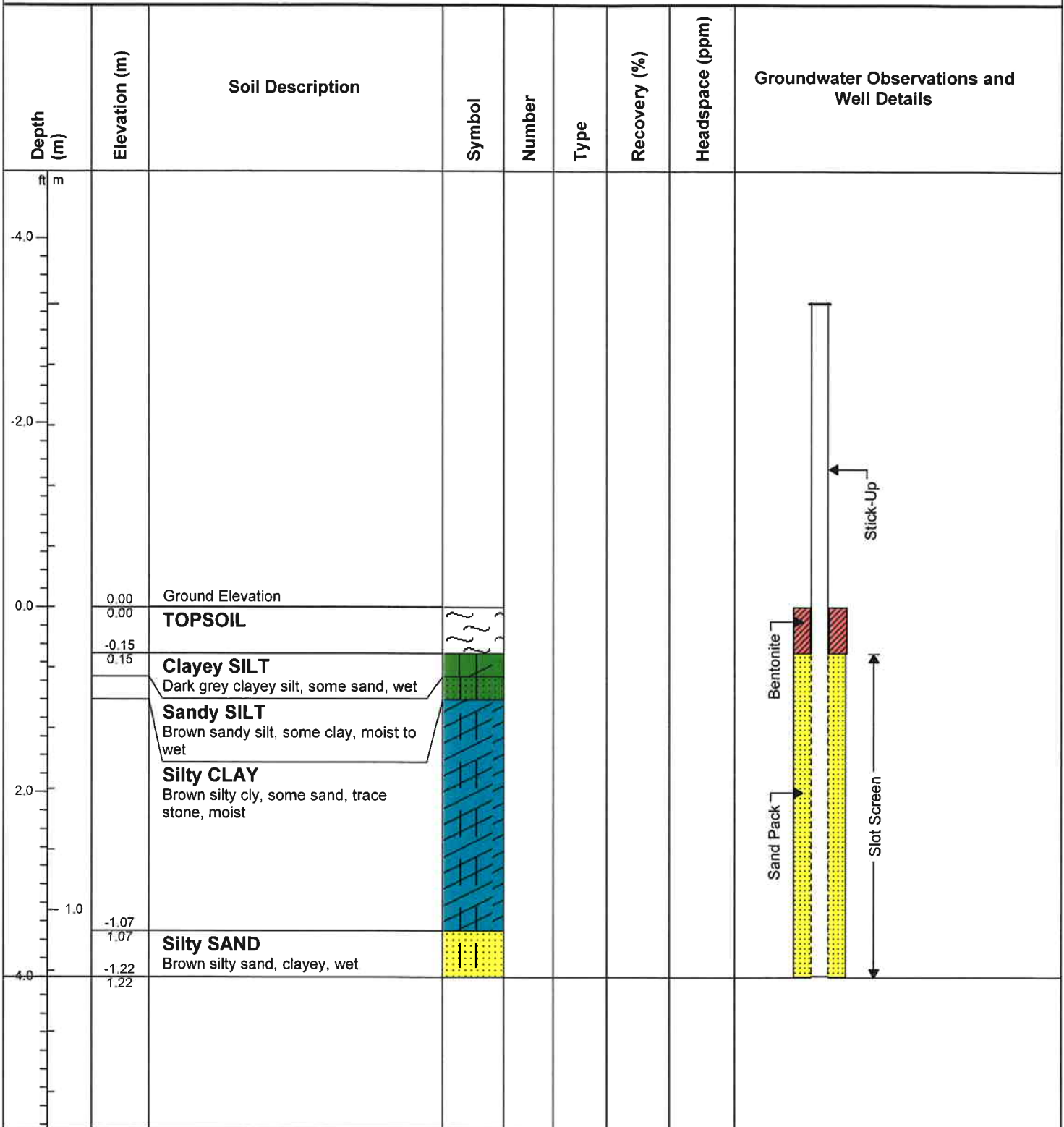
Sheet: 1 of 1

Client: Wilmot Employment Lands  
 Project: Hydrogeological Investigations  
 Location: Wilmot Lands

Mini-Piezometer: MP3-11

Job Number: 34896-100

Drill Date: January 11, 2011



Reviewed By: RBM  
 Method: Hand Augering  
 Notes:

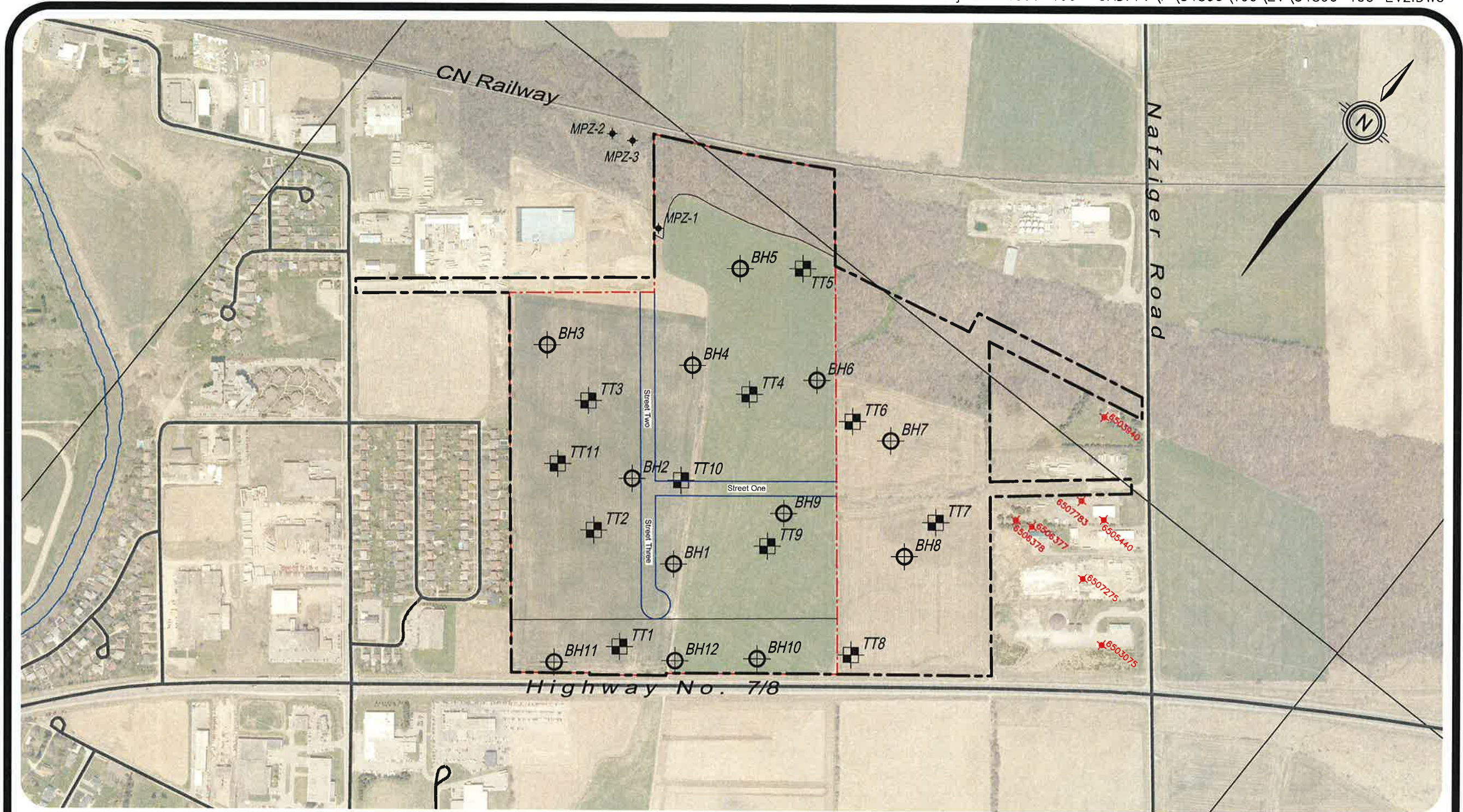
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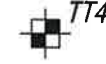

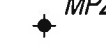
Sheet: 1 of 1

MOE WELL RECORDS

MOE_ID	EASTING	NORTHING	ELEVATION (m)	FROM (m)	TO (m)	MATERIAL	WATER LEVEL (m)
6507783	525474	4803928	342.3	0.00 19.81 23.16	19.81 23.16 64.00	CLAY GRAVEL HARDPAN	4.57
				64.00	70.10	LIMESTONE	
6503075	525662.46	4803750.31	347.48	0.00 16.76	16.76 19.20	CLAY GRAVEL	
6503940	525412.46	4804070.29	347.48	0.00 9.14	9.14 15.24	CLAY GRAVEL	
6505440	525526.47	4803926.31	345.04	0.00 9.75 13.72	9.75 13.72 24.38	CLAY SAND CLAY	
6506377	525433.47	4803837.31	345.04	0.00 10.36 11.28 11.58	10.36 11.28 11.58 13.72	CLAY SAND MEDIUM SAND SAND	6.10
6506378	525404.47	4803828.31	345.04	0.00 10.67 15.85	10.67 15.85 16.76	CLAY SAND CLAY	
6507275	525562.47	4803821.3	345.95	0.00 3.66 7.32 21.34 35.05 38.41	3.66 7.32 21.34 35.05 38.41 57.91	STONES CLAY STONES SILT BOULDERS ROCK	8.23



**LEGEND**

-  Borehole
-  Test Trench / Test Pit
-  MOE Wells & I.D. Number
-  Mini Piezometer

**Figure 4 BOREHOLE , TEST TRENCH & MOE WELL LOCATIONS**



<u>Project Name</u> Wilmot Employment Lands Enhanced Master Drainage Plan			
<u>Site</u> Wilmot Employment Lands, Township of Wilmot, Ontario		<u>Client</u> Township of Wilmot	
<u>Scale</u> 1:10,000	<u>MTE Project No.</u> 34896-100	<u>Date</u> February 2011	<u>Layout No.</u> EV1.5





**APPENDIX B**  
ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

## 1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

## 2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and
- extend downward and outward at a slope no greater than 45° to meet the subgrade

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

## 3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

## 4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

## 5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

## 6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

## 7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces for all buildings and residential dwellings or any part thereof (including but not limited to footings and floor slabs) on structural fill or native soils must be inspected and approved by PML engineering personnel prior to placement of the base/subbase granular material and/or concrete. The purpose of the inspection is to ensure the subgrade soils are capable of supporting the building/house foundation and floor slab loads and to confirm the building/house envelope does not extend beyond the limits of any structural fill pads.

## 8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

## 9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze/thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and/or spreading of fill has not been carried out at the site.

## 10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and/or site specified.

Iron bars should be placed at the corner/intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

## 11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only nonfrozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.



**APPENDIX C**  
STATEMENT OF LIMITATIONS

# STATEMENT OF LIMITATIONS

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This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings and comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

# STATEMENT OF LIMITATIONS

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The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence any action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.