GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT
HIGHWAY 7/8 NEW HAMBURG PROPERTY
NEW HAMBURG, ONTARIO

for

NEW HAMBURGLRS INC.
MR. PAUL GRESPAN/LEE AND ROGER KIESWETTER
c/o MTE CONSULTANTS INC.

PETO MacCALLUM LTD.
16 FRANKLIN STREET SOUTH
KITCHENER, ONTARIO
N2C 1R4
PHONE: (519) 893-7500
FAX: (519) 893-0654
EMAIL: kitchener@petomaccallum.com

Distribution:
23 cc: MTE Consultants Inc. (+email - dhicks@mte85.com)
(+email - pgrespan@mgbwlaw.com)
1 cc: PML Kitchener

PML Ref.: 18KF025
Report: 1
December 18, 2018

Peto MacCallum Ltd.
CONSULTING ENGINEERS

December 18, 2018

PML Ref.: 18KF025
Report: 1

New Hamburglrs Inc.
Mr. Paul Grespan/Lee and Roger Kieswetter
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
Highway 7/8 New Hamburg Property
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. in an email dated May 24, 2018.

In general, the project involves the proposed construction of an industrial subdivision on a 18.7 Ha site located northwest of the Highway 7/8 and Nafziger Road intersection in New Hamburg, Ontario. The proposed development is located on an existing agricultural property, and is bordered by agricultural lands to the west and commercial properties to the east. It is understood that buried agricultural field drains are located across the site.

PML recently completed a geotechnical investigation for a development on the neighbouring property to the west. The investigation included a series of boreholes which extended across the current site, for a road connection to Nafziger Road. It is also understood that a previous geotechnical investigation was carried out at the site in 2010. Reference is given to Appendix A for the borehole logs from PML's previous investigation along with borehole logs provided by MTE Consultants Inc. (MTE) for the 2010 investigation.

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 on June 6, 2018. The investigation program comprised a total of 6 boreholes (201 to 206) advanced to 6.7 m depth, with monitoring wells installed in four 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 surveyed 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.

Monitoring wells were installed in four boreholes to more accurately measure ground water levels. The monitoring wells comprised 50 mm diameter PVC pipe, filter sand, bentonite seals, and protective casings. PML conducted water level readings in the wells upon installation and on June 15, 2018. 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 four 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 occasional silt, sandy silt, and silty sand layers.

Surficial topsoil was contacted in all of the boreholes, and was between 100 and 400 mm thick, with an average of 275 mm.

An extensive clayey silt deposit was encountered below the surficial topsoil, in all of the boreholes, and extended to between 4.0 and the 6.7 m borehole termination depths. The cohesive clayey silt deposit was generally firm to very stiff with standard penetration N values between 6 and 40 blows per 0.3 m penetration of the split spoon sampler. The clayey silt was typically brown to about 2.5 to 4.0 m depth, and grey below. Moisture content ranged between 8 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 were also encountered within the clayey silt deposit. Reference is given to Figures 1 to 3 for the results of particle size distribution analyses conducted on samples of the clayey silt and silt.

Silty sand was encountered below the clayey silt in Borehole 202 and extended to the 6.7 m borehole termination depth. The silty sand was dense to very dense with SPT N values ranging from 40 to greater than 50 blows per 0.3 m penetration. The sandy silt was saturated with moisture contents between 15 and 18%. Reference is given to Figure 4 for the results of the particle size distribution analysis conducted on a sample of the silty sand.

Silt till was encountered below the clayey silt in Borehole 204 and extended to the 6.7 borehole termination depth. The till was very dense with SPT N value greater than 50 blows per 0.3 m penetration. The silt till was moist with a laboratory moisture content of 9%.

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 and were generally encountered in the silt layers within the clayey silt deposits, and in the silty sand. Wet and saturated conditions were typically encountered below 4.0 m depth in the silt layers of the grey clayey silt and underlying silty sand. Localized near surface wet conditions were observed in Borehole 202 from the ground surface. Free water was observed during drilling of Borehole 202 from about 3.5 m depth to the borehole termination depth.

On June 15, 2018 water level measurements from the monitoring wells installed in Boreholes 201 to 204 ranged between 1.56 to 6.12 m depth below existing grade (about Elevation 336.75 to 339.23).

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 commercial development on a property north of Highway 7/8 in New Hamburg, Ontario. The work will include earthworks grading for the commercial lots, and construction of municipal roads.

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, it is understood that agricultural field drainage pipes extend across the site. The location and extent of the drainage pipes should be verified, and rerouted away from the building areas, or decommissioned as required. It is expected that excavation of the site for grading and servicing might encounter some of the agricultural tiles during construction.

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% SPMDD. Reference is given to Appendix B for additional engineered fill construction recommendations.

A minimum 150 mm thick layer of Granular A compacted to 98% SPMDD 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

γ = unit weight of free-draining granular material
= *21* kN/m^3

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 4 m depth within the proposed development.

Excavations for service installations are expected to extend up to about 4 m depth through topsoil and into the native clayey silt deposits containing silt layers 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 4 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 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 in 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 8 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.

Soil Infiltration

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.

SOIL	HYDRAULIC CONDUCTIVITY (cm/s)	INFILTRATION RATE (mm/hr)
Clayey Silt	Less than $1x10^{-6}$	Less than 0.04
Silty Sand	$1x10^{-4}$	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, a new roadway will be constructed across the middle section of the site to connect to Nafziger Road. 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.

PAVEMENT COMPONENT	THICKNESS (mm)
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.

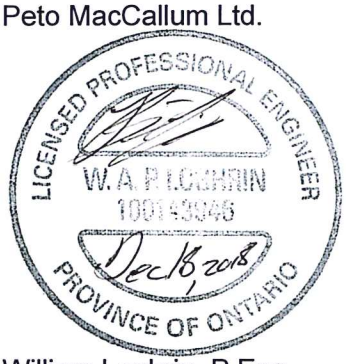
This report is subject to the Statement of Limitations that is included in Appendix C, which must be read in conjunction with the report.

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 Loghrin, P.Eng.
Project Engineer, Geotechnical Services

Gerry Mitchell, MEng, P.Eng.
Senior Consultant

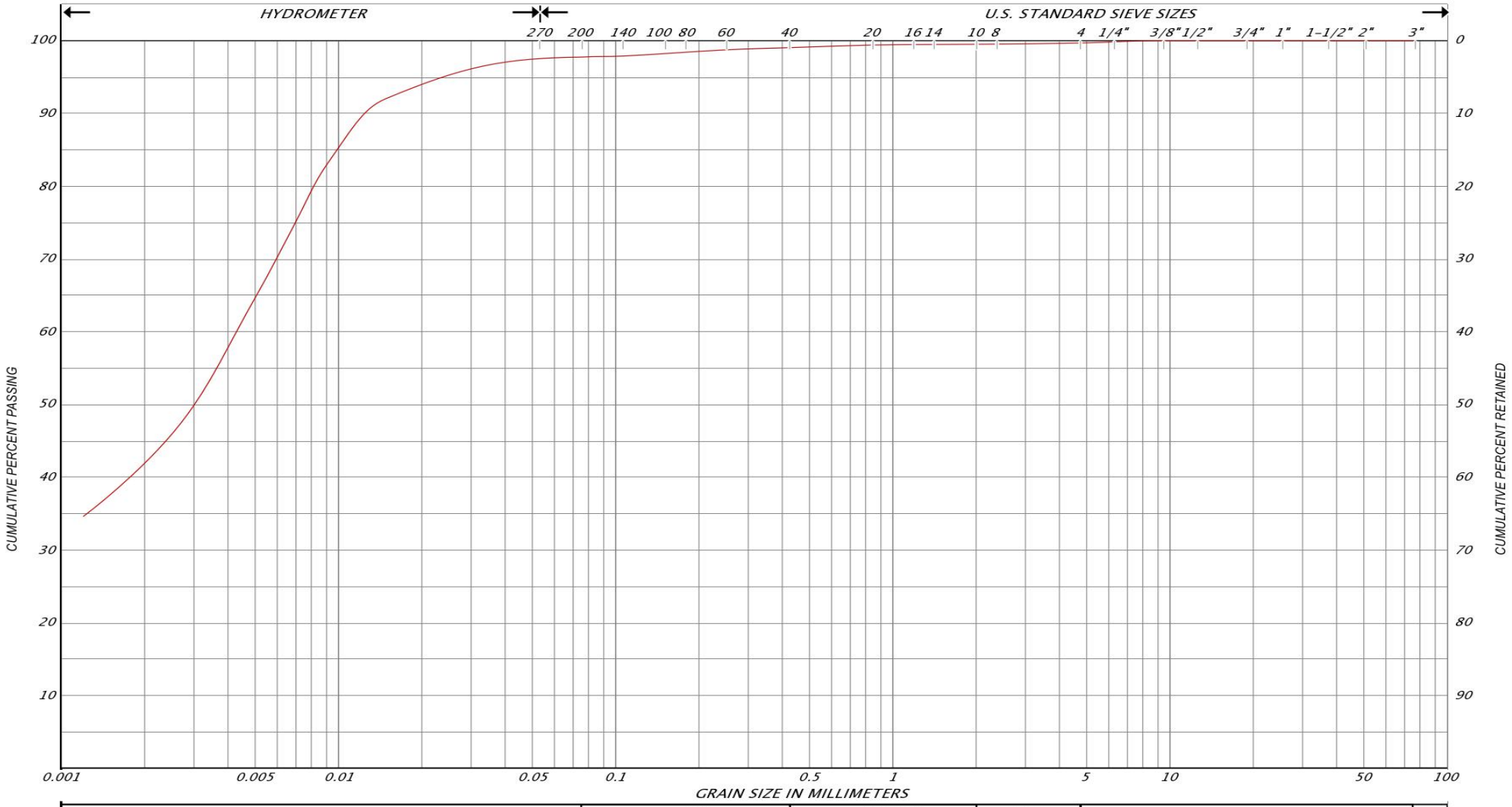
WL/GM:wl

Enclosures:
Figures 1 to 3 - Particle Size Distribution Charts
List of Abbreviations
Log of Boreholes 201 to 206
Drawing 1 - Borehole Location Plan
Appendix A – Previous PML and MTE Boreholes
Appendix B – Engineered Fill
Appendix C – Statement of Limitations

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PROJECT NO. 18KF025
FIGURE NO. 1

PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE	MEDIUM	COARSE	GRAVEL		COB BLES	UNIFIED
			SAND						
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL	COBBLES	M.I.T
	SILT			SAND					
CLAY	SILT		V.FINE	FINE	MED.	COARSE	GRAVEL		US BUREAU
			SAND						

SYMBOL	BH No.	SAMPLE No.	DEPTH (ft)	WL	WP	PI
●	201	5	15			

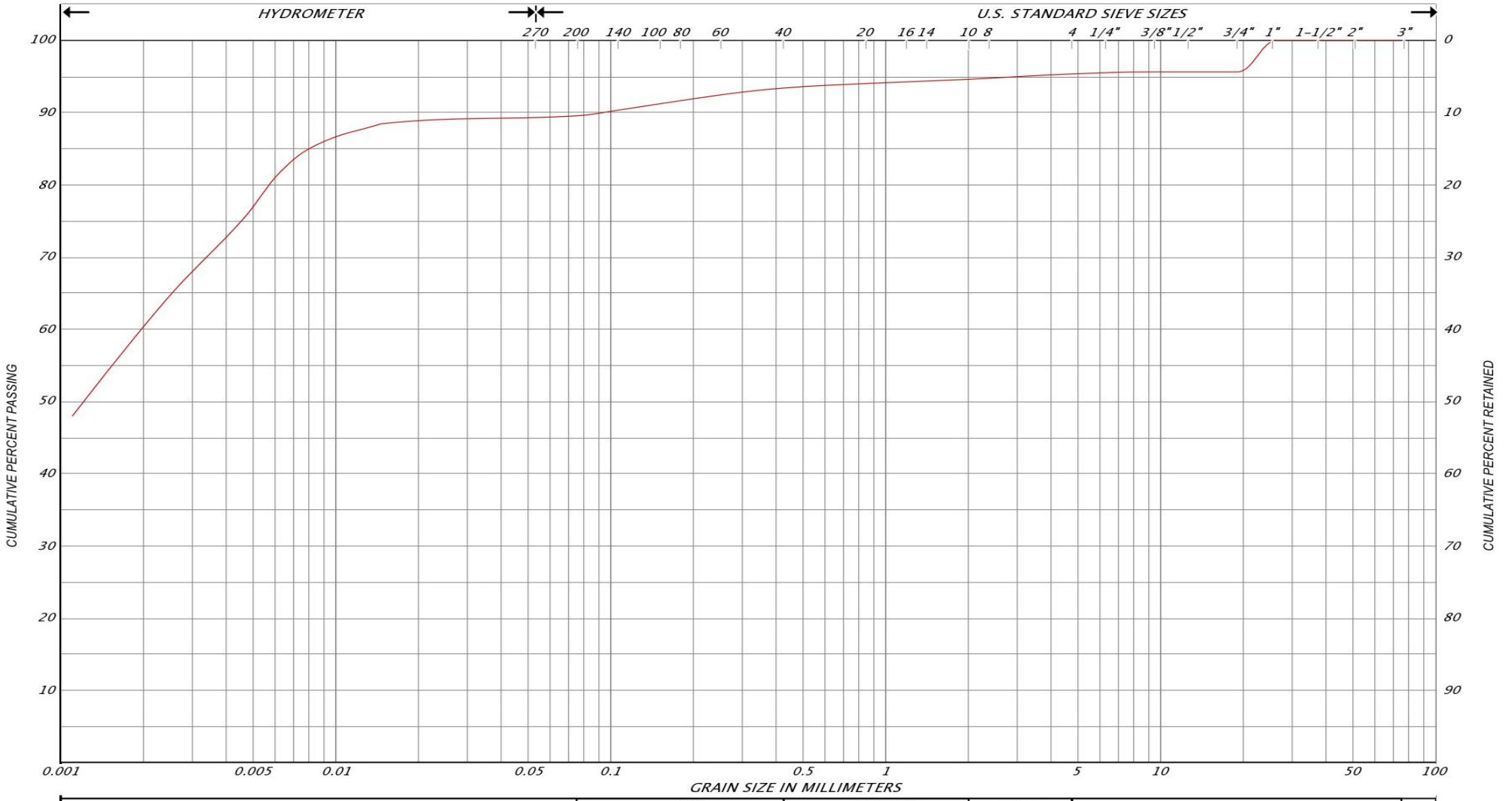
REMARKS: Borehole 201, Sample SS5, Depth 4.6 to 5.2 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PROJECT NO. 18KF025
FIGURE NO. 3

PARTICLE SIZE DISTRIBUTION CHART



SYMBOL	BH No.	SAMPLE No.	DEPTH (ft)	WL	WP	PI
●	203	5	15			

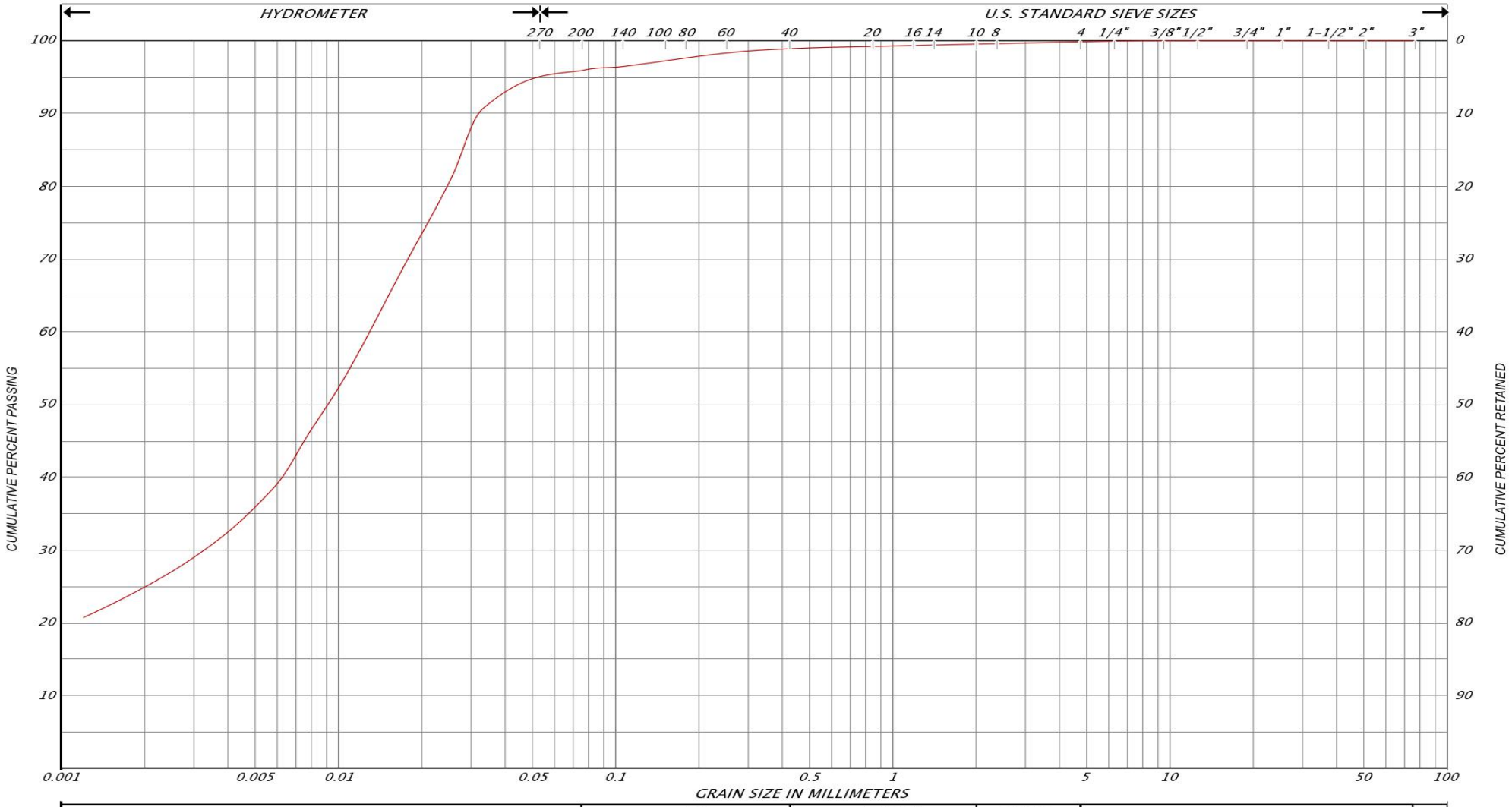
REMARKS: Borehole 203, Sample SS5, Depth 4.6 to 5.2 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PROJECT NO. 18KF025
FIGURE NO. 4

PARTICLE SIZE DISTRIBUTION CHART



SYMBOL	BH No.	SAMPLE No.	DEPTH (ft)	WL	WP	PI
●	204	5	15			

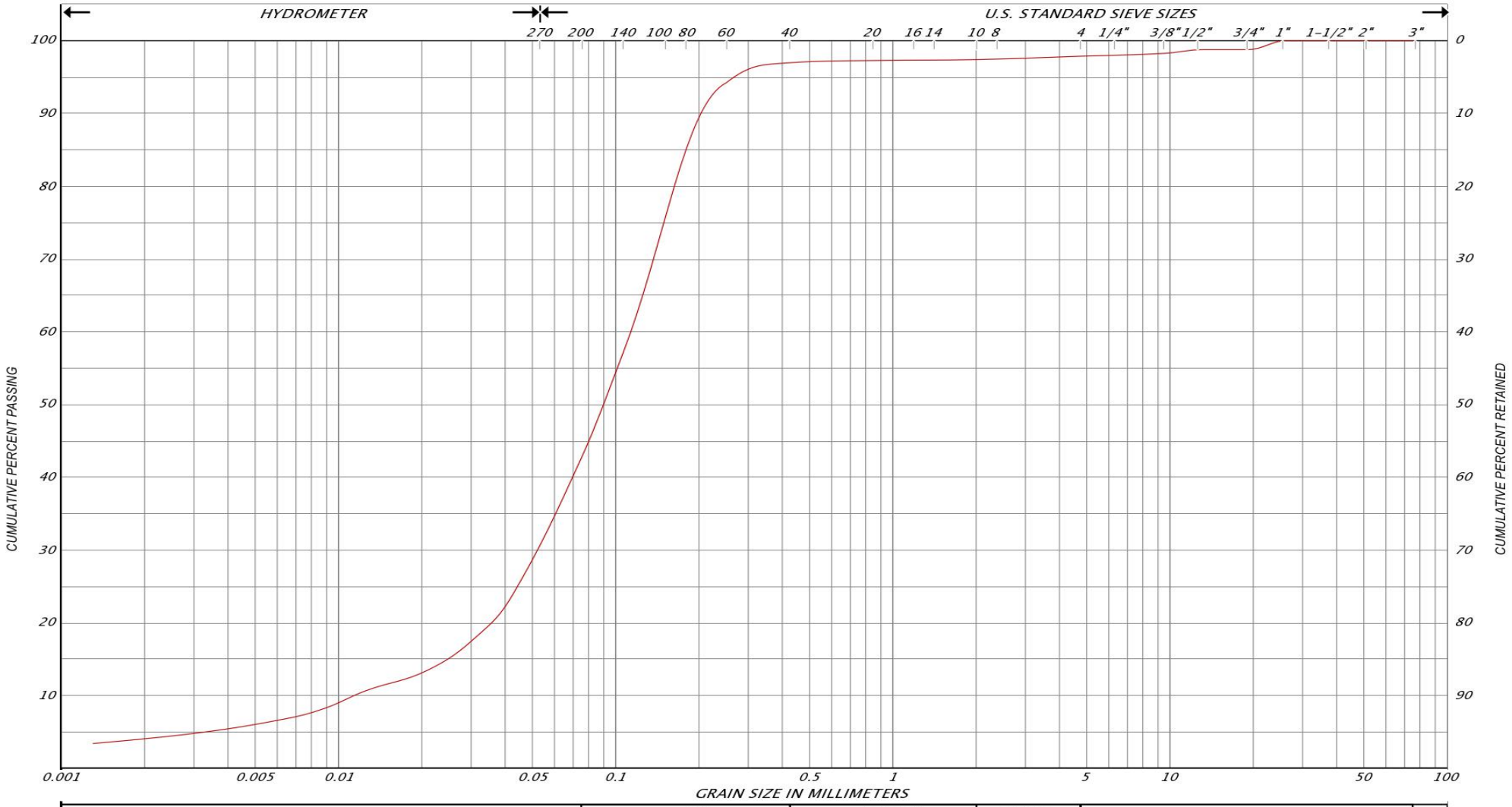
REMARKS: Borehole 204, Sample SS5, Depth 4.6 to 5.2 m

CLAYEY SILT

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PROJECT NO. 18KF025
FIGURE NO. 2

PARTICLE SIZE DISTRIBUTION CHART



SYMBOL	BH No.	SAMPLE No.	DEPTH (ft)	WL	WP	PI
●	202	7	15			

REMARKS: Borehole 202, Sample SS7, Depth 4.6 to 5.2 m

SILTY SAND

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:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
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		

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 201

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 6, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20 40 60 80)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%) (10 20 30 40)	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION									
0.40	TOPSOIL: Dark brown silt, moist		1	SS	7					Stickup Well Protector Set in Concrete
	CLAYEY SILT: Firm to stiff brown clayey silt, some sand, trace gravel, APL									
			2	SS	12					Bentonite Seal
			3	SS	9					
4.0	becoming firm grey occasional silt layers									Filter Sand
			4	SS	8					Slotted Screen
			5	SS	8					
6.7	BOREHOLE TERMINATED AT 6.7 m									Water Level Readings: Initial: Dry 2018-06-15: 2.91 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 202

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 6, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION			
0.0	TOPSOIL: Dark brown silt, moist to wet	1	SS	5
0.30	CLAYEY SILT: Brown mottled clayey silt, some sand trace gravel, occasional wet sand layers, APL	2	SS	7
1.0		3	SS	6
2.0				
2.1	becoming hard, DTPL	4	SS	40
3.0		5	SS	30
4.0				
4.0	SILTY SAND: Dense brown silty fine sand, saturated	6	SS	54
5.0				
6.0		7	SS	44
6.7	BOREHOLE TERMINATED AT 6.7 m			
7.0				
8.0				
9.0				
10.0				
11.0				
12.0				
13.0				
14.0				
15.0				

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

GAS READINGS ppm

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Slotted Screen

Free water at 3.5 m after SS6

Water Level Readings:
Initial: 3.5 m
2018-06-15: 2.28 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 203

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 6, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION					
0.0	TOPSOIL: Dark brown silt, moist		1	SS	9	
0.35	CLAYEY SILT: Firm brown clayey silt, some sand, trace gravel, APL, occasional wet silt layers					
1.0						
			2	SS	8	
2.0						
2.5	becoming grey					
3.0			3	SS	6	
4.0						
			4	SS	9	
5.0						
			5	SS	10	
6.0						
6.7	BOREHOLE TERMINATED AT 6.7 m					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

GAS READINGS ppm

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Slotted Screen

Water Level Readings:
Initial: Dry
2018-06-15: 6.12 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 204

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 9, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
	SURFACE ELEVATION				
0.0	TOPSOIL: Dark brown silt, moist		1	SS	9
0.40	CLAYEY SILT: Firm to very stiff brown clayey silt, some sand, trace gravel, APL to DTPL, occasional silt layers		2	SS	7
1.0					
2.0			3	SS	11
3.0			4	SS	13
4.0	becoming grey, occasional saturated silt layers				
4.0			5	SS	6
5.0					
5.9					
6.0	SILT TILL: Very dense grey silt, some sand, some gravel, occasional cobble, occasional boulders, moist		6	SS	75
6.7	BOREHOLE TERMINATED AT 6.7 m				
7.0					
8.0					
9.0					
10.0					
11.0					
12.0					
13.0					
14.0					
15.0					

ELEVATION SCALE

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

GAS READINGS ppm

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
Bentonite Seal
Filter Sand
Slotted Screen

Water Level Readings:
Initial: Dry
2018-06-15: 1.56 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 205

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 9, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION						
0.0	TOPSOIL: Dark brown clayey silt, APL		1	SS	5		
	CLAYEY SILT: Very stiff brown clayey silt, some sand, trace gravel, DTPL		2	SS	27		
			3	SS	18		
			4	SS	14		
			5	SS	12		
4.0	becoming grey, APL, occasional wet silt layers		6	SS	12		
			7	SS	16		
6.7	BOREHOLE TERMINATED AT 6.7 m						Upon completion of augering Open No free water

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

ELEVATION SCALE: 0.0 1.0 2.0 3.0 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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 206

PROJECT Proposed Development - Wilmot Employment Lands Eastside
PML REF. 18KF025
LOCATION New Hamburg, Ontario
BORING DATE June 9, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN W. Loghrin

DEPTH ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%)	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	SURFACE ELEVATION						50 100 150 200; 20 40 60 80	10 20 30 40		
	TOPSOIL: Dark brown silt, moist		1	SS	4					
	CLAYEY SILT: Firm brown clayey silt, some sand, trace gravel, APL to DTPL									
1.0			2	SS	9					
1.4	becoming hard, DTPL		3	SS	34					
2.0			4	SS	40					
2.9	becoming grey		5	SS	31					
4.0										
5.0			6	SS	34					
6.0			7	SS	30					
6.7	BOREHOLE TERMINATED AT 6.7 m									Upon completion of augering Open No free water
7.0										
8.0										
9.0										
10.0										
11.0										
12.0										
13.0										
14.0										
15.0										

NOTES

KEY PLAN

LEGEND:

- BOREHOLE
- BOREHOLE WITH MONITORING WELL
- PREVIOUS BOREHOLE BY OTHERS
- PREVIOUS TEST PIT BY OTHERS

REFERENCE:

BOREHOLE LOCATION PLAN REPRODUCED FROM DRAWING SUPPLIED BY CLIENT.

NOTE:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

NEW HAMBURGLRS INC.

PROPOSED DEVELOPMENT

HIGHWAY 7/8 NEW HAMBURG PROPERTY

NEW HAMBURG, ONTARIO

BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	D. BRICE	DATE	SCALE	PML REF.	DWG. NO.
CHECKED	W. LOGHRIN	DECEMBER 2018	AS SHOWN	18KF025	1
APPROVED	G. MITCHELL				

APPENDIX A

PREVIOUS PML AND MTE BOREHOLES

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

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

Client: Wilmot Employment Lands

Project: Hydrogeological Investigations

Location: Wilmot 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 (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
	-0.61								
2.0	0.61	**SILT** Light brown clayey silt, fine grained, stiff, dry, no staining or odour. Light brown sandy silt @ 7'		1	SS	30			
4.0									
6.0				2	SS	51			
	-2.29								
8.0	2.29	**Silty CLAY** Grey-brown silty clay, fine grained, stiff, dry, no staining or odour		3	SS	42			
10.0	-3.05								
	3.05	**CLAY** Grey clay, fine, stiff, dry, trace sand @ 17', no staining or odour		4	SS	23			
12.0									
14.0									
16.0				5	SS	33			
18.0									
20.0				6	SS	27			
22.0									
24.0									
26.0				7	SS	31			
	-8.23								
	8.23								
28.0									
30.0									
32.0									
34.0									

ft / m: 0.0 / 2.0 / 4.0 / 6.0 / 8.0 / 10.0

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
	-0.61								
2.0	0.61	**SILT** Light brown clayey silt, trace sand, dry, no staining or odour		1	SS	31			
4.0	-1.52								
6.0	1.52	**Sandy SILT** Light brown sandy silt with clay, fine grained, stiff, dry, slightly moist @ 8'		2	SS	49			
8.0				3	SS	38			
10.0	-3.05								
	3.05	**Silty CLAY** Grey silty clay with sand, fine grained, stiff, dy, no staining or odour		4	SS	32			
12.0	-3.66								
14.0	3.66	**Silty SAND** Grey silty sand, trace clay seams, fine grained, stiff, no staining or odour, dry to wet		5	SS	45			
16.0									
18.0									
20.0				6	SS	20			
22.0									
24.0									
26.0				7	SS	54			
	-8.23								
	8.23								
28.0									
30.0									
32.0									
34.0									

ft / m: 0.0 / 2.0 / 4.0 / 6.0 / 8.0 / 10.0

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

Client: Wilmot Employment Lands

Project: Hydrogeological Investigations

Location: Wilmot 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 (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
	-0.61								
2.0	0.61	**SILT** Dark brown sandy silt with clay, light brown silty clay @ 4'dry, no staining or odour		1	SS	28			
4.0	-1.52								
6.0	1.52	**SILT TILL** Light brown clayey silt till, some small stones, dry, no staining or odour		2	SS	36			
2.0	-2.13								
8.0	2.13	**Silty SAND** Light brown silty sand, loose, fine, moist to wet @8', light brown dry clay @ 9,		3	SS	23			
10.0	-3.05								
	3.05	**CLAY** Grey clay, trace silt, fine grained, stiff, no staining or odour, slightly moist		4	SS	21			
12.0									
4.0									
14.0									
16.0				5	SS	23			
18.0									
20.0	-6.10								
6.0	6.10	**Sandy SILT** Grey sandy silt, fine grained, saturated, no staining or odour		6	SS	49			
22.0									
24.0	-7.62								
	7.62	**CLAY** Grey clay, fine grained, stiff, no staining or odour, dry		7	SS	47			
26.0	-8.23								
8.0	8.23								
28.0									
30.0									
32.0									
10.0									
34.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

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 (25 50 75)	Headspace (ppm)	Borehole
0.0 ft / 0.0 m	0.00	Ground Elevation							
	0.00	**TOPSOIL**							
	-0.61								
2.0	0.61	**Clayey SILT** Grey to light brown silt and clay, fine grained, soft, moist, no staining or odour		1	SS	27			
4.0	-1.52								
	1.52	**Silty CLAY** 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			
6.0 – 2.0				3	SS	74			
8.0									
10.0				4	SS	32			
12.0									
14.0 – 4.0									
16.0				5	SS	24			
18.0									
20.0 – 6.0				6	SS	24			
22.0									
24.0	-7.62								
	7.62	**CLAY TILL** Grey silty clay till, trace sand, trace stone, stiff, moist to slight moist		7	SS	93			
26.0 – 8.0	-8.23								
	8.23								
28.0									
30.0									
32.0									
34.0 – 10.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

Client: Wilmot Employment Lands

Project: Hydrogeological Investigations

Location: Wilmot lands

Borehole Number: BH6

Job Number: 34896-100

Drill Date: December 01, 2010

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
	-1.22			1	SS	16			
2.0	1.22	**Silty CLAY** Light brown silty clay, little sand, moist to very moist, no staining or odour		2	SS	14			
4.0	-2.44								
6.0	2.44	**Silty SAND** Light brown silty sand, some clay, wet		3	SS	29			
8.0	-3.05								
10.0	3.05	**Silty CLAY** Light grey silty clay, dry		4	SS	70			
12.0		**Silty SAND** Light brown silty sand, little clay, trace stone, slight wet							
14.0	-4.57								
16.0	4.57	**Silty CLAY** Greyish brown silty clay, some sand,fine grained, stiff slightly moist		5	SS	50			
18.0	-5.49								
20.0	5.49	**Silty SAND** Lihgt grey clayey silty sand, fine grained, slightly wet to saturated		6	SS	65			
22.0		**Silty CLAY** Grey silty clay, some sand, fine grained, stiff, moist							
24.0		**CLAY TILL** Grey sandy silty clay till, some stones, fien grained, stiff, damp to moist		7	SS	65			
26.0									
28.0									
30.0				8	SS	75			
32.0	-9.75								
34.0	9.75								

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
2.0	-0.76								
	0.76	**Silty CLAY** Light brown silty clay, little sand, stiff, damp to moist, no staining or odour		1	SS	52			
4.0									
6.0				2	SS	57			
2.0									
8.0				3	SS	52			
10.0									
				4	SS	46			
12.0	-3.66								
	3.66	**SILT TILL** Light brown to grey clayey silt till, some sand, some small stones, fine grained, some pebbles @ 16', dry							
4.0									
14.0									
16.0				5	SS	71			
18.0									
6.0									
20.0				6	SS	92			
22.0									
24.0									
26.0				7	SS	50			
8.0	-8.23								
	8.23								
28.0									
30.0									
32.0									
10.0									
34.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
2.0	-0.76								
	0.76	**Silty CLAY** Light brown silty clay, trace sand, stiff, dry,gravelly sand with stones @ 16' no staining or odour		1	SS	30			
4.0									
6.0				2	SS	55			
2.0									
8.0				3	SS	35			
10.0									
12.0									
4.0									
14.0									
16.0	-4.88			4	SS	125			
	4.88	**SILT TILL** Grey silt till, very stiff, dry, no staining or odour, light brown moist to wet silty sand @ 22'.							
18.0									
6.0									
20.0				5	SS	50			
22.0									
24.0	-7.62								
	7.62	**SAND** Light brown sand, fine grained, stiff, saturated, moist silty clay @ 27', no staining or odour		6	SS	99			
26.0									
8.0	-8.23								
	8.23								
28.0									
30.0									
32.0									
10.0									
34.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

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 (25 50 75)	Headspace (ppm)	Borehole
0.0	0.00	Ground Elevation							
0.0	0.00	**TOPSOIL**							
	-1.07			1	SS	25			
2.0	1.07	**Sandy SILT** Light brown sandy silt with clay, some stones, moist, no staining or odour		2	SS	18			
4.0	-2.29								
6.0	2.29	**Silty CLAY** Grey silty clay, trace sand, soft, slightly moist, no staining or odour, water coming out @ 13'		3	SS	27			
8.0				4	SS	25			
10.0									
12.0									
14.0	-4.57								
16.0	4.57	**CLAY** Grey clay, soft, fine grained, slightly moist, no staining or odour		5	SS	30			
18.0									
20.0				6	SS	39			
22.0									
24.0									
26.0				7	SS	42			
28.0	-8.23								
30.0	8.23								
32.0									
34.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph (25 50 75)	Headspace (ppm)	Borehole
0.0 ft / 0.0 m	0.00	Ground Elevation							
	0.00	**TOPSOIL**							
2.0	-0.76								
	0.76	**CLAY TILL** Light brown silty clay till with sand, stiff, dense, fine grained, dry, no staining or odour		1	SS	64			
4.0				2	SS	50			
6.0 – 2.0				3	SS	41			
8.0				4	SS	41			
10.0									
12.0 – 4.0									
14.0	-4.57								
	4.57	**Silty CLAY** Grey silt with some silt and sand, dense, fine grained, slightly moist to moist, no staining or odour		5	SS	20			
16.0									
18.0									
20.0 – 6.0				6	SS	38			
22.0									
24.0	-7.62								
	7.62	**Clayey SILT** Grey clayey silt with sand, stiff, fine grained, dry, no staining or odour		7	SS	85			
26.0 – 8.0	-8.23								
	8.23								
28.0									
30.0									
32.0 – 10.0									
34.0									

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 (ft)	Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	N-Value	Standard Penetration Graph (25 50 75)	Headspace (ppm)	Borehole
0.0	0.0	0.00	Ground Elevation							
		0.00	**TOPSOIL**							
2.0		-0.76								
		0.76	**CLAY TILL** Light brown silty clay till with sand, stiff, fine grained, dry, no staining or odour		1	SS	38			
4.0										
6.0	2.0	-1.98			2	SS	37			
		1.98	**Sandy SILT** Light brown sandy silt, trace clay, dry,moist to wet @ 8', no staining or odour							
8.0		-2.74			3	SS	53			
		2.74	**Silty CLAY** Light brown silty clay, moist to wet, no staining or odour		4	SS	35			
10.0										
12.0			**Silty SAND** Grey silty sand with clay, fine grained, loose, moist, wet to saturated @ 16', no staining or odour							
14.0	4.0									
16.0					5	SS	52			
18.0										
20.0	6.0	-6.40			6	SS	45			
		6.40	**Silty CLAY** Grey silty clay, stiff, dense, fine grained, slightly moist, no staining or odour							
22.0										
24.0										
26.0	8.0	-8.23			7	SS	56			
		8.23								
28.0										
30.0										
32.0	10.0									
34.0										

Reviewed By: RBM

Method: Hollow Stem Auguring/Split Spoon

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

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
ft m 0.0 0.0	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, wood pieces, soft, damp					
2.0	-0.76						No seepage observed during excavation
	0.76	**Silty CLAY** Brown silty clay, sand seam @ 3-3.5 feet, soft, sticky, moist to very moist					Caving @ 3 feet
4.0							
6.0							
2.0							
8.0							
10.0	-3.20						
	3.20						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 (ft) / 0.0 (m)	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets of corn, soft, damp					
	-0.46 / 0.46	**Clayey SILT** Brown silt and clay, some sand, damp to very moist,soft, no staining or odour					No seepage observed during excavation
2.0							
4.0	-1.37 / 1.37	**Silty CLAY** Brown silty clay, little sand, sticky, moist, no staining or odour					
6.0							
2.0 (m)							
8.0	-2.44 / 2.44	**Sandy SILT** Grey sandy silt, clayey, fine grained, moist to slight wet					
10.0							
	-3.35 / 3.35						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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
ft m 0.0 0.0	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets of corn, soft, damp					
	-0.46 0.46	**SILT** Brown ssandy clayey silt, loose, damp, no staining or odour					No seepage observed during excavation
	-1.07 1.07	**Silty CLAY** Brown to dark brown silty clay, little sand, hard, moist to damp, no staining or odour					
2.0							
	-3.35 3.35						

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 ft / 0.0 m	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46 / 0.46	**Silty CLAY** Brown silty clay, little sand, damp to moist, changing to grey below 8' and damp to dry with trace sand, no staining or odour					No seepage observed during excavation
2.0							
4.0							
6.0							
2.0 m							
8.0							
10.0	-3.35 / 3.35						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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
ft / m	0.00	Ground Elevation					
0.0 / 0.0	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46						
	0.46	**Sandy SILT** Brown to dark brown sandy clayey silt, few big stones @ 2-2.5', trace gry sand @ 2.5' , no staining or odour					No seepage observed during excavation
2.0	-0.91						
	0.91	**Silty CLAY** Brown to dark brown silty clay, trace sand, hard, sticky, damp, no staining or odour					
4.0							
6.0							
2.0							
8.0							
10.0	-3.20						
	3.20						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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
ft / m	0.00	Ground Elevation					
0.0 / 0.0	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46						
	0.46	**Silty CLAY** 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
2.0							
4.0							
6.0							
2.0							
8.0							
10.0	-3.05						
	3.05						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

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
ft / m							
0.0 / 0.0	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
2.0	-0.61						
	0.61	**Sandy SILT** Brown sandy clayey silt, gravelly, loose, dry to moist, no staining or odour					
4.0	-1.22						
	1.22	**Silty CLAY** Brown to dark brown silty clay, hard, sticky, damp to moist, no staining or odour					
	-1.68						
	1.68	**SAND AND GRAVEL** Brown sand and gravel, some clay, saturated, no staining or odour					Seepage observed during excavation @6'
6.0 / 2.0	-2.13						
	2.13	**Silty CLAY** Brown silty clay, gravelly, moist, no staining or odour					
8.0							
10.0	-3.20						
	3.20						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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
ft m 0.0 0.0	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46						
	0.46	**Silty CLAY** 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					No seepage observed during excavation
2.0							
4.0							
6.0							
2.0							
8.0							
	-2.59						
	2.59	Grey to dark grey silty clay, hard, damp					
10.0							
	-3.20						
	3.20						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

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	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46						
	0.46	**Sandy SILT** Brown sandy silt, clayey, fine grained, loose, damp, no staining or odour					No seepage observed during excavation
	-0.91						
	0.91	**Silty CLAY** Brown silty clay, little sand, soft, damp to slight moist					
2.0							
4.0							
6.0							
8.0							
10.0							
	-3.35						
	3.35						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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
ft m 0.0 0.0	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46						
	0.46	**Clayey SILT** Brown clayey silt, some sand, loose, fine grained,moist to wet, no staining or odour					Seepage observed during excavation @ 3.5'
2.0							
	-1.22						
4.0	1.22	**Silty CLAY** Brown silty clay, little sand, soft, moist, no staining or odour					
6.0							
2.0							
8.0							
10.0							
	-3.20						
	3.20						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

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 ft / 0.0 m	0.00	Ground Elevation					
	0.00	**TOPSOIL** Dark brown topsoil, rootlets, soft, damp					
	-0.46 / 0.46	**Sandy SILT** Brown sandy silt, clayey, fine grained, loose, moist, no staining or odour					No seepage observed during excavation
2.0							
4.0	-1.22 / 1.22	**SILT AND CLAY** Brown silt and clay, some sand, very moist, no staining or odour					
6.0							
2.0	-2.13 / 2.13	**Clayey SILT** Grey clayey sandy silt, fine grained, loose, slight wet, no staining or odour					
8.0							
10.0	-3.35 / 3.35						
12.0							

Reviewed By: RBM

Method: Backhoe

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

Client: Wilmot Employment Lands

Project: Hydrogeological Investigations

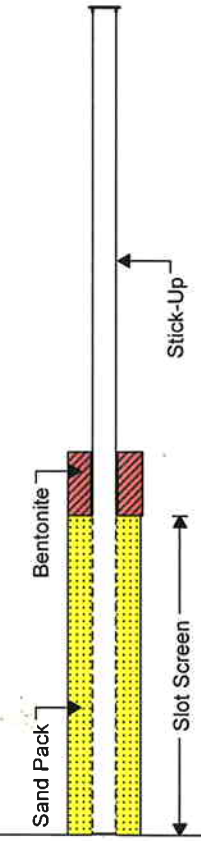
Location: Wilmot Lands

Mini-Piezometer: MP1-11

Job Number: 34896-100

Drill Date: January 11, 2011

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Recovery (%)	Headspace (ppm)	Groundwater Observations and Well Details
ft / m								
-4.0								
-2.0								
0.0	0.00	Ground Elevation						
	0.00	**TOPSOIL**						
	-0.15							
	0.15	**Silty SAND** Brownish grey silty sand, some organics, some clay, wet						
	-0.30							
	0.30	**Silty CLAY** Grey silty clay, some sand, wet to moist						
2.0								
	-0.91							
	0.91							
1.0								
4.0								
6.0								



Reviewed By: RBM

Method: Hand Augering

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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 -2.0 0.0 2.0 1.0 4.0	0.00 0.00 -0.15 0.15 -0.61 0.61 -0.84 0.84	Ground Elevation **TOPSOIL** **Silty CLAY** Greyish brown silty clay, little to trace sand, very moist **Clayey SILT** Greyish brown clayey silt, some sand, moist to wet **Silty CLAY** Grey silty clay, hard, moist						Stick-Up Bentonite Sand Pack Slot Screen

Reviewed By: RBM

Method: Hand Augering

Notes:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

Sheet: 1 of 1

Client: Wilmot Employment Lands

Project: Hydrogeological Investigations

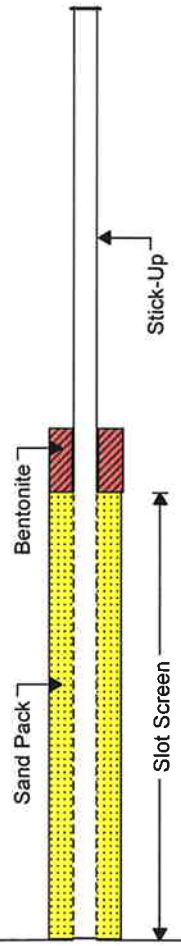
Location: Wilmot Lands

Mini-Piezometer: MP3-11

Job Number: 34896-100

Drill Date: January 11, 2011

Depth (m)	Elevation (m)	Soil Description	Symbol	Number	Type	Recovery (%)	Headspace (ppm)	Groundwater Observations and Well Details
ft / m								
-4.0								
-2.0								
0.0	0.00	Ground Elevation						
	0.00	**TOPSOIL**						
	-0.15 / 0.15	**Clayey SILT** Dark grey clayey silt, some sand, wet						
		Sandy SILT Brown sandy silt, some clay, moist to wet						
2.0		**Silty CLAY** Brown silty cly, some sand, trace stone, moist						
1.0	-1.07 / 1.07	**Silty SAND** Brown silty sand, clayey, wet						
4.0	-1.22 / 1.22							



Reviewed By: RBM

Method: Hand Augering

Notes:

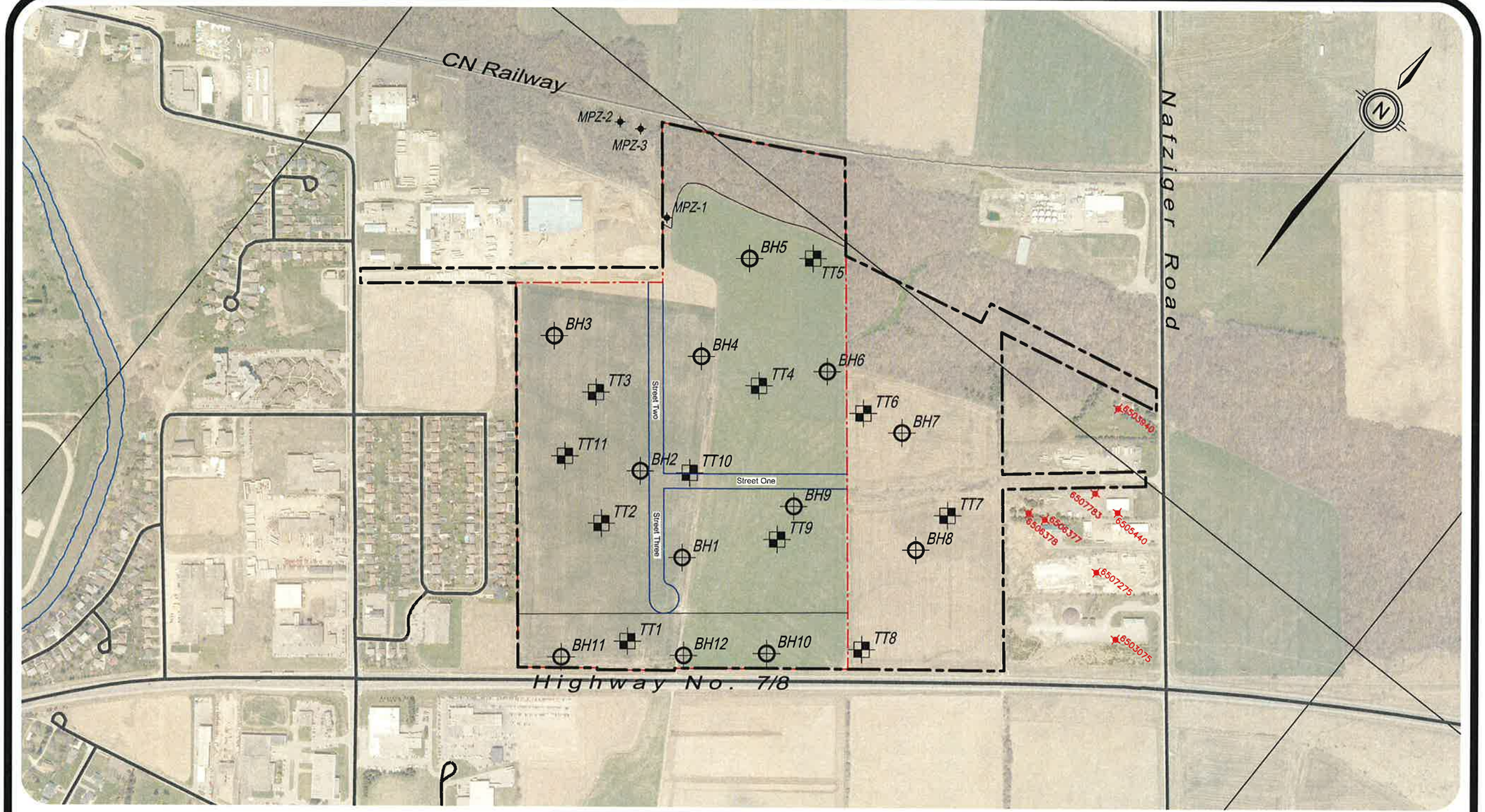
MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario
N2B 3X9
(519) 743-6500

Logged By: YXM

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	CLAY	4.57
				19.81	23.16	GRAVEL	
				23.16	64.00	HARDPAN	
				64.00	70.10	LIMESTONE	
6503075	525662.46	4803750.31	347.48	0.00	16.76	CLAY	
				16.76	19.20	GRAVEL	
6503940	525412.46	4804070.29	347.48	0.00	9.14	CLAY	
				9.14	15.24	GRAVEL	
6505440	525526.47	4803926.31	345.04	0.00	9.75	CLAY	
				9.75	13.72	SAND	
				13.72	24.38	CLAY	
6506377	525433.47	4803837.31	345.04	0.00	10.36	CLAY	6.10
				10.36	11.28	SAND	
				11.28	11.58	MEDIUM SAND	
				11.58	13.72	SAND	
6506378	525404.47	4803828.31	345.04	0.00	10.67	CLAY	
				10.67	15.85	SAND	
				15.85	16.76	CLAY	
6507275	525562.47	4803821.3	345.95	0.00	3.66	STONES	8.23
				3.66	7.32	CLAY	
				7.32	21.34	STONES	
				21.34	35.05	SILT	
				35.05	38.41	BOULDERS	
				38.41	57.91	ROCK	



LEGEND

- BH9 — Borehole
- TT4 — Test Trench / Test Pit
- 6503075 — MOE Wells & I.D. Number
- MPZ-1 — Mini Piezometer

MTE 25 YEARS 1985-2010

ENVIRONMENTAL DIVISION

Figure 4 BOREHOLE , TEST TRENCH & MOE WELL LOCATIONS

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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 101

PROJECT Proposed Development - Wilmot Employment Lands
PML REF. 18KF009
LOCATION New Hamburg, Ontario
BORING DATE March 13, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 338.59			
0.0	338.54	TOPSOIL: Dark brown clayey silt, frozen	1	SS	8
		CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL			
1.0			2	SS	19
2.0			3	SS	25
			4	SS	28
3.0	335.6	becoming stiff, grey, APL	5	SS	9
4.0					
5.0			6	SS	10
6.0	332.5	becoming very stiff, occasional silt layers, wet	7	SS	21
7.0					
8.0			8	SS	18
9.0			9	SS	18
10.0					
11.0	327.5	BOREHOLE TERMINATED AT 11.1 m	10	SS	23
12.0					
13.0					
14.0					
15.0					

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 338, 337, 336, 335, 334, 333, 332, 331, 330, 329, 328

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
50 mm Plastic Riser
Bentonite Seal
Filter Sand
Slotted Screen

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

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 336.06			
0.0	336.06	TOPSOIL: Dark brown clayey silt topsoil, frozen	1	SS	6
0.33	335.73	CLAYEY SILT: Firm brown clayey silt, some sand, APL	2	SS	4
1.5	334.6	becoming stiff, layered with brown silt, some fine sand, wet	3	SS	14
			4	SS	25
3.0	333.1	becoming grey clayey silt, trace sand, DTPL, occasional sand partings	5	SS	13
			6	AS	
			7	SS	13
			8	SS	11
			9	SS	22
8.1	328.0	BOREHOLE TERMINATED AT 8.1 m			

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ●

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
	333.72	SURFACE ELEVATION 333.72				
0.25	333.47	TOPSOIL: Dark brown clayey silt, frozen		1	SS	6
0.76	332.96	CLAYEY SILT: Firm brown clayey silt, trace sand, moist		2	SS	8
1.5	332.2	SILT: Loose brown sandy silt, trace clay, moist		3	SS	11
		becoming compact, occasional clayey lenses		4	SS	16
3.0	330.7	CLAYEY SILT: Stiff grey clayey silt, trace sand, APL		5	SS	14
				6	GS	
				7	SS	12
				8	SS	13
				9	SS	12
8.1	325.6	BOREHOLE TERMINATED AT 8.1 m				

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

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

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 339.03					
0.0		TOPSOIL: Dark brown clayey silt, frozen					
0.25	338.78	CLAYEY SILT: Firm to very stiff brown clayey silt, trace sand, moist		1	SS	8	
				2	SS	13	338
1.5	337.5	numerous wet silt layers		3	SS	12	
				4	SS	15	337
3.0	336.0	SILT: Compact grey silt, some sand, occasional clayey lenses, saturated		5	SS	18	336
				6	SS	25	335
				7	SS	24	334
7.6	331.4	becoming dense		8	SS	31	333
							332
9.1	329.9	CLAYEY SILT: Very stiff grey clayey silt, APL, numerous saturated silt layers		9	SS	21	331
							330
							329
11.1	327.9	BOREHOLE TERMINATED AT 11.1 m		10	SS	26	328

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 340.48					
0.0	340.48	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	5	340
0.36	340.12	CLAYEY SILT: Firm brown clayey silt, some sand, APL		2	SS	7	
1.0				3	SS	6	339
2.0							
2.3	338.2	becoming stiff, grey, no zones		4	SS	12	338
3.0				5	SS	12	
4.0							337
4.5	336.0	SANDY SILT: Compact grey sandy silt, saturated, occasional clayey lenses		6	SS	16	336
5.0							
6.0							335
6.1	334.4	CLAYEY SILT: Very stiff grey clayey silt, trace sand, DTPL, occasional silt lenses, wet		7	SS	17	
7.0							334
8.0				8	SS	19	
8.1	332.4	BOREHOLE TERMINATED AT 8.1 m					333
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
50 mm Plastic Riser
Bentonite Seal
Filter Sand
Slotted Screen

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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 339.91					
0.25	339.66	TOPSOIL: Dark brown clayey silt, trace sand, frozen		1	SS	9	
		CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL		2	SS	17	339
				3	SS	18	338
				4	SS	18	
				5	SS	12	337
4.5	335.4	becoming firm, grey, occasional silt layers, wet		6	SS	7	336
6.1	333.8	SILT: Compact grey silt, some sand, trace clay, wet, occasional clayey layers		7	SS	13	335
6.5	333.4	BOREHOLE TERMINATED AT 6.5 m					334

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
50 mm Plastic Riser
Bentonite Seal
Filter Sand
Slotted Screen

Upon completion of drilling no free water in cased borehole

Water Level Readings:
Initial Depth: 4.5 m
Elevation: 335.41

2018-04-08:
Depth: 2.76 m
Elevation: 337.15

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 107

PROJECT Proposed Development - Wilmot Employment Lands
PML REF. 18KF009
LOCATION New Hamburg, Ontario
BORING DATE March 13, 2018
ENGINEER W. Loghrin
BORING METHOD Continuous Flight Hollow Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	338.38	SURFACE ELEVATION 338.38			
0.27	338.11	TOPSOIL: Dark brown clayey silt, trace sand, frozen	1	SS	8
		CLAYEY SILT: Firm brown clayey silt, some sand, APL	2	SS	7
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
			6	SS	14
6.0	332.4	becoming very stiff, occasional silt layers	7	SS	16
7.6	330.8	becoming stiff	8	SS	9
8.1	330.3	BOREHOLE TERMINATED AT 8.1 m			

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Stickup Well Protector Set in Concrete
50 mm Plastic Riser
Bentonite Seal
Filter Sand
Slotted Screen

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

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
		SURFACE ELEVATION 340.05				
0.0	340.05					
	0.20	TOPSOIL: Dark brown clayey silt, trace				
	339.85	sand, frozen		1	SS	10
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL				
1.0				2	SS	11
	1.5					
	338.6	becoming very stiff, occasional silty sand layers		3	SS	16
2.0	2.3					
	337.8	SILT: Compact grey silt, some sand, trace clay, wet		4	SS	14
3.0				5	SS	10
	3.5					
	336.6	CLAYEY SILT: Stiff grey clayey silt, trace sand, APL				
4.0				6	SS	10
5.0						
6.0				7	SS	15
7.0						
	7.6					
	332.5	becoming APL, numerous silt layers, wet		8	SS	13
8.0						
9.0				9	SS	17
10.0						
11.0	11.1			10	SS	14
	329.0	BOREHOLE TERMINATED AT 11.1 m				
12.0						
13.0						
14.0						
15.0						

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

ELEVATION SCALE: 339, 338, 337, 336, 335, 334, 333, 332, 331, 330, 329

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Sampler wet from 7.6 m to completion

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 109

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

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
		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	
				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	SS	22	
8.1	329.8	occasional sand seams, wet					Sampler wet at 8.1 m
				9	SS	17	
				10	SS	14	
11.1	326.8	BOREHOLE TERMINATED AT 11.1 m					Upon completion of augering Open Free water at 6.0 m

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
	SURFACE ELEVATION 347.31					
0.45 / 346.86	FILL: 150 mm dark brown silt, over dark brown clayey silt, DTPL-APL		1	SS	10	347
	CLAYEY SILT: Very stiff brown clayey silt, trace sand, trace gravel, DTPL		2	SS	15	346
			3	SS	21	345
2.9 / 344.4	becoming grey/brown, APL		4	SS	14	344
3.6 / 343.7	BOREHOLE TERMINATED AT 3.6 m					

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	"N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 344.26					
0.0	344.16	TOPSOIL: Dark brown clayey silt, some sand, moist		1	SS	12	344
		CLAYEY SILT: Very stiff brown clayey silt, trace sand, DTPL		2	SS	18	
1.0							343
2.0				3	SS	17	342
	3.0						
3.0	341.3	becoming stiff, APL, occasional silt seams, wet		4	SS	13	341
	3.7						
4.0	340.6	BOREHOLE TERMINATED AT 3.7 m					

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
		SURFACE ELEVATION 342.07									
0.0		TOPSOIL: Dark brown clayey silt, trace sand, moist		1	SS	7	342				
0.33	341.74	CLAYEY SILT: Stiff brown clayey silt, some sand, trace gravel, DTPL to APL, occasional silt zones		2	SS	9	341				
1.0											
2.0				3	SS	10	340				
3.0											
3.0	339.1	SILT: Dense grey silt, some sand, saturated		4	SS	32	339				
3.7	338.4	BOREHOLE TERMINATED AT 3.7 m									Upon completion of augering Wet Cave at 3.0 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											

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; 50 100 150 200; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●; 20 40 60 80

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%): 10 20 30 40

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	"N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 340.11					
0.20	339.91	TOPSOIL: Dark brown clayey silt, moist					
		CLAYEY SILT: Stiff brown clayey silt, trace sand, DTPL to APL		1	SS	7	
				2	SS	9	
2.0	338.1	SILT: Compact brown silt, some sand, wet, occasional clayey zones		3	SS	14	
				4	SS	17	
3.7	336.4	BOREHOLE TERMINATED AT 3.7 m					

SHEAR STRENGTH (kPa)
+FIELD VANE △TORVANE ○ Qu
▲POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		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	336
				3	SS	11	335
2.3	334.5	CLAYEY SILT: Stiff brown clayey silt, trace sand, APL, occasional sand layers		4	SS	10	
3.0	333.8	becoming grey		5	SS	11	334
4.5	332.3	becoming layered with grey silt, some sand, wet		6	SS	12	333
							332
6.5	330.3	BOREHOLE TERMINATED AT 6.5 m		7	SS	10	331

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Open
No free water

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 338.96					
0.0	338.96						
0.20	338.76	TOPSOIL: Dark brown clayey silt, APL		1	SS	5	
0.60	338.36	CLAYEY SILT: Firm brown clayey silt, trace sand, trace gravel, APL becoming very stiff, DTPL		2	SS	15	338
1.0							
2.0				3	SS	23	337
3.0	336.0	becoming hard, grey		4	SS	47	336
3.7	335.3	BOREHOLE TERMINATED AT 3.7 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							

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering
Open
No free water

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
		SURFACE ELEVATION 339.58									
0.0	339.58	TOPSOIL: Dark brown clayey silt, APL									
0.20	339.38	CLAYEY SILT: Firm brown clayey silt, some sand, APL		1	SS	5	339				
1.0				2	SS	6					
1.5	338.1	occasional sand seams, wet					338				
2.0				3	SS	4	337				Sampler wet at 3.0 m
3.0	336.6	becoming hard, DTPL, occasional sand partings		4	SS	54					
3.7	335.9	BOREHOLE TERMINATED AT 3.7 m					336				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											

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80
PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT
w_P w w_L
WATER CONTENT (%)
10 20 30 40

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 118

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

DEPTH (metres)	ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	ELEVATION SCALE
		SURFACE ELEVATION 341.51					
0.0	341.51						
0.20	341.31	TOPSOIL: Dark brown clayey silt, trace sand, moist		1	SS	10	341
		CLAYEY SILT: Stiff brown clayey silt, some sand, trace gravel, APL		2	SS	10	
1.0							
1.5	340.0	becoming very stiff, DTPL					340
2.0				3	SS	22	339
3.0	338.5	becoming hard, grey, occasional sand layers, wet		4	SS	38	338
3.7	337.8	BOREHOLE TERMINATED AT 3.7 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							

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Wet cave at 3.0 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

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. Loghrin
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN D. Brice

DEPTH (metres) / ELEV	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	"N" VALUES
	SURFACE ELEVATION 345.30				
345.22	FILL: Dark brown clayey silt topsoil, trace sand, damp		1	SS	19
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
1.5					
343.8	becoming APL, occasional silt layers, moist to wet		3	SS	10
			4	SS	10
3.7					
341.6	BOREHOLE TERMINATED AT 3.7 m				

ELEVATION SCALE: 345, 344, 343, 342

SHEAR STRENGTH (kPa)
+ FIELD VANE △ TORVANE ○ Qu
▲ POCKET PENETROMETER ○ Q
50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
20 40 60 80

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30 40

UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Upon completion of augering
Open
No free water

NOTES

APPENDIX B

ENGINEERED FILL

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

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 an 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

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.