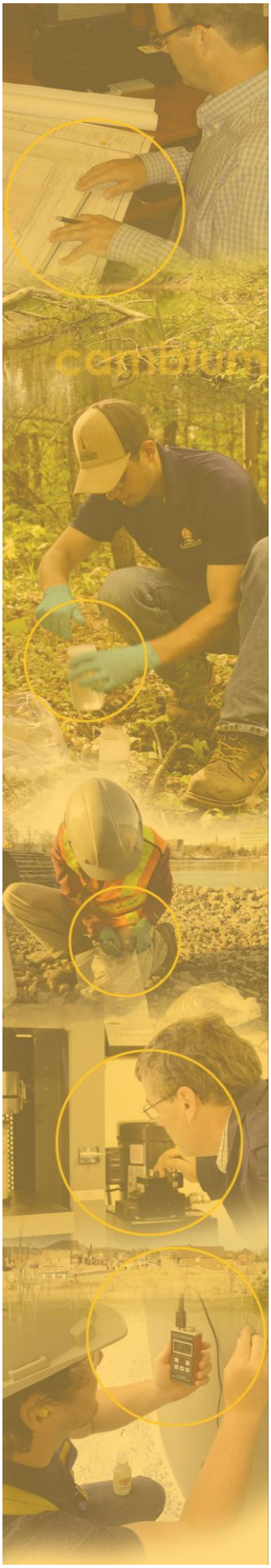


Geotechnical Investigation Report 49 Folkard Lane Picton, Ontario

Cambium Reference No.: 6563-001

August 24, 2017

Prepared for: G.D. Jewell Engineering Inc.

Cambium Inc.

710 Arlington Park Place
Kingston, Ontario
K7M 7N7

Telephone: (866) 217.7900
Facsimile: (705) 742.7907

cambium-inc.com

TABLE OF CONTENTS

LIST OF APPENDED FIGURES

LIST OF INSERTED TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

Cambium Inc. (Cambium) was retained by G.D. Jewell Engineering Inc. (Client) to complete a geotechnical investigation in support of the design and construction of a residential subdivision in Picton, Ontario (Site) located at 49 Folkard Lane. In addition, the investigation is required as part of the due diligence process to determine if the property is well suited for the proposed residential contraction.

The property to be developed is currently a mixture of tall grass and small trees which cover a majority of the property. The general topography is relatively flat with a slight dip from west to east towards Picton Bay with the property also being of lower elevation in comparison to County Road 49.

The geotechnical investigation was required to confirm the subsurface conditions at the Site in order to provide geotechnical design parameters as input into the design and construction of the proposed residential units, site servicing, and road construction. A Site Plan showing borehole locations is included as Figure 1 of this report.

This report presents the methodology and findings of the geotechnical investigation at the Site and addresses requirements and constraints for the design and construction of the buildings, pavement structure, and underground servicing.

2.0 METHODOLOGY

2.1 BOREHOLE INVESTIGATION

A borehole investigation was conducted on August 4, 2017 to assess subsurface conditions at the Site. A total of nine (9) boreholes, designated as BH101-17 through BH109-17, were advanced throughout the Site. The boreholes extended to bedrock refusal depth across the entirety of the site at depths ranging from 0.25 m to 1.45 m below ground surface (mbgs). The location of each borehole was identified in the field with GPS coordinates from a handheld device with all borehole locations shown in Figure 1.

Drilling and sampling was completed using a track-mounted drill rig operating under the supervision of a Cambium technician. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers with 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) N values were recorded for the sampled internals as the number of blows required to drive a split spoon sampler 305 mm in to the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive soils. Soil samples were collected at approximately 0.75 m intervals to 3.0 m depth. The encountered soil units were logged in the field using visual and tactile methods, and samples were placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage. Open boreholes were checked for groundwater and general stability prior to backfilling.

Borehole logs are provided in Appendix A while Site soil and groundwater conditions are described and geotechnical recommendations are discussed in the following sections of this report.

2.2 PHYSICAL LABORATORY TESTING

Physical laboratory testing, including four (4) particle size distribution analyses (LS-702, 705) was completed on selected soil samples to confirm textural classification and to assess geotechnical parameters. Natural moisture content testing (LS-701) was completed on all retrieved soil samples. Results are presented in Appendix B and are discussed in Section 3.0.

3.0 SUBSURFACE CONDITIONS

The subsurface conditions at the Site predominantly consist of a layer of surficial topsoil overlying various layers of sand to silty sand to silt with traces of clay, gravel, and cobbles consistent with till like deposits. These soils were encountered throughout the borehole locations with varying termination depth on presumed limestone bedrock. The borehole locations are shown on Figure 1 and the individual soil units are described in detail below.

3.1 TOPSOIL

In all of the boreholes advanced on the Site, surficial topsoil was encountered across the entirety of the site. The topsoil ranged in thickness from 100 mm to approximately 450 mm. The topsoil mainly consisted of moderately rooted sandy silt to silt, and was very loose to loose.

Assessments of organic matter content or other topsoil quality tests were beyond the scope of this study.

3.2 OVERBURDEN

Underlying the topsoil across the entirety of the site was intermittent layers of sand to sandy silt to silt material with varying amounts of clay and gravel. This material extended to the borehole termination depths between 0.25 m and 1.45 mbgs on presumed limestone bedrock. Based on these observations the general soil texture resembles a glacial till. The sand to silty sand soils varied in colour from light brown to brown and was dry to moist at the time of the investigation with isolated regions of moist conditions. Based on laboratory analysis the moisture content ranged from 7.0% to 29.2%.

Based on SPT values generally ranging from 5 to 29 blows per 305 mm of penetration, the sand to sandy silt to silt has a loose to compact relative density. However, most

Laboratory particle size distribution analyses were completed on four (4) samples of the glacial till overburden material. The analytical results are shown on the borehole logs, included in Appendix A., and are summarized in Table 1 based on the Unified Soil Classification System (USCS).

Table 1 Particle Size Distribution Results – Overburden

Borehole	Depth	Soil	% Gravel	% Sand	% Silt	% Clay
BH103-17	0.0 m – 0.6 m	Silty Sand	7	65	28	
BH104-17	0.8 m – 1.2 m	Sand and Silt	16	48	36	
BH105-17	0.8 m – 1.2 m	Silty Sand	3	72	20	5
BH108-17	0.0 m – 0.6 m	Sand and Silt	1	47	40	12

3.3 BEDROCK

Bedrock was encountered in all boreholes and terminated at depths ranging from 0.25 mbgs to 1.45 mbgs. The bedrock is presumed to consist of limestone with a weathered upper surface based on the ability for the solid stem auger to penetrate the limestone. Depth to bedrock is shown in Table 2 below.

Table 2 Bedrock Termination Depth

Borehole ID	Depth to Bedrock
BH101-17	0.43 m
BH102-17	0.25 m
BH103-17	0.56 m
BH104-17	1.45 m
BH105-17	1.20 m
BH106-17	0.75 m
BH107-17	0.51 m
BH108-17	0.60 m
BH109-17	1.06 m

3.4 GROUNDWATER

Groundwater was not encountered across the entirety of the site and is expected to be housed within the limestone bedrock at an elevation close to that of the adjacent Picton Bay. It should be noted that soil moisture and groundwater levels at the Site may fluctuate seasonally and in response to climatic events.

4.0 GEOTECHNICAL CONSIDERATIONS

The following recommendations are based on the borehole information and are intended to assist designers. Recommendations should not be construed as providing instructions to contractors, who should form their own opinions about site conditions. It is possible that subsurface conditions beyond the borehole locations may vary from those observed. If significant variations are found before or during construction, Cambium should be contacted so that we can reassess our findings, if necessary.

4.1 SITE PREPARATION

Any existing topsoil or soils identified with organic content at the Site should be excavated and removed from beneath any areas of the Site to be developed.

Based on the shallow nature of the bedrock at this site and the instability of the overburden material it is expected that all residential building structures will be founded on limestone bedrock above the existing groundwater table.

The near surface clayey silt to silty sand soils can be very unstable if they are wet or saturated. Such conditions are common in the spring and late fall. Under these conditions, temporary use of granular fill, and possible reinforcing geotextiles, may be required to prevent severe rutting on construction access routes.

4.2 EXCAVATIONS

Temporary excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). The generally compact native sand to sandy silt soils above the groundwater table may be classified as Type 2 soils in accordance with OHSA, with vertical sides to a depth of 1.2 m and then cut with side slopes no steeper than 1H:1V beyond 1.2 m depth if required. Below the groundwater table if encountered, these soils may be classified as Type 3 soils, with unsupported side slopes no steeper than 1H:1V. Shallow, temporary excavations into the limestone bedrock at the site can have vertical side slopes.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions or the excavation sidewalls must be fully supported (shored).

The upper 0.3 m of limestone bedrock at the site can likely be removed by a large excavator. Any deeper excavations would require a hoe ram and/or blasting.

4.3 DEWATERING

Across a majority of the Site, groundwater was not encountered and is expected to be housed within the bedrock. Based on these observations groundwater seepage is not expected to be an issue during residential foundation

construction but may be encountered during the installation of underground services into bedrock. If groundwater seepage is encountered it should be manageable with filtered sumps and pumps and a Permit to Take Water (PTTW) from the Ministry of the Environment and Climate Change (MOECC) will not be required. It is noted that the elevation of the groundwater table will vary due to seasonal conditions and in response to heavy precipitation events but is expected to be below proposed foundation depths.

4.4 BACKFILL AND COMPACTION

Excavated non-organic, native overburden sand to sandy silt soils from the site may be appropriate for use as fill below grading and parking areas, provided that the actual or adjusted moisture content at the time of construction is within a range that permits compaction to required densities. Some moisture content adjustments may be required depending upon seasonal conditions. Geotechnical inspections and testing of engineered fill are required to confirm acceptable quality.

Any engineered fill for foundations should be placed in maximum 200 mm thick lifts and should be compacted to a minimum of 100% of standard Proctor maximum dry density (SPMDD). If engineered fill is being placed for general site backfill and grading then compaction to 98% is applicable If conditions are wet at the time of construction, compaction of granular fill may not be possible and 19 mm diameter crushed clear stone wrapped in a geotextile filter fabric (Terrafix 270R or equivalent) should be used in place of engineered fill.

Foundation wall backfill should consist of free-draining imported granular material. Most of the native site soils are too fine-grained to provide proper drainage, and as such this should be accomplished using well graded Granular B Type 1 material complying with OPSS 1010. If a drainage layer membrane is used against the foundation then Granular B Type 1 material will not be required and the native site soils will be sufficient. Backfill should be placed in lifts not exceeding 250 mm in thickness and compacted to 98% of SPMDD. Placement of engineered fill should be verified by onsite compaction testing during construction.

4.5 FOUNDATION DESIGN

Assuming that the Site is prepared as outlined above, all building foundations will be founded on limestone bedrock encountered across the entirety of the Site and is competent to support the structures on conventional strip and spread footings. The limestone bedrock may be designed for an allowable bearing capacity of 900 kPa at ultimate limit state (ULS). The settlement potential on bedrock will be negligible assuming the upper weathered portion of the bedrock is removed and minimal clay seams are identified during this process.

The quality of the rock should be inspected by Cambium during construction, prior to constructing the footings, to confirm bearing capacity estimates. Any loose, weathered rock present at footing depth should be scraped and cleaned to provide a smooth bearing surface for footing placement.

4.5.1 FROST PENETRATION

Based on climate data and design charts, the maximum frost penetration at the Site is estimated at 1.2 m.

Footings for the proposed structures should be situated at or below this depth for frost protection or should be protected. As long as footings are placed on competent limestone bedrock free from weathering and with a clean surface, frost penetration is not expected to be an issue based on the competency of the bedrock in the region. If heavily weathered surface or multiple clay seams are identified frost protection in the form of granular back fill or insulation will be required.

It is assumed that the pavement structure thickness will be less than 1.2 m, so grading and drainage are important for good pavement performance and life expectancy. The construction of any underground services should be located below this depth or be appropriately insulated.

4.6 FLOOR SLABS

Inorganic native soils at the Site are considered not competent to support floor slab loads and must also be founded on limestone bedrock or engineered fill extending to bedrock. To create a stable working surface and to distribute loadings, all slabs-on-grade should be constructed on a minimum of 200 mm of OPSS 1010 Granular A compacted to 98 percent of SPMDD with additional engineered fill placed and compacted to 98% SPMDD to raise grades as required.

4.7 SUBDRAINAGE

Groundwater seepage was not encountered in the boreholes at the time of investigation, but it should be noted that groundwater levels are affected by seasonal climatic conditions, as such, groundwater levels are expected to be at higher levels during seasonally wet periods, and the bedrock can potentially block groundwater infiltration during wetter seasons. As such, geotextile wrapped perforated pipe subdrains set in a trench of clear stone and connected to a sump or other frost-free positive outlet are recommended around all footings and underneath the floor slabs. As the subgrade was a silty material and given the encountered ground water, it is recommended that a geotextile (Terrafix 270R or equivalent) is placed between the subgrade and the clear stone to prevent erosion of the subgrade soils.

4.8 BURIED UTILITIES

Trench excavations should generally consider limestone bedrock conditions which can be excavated with unsupported side slopes. If encountered, groundwater should be controllable using filtered sumps and pumps within the excavations.

The bedding and cover material for any services should consist of OPSS 1010-3 Granular A or B Type II, placed in accordance with pertinent Ontario Provincial Standard Drawings (OPSD 802.013). The bedding and cover material shall be placed in maximum 200 mm thick lifts and should be compacted to at least 98% of SPMDD. The cover material shall be a minimum of 300 mm over the top of the pipe and compacted to 95% SPMDD, taking care not to damage the utility pipes during compaction. If groundwater is present during placement of bedding material for utilities then 19 mm clear stone shall be used in place of granular material to ensure adequate compaction under wet conditions.

4.9 LATERAL EARTH PRESSURE

Unfactored lateral earth pressure coefficients (K) for foundation and retaining wall design are provided below. It is assumed that potential lateral loads will result from cohesionless, frictional materials, such as granular backfill.

Ko (at rest)	0.42
Ka (active)	0.27
Kp (passive)	3.7

The following formula may be used to calculate active lateral thrust (Pa) on yielding retaining structures;

$$Pa = (H/2)(Ka)(\gamma H + 2q)$$

where,

H = Height of retaining structure (m)

γ = unit weight of retained soil (kN/m^3)

q = surcharge (kPa)

A unit weight of 22 kN/m^3 should be assumed for compacted granular backfill loadings.

4.10 PAVEMENT DESIGN

The performance of the pavement is dependent upon proper subgrade preparation. All topsoil and organic materials should be removed down to native material and backfilled with approved engineered fill or native material, compacted to 98 percent SPMDD. The subgrade should be proof rolled and inspected by a Geotechnical Engineer. Any areas where boulders, rutting, or appreciable deflection is noted should be subexcavated and replaced with suitable fill. The fill should be compacted to at least 98 percent SPMDD.

The recommended pavement structure should meet the Ministry standards for parking and driving areas and should, as a minimum, consist of the pavement layers identified in Table 3. The light duty pavement structure is intended for parking areas while the heavy duty pavement structure is appropriate for areas where heavy traffic is anticipated.

Table 3 Recommended Minimum Pavement Structure

Pavement Layer	Light Duty	Heavy Duty
Surface Course Asphalt	50 mm HL3 or HL4	40 mm HL3 or HL4
Binder Course Asphalt		50 mm HL8
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	300 mm OPSS 1010 Granular B	300 mm OPSS 1010 Granular B

Material and thickness substitutions must be approved by the Design Engineer.

The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement. The heavy duty classification is recommended for the majority of roadways at this site and is based off of the minimum standards set out by Prince Edward County.

Compaction of the subgrade should be verified by the Engineer prior to placing the granular fill. Granular layers should be placed in 150 mm maximum loose lifts and compacted to at least 98 percent of SPMDD (ASTM D698) standard. The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing.

The final asphalt surface should be sloped at a minimum of 2 percent to shed runoff. Abutting pavements should be sawcut to provide clean vertical joints with new pavement areas.

4.11 DESIGN REVIEW AND INSPECTIONS

Cambium should be retained to complete testing and inspections during construction operations to examine and approve subgrade conditions, placement and compaction of fill materials, granular base courses, and asphaltic concrete.

We should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at this site for excavation and backfill procedures, deleterious soil removal, subgrade inspections and compaction testing.

5.0 CLOSING

We trust that the information contained in this report meets your current requirements. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned at (705) 742-7900 ext. 332.

Respectfully submitted,

CAMBIUM INC.

Kyle Thompson, BScE, EIT
Project Coordinator

Stuart Baird, P.Eng.
Senior Project Manager

SEB/kwt

P:\6500 to 6599\6563-001 G.D. Jewell Engineering - Geotechnical Investigation - 49 Folkard Lane, Picton\Deliverables\2017-08-17 RPT 49 Folkard Lane Geotech.docx

Appended Figures

GEOTECHNICAL INVESTIGATION

G.D.JEWELL ENGINEERING
49 Folklard Lane
Picton, Ontario

LEGEND

- Borehole Location
- Site Area (approximate)

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2017 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

CAMBIUM
P.O. Box 325, 52 Hunter Street East
Peterborough, Ontario, K9H 1G5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

BOREHOLE LOCATION PLAN

Project No.:	6563-001	Date:	August 2017
		Rev.:	
Scale:	1:1,500	Projection:	NAD 1983 UTM Zone 18N
Created by:	TLC	Checked by:	KWT
Figure:	1		

O:\GIS\project_MXDs\6500-6599\6563-001 G.D. Jewell Engineering - Geotechnical Investigation - 49 Folkard Lane, Picton\2017-08-04 FIG 1 - Borehole Location Plan.mxd

Appendix A
Borehole Logs

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH101-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328983 N 4877208 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown sandy silt topsoil, some organics, very loose, moist	1	SS	100	50/125	•	•		
		Borehole terminated at 0.43 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH102-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328925 N 4877207 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, some sand, some organics, very loose, dry to moist	1	SS	80	50/100	•	•		
		Borehole terminated at 0.25 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH103-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328836 N 4877208 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silty sand topsoil, some organics, very loose to loose, dry to moist	1	SS	58	5	•	•		SS-01 GSA: Gravel 7% Sand 65% Silt & Clay 28%
		SAND: Light brown sand, some silt, very loose to loose, dry to moist								
		Borehole terminated at 0.56 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH104-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328834 N 4877164 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown sandy silt topsoil, some organics, very loose to loose, dry to moist								
		SILT: Brown silt, some clay, very loose to loose, dry to moist	1	SS	42	5				SS-02 GSA: Gravel 16% Sand 48% Silt & Clay 36%
-1 / 1		SILTY SAND: Brown silty sand, some gravel, compact, dry to moist	2	SS	72	29				
		Borehole terminated at 1.45 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH105-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328864 N 4877109 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, some sand, trace clay, some organics, very loose, dry to moist								
		SILTY SAND: Light brown silty sand, trace clay, loose to compact, dry to moist	1	SS	46	5				SS-02 GSA: Gravel 3% Sand 72% Silt 20% Clay 5%
			2	SS	81	13				
-1 / 1		Borehole terminated at 1.2 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH106-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328903 N 4877125 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, trace clay, some organics, very loose, dry to moist								
		SILT: Brown silt, some sand, trace clay, loose to compact, dry to moist	1	SS	42	6	•	•		
		Borehole terminated at 0.75 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH107-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328940 N 4877100 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, some sand, some organics, very loose, dry to moist	1	SS	47	4	•	•		Borehole open and dry upon completion
		SAND: Light brown sand, some silt, loose, dry to moist								
		Borehole terminated at 0.51 m on auger refusal of presumed bedrock								
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH108-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328953 N 4877071 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, some clay, some organics, loose, moist								SS-01 GSA: Gravel 1% Sand 47% Silt 40% Clay 12%
		SAND AND SILT: Light brown sand and silt, some clay, loose, dry to moist	1	SS	67	5	•	•		
		Borehole terminated at 0.60 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-1 / 1										
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH109-17

Client: G.D. Jewell Engineering Inc.
Project Name: Geotechnical Investigation
Project No.: 6563-001
Contractor: Canadian Environmental Drilling
Method: Solid Stem Auger
Date Completed: August 4, 2017
Location: 49 Folkard Lane, Picton, Ontario
UTM: 18T 328885 N 4877051 E
Elevation:

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0		TOPSOIL: Brown silt topsoil, some sand, some organics, very loose to loose, dry to moist	1	SS	75	6				
		SANDY SILT: Brown sandy silt, trace clay, loose, dry to moist								
		- No clay present	2	SS	57	50/25				
-1 / 1		Borehole terminated at 1.06 m on auger refusal of presumed bedrock								Borehole open and dry upon completion
-2 / 2										

Logged By: M. Smit
Input By: K. Thompson

Appendix B

Physical Laboratory Testing Results

Grain Size Distribution Chart

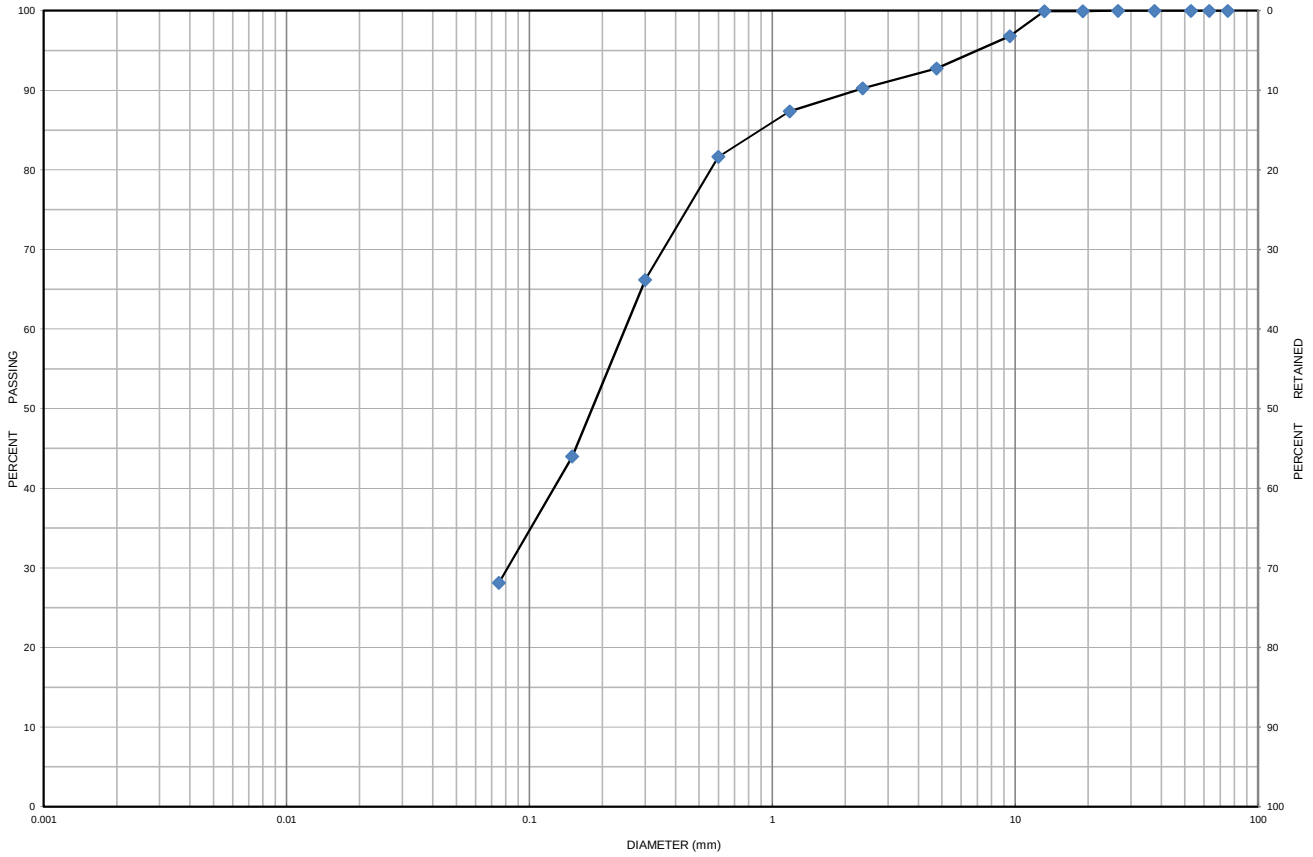
Project Number: *6563-001* **Client:** *G.D. Jewell Engineering*

Project Name: *49 Folkard Lane*

Sample Date: *August 4, 2017* **Sampled By:** *Michael Smit - Cambium Inc.*

Location: *BH 103-17 SS 1* **Depth:** *0 m to 0.6 m* **Lab Sample No:** *S-17-0658*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-17	SS 1	0 m to 0.6 m	7	65	28		10.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Gravel	SM	0.250	0.082	-	-	-

Issued By: _____ *Date Issued:* *August 22, 2017*

(Senior Project Manager)

Cambium Inc. (Laboratory)

866.217.7900 | cambium-inc.com

701 The Queensway | Units 5-6 | Peterborough | ON | K9J 7J6

Grain Size Distribution Chart

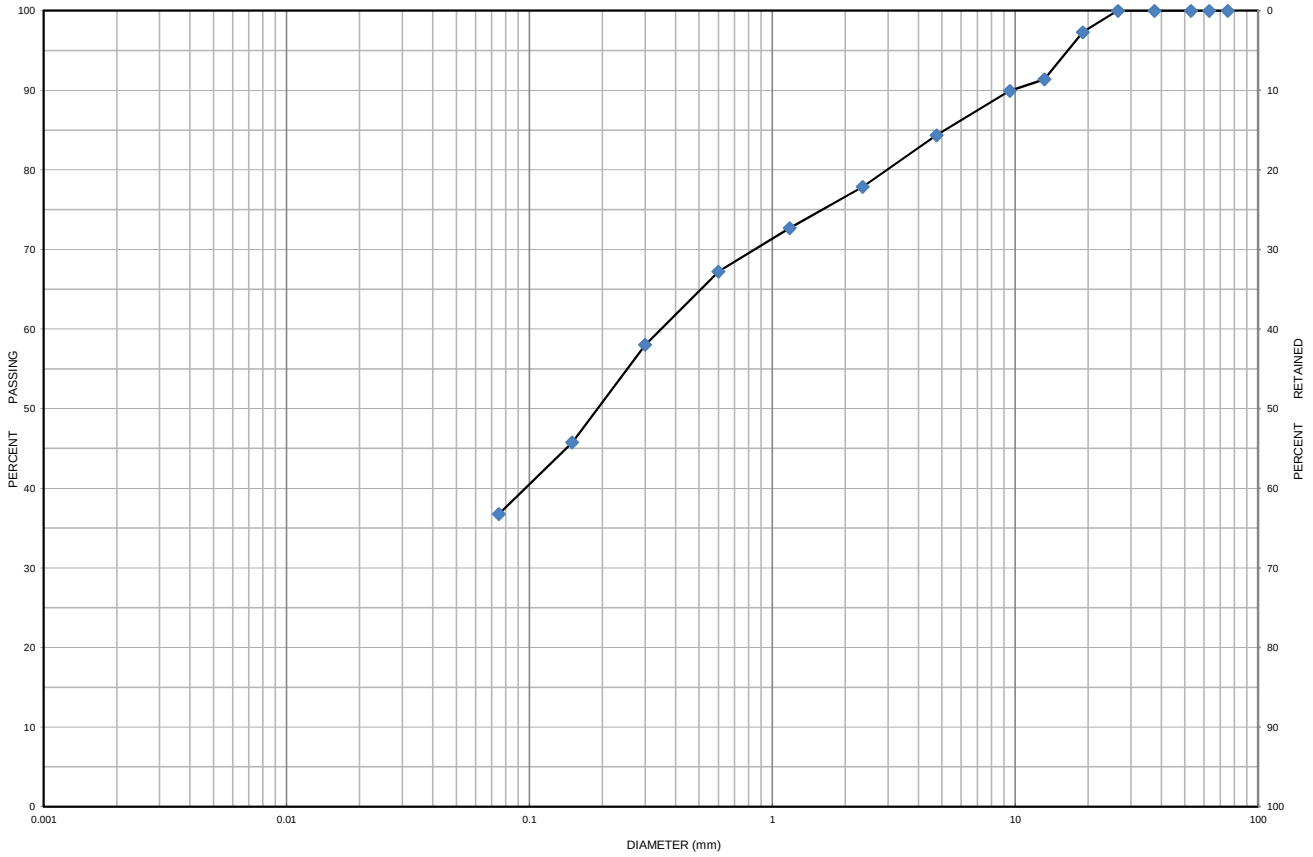
Project Number: *6563-001* **Client:** *G.D. Jewell Engineering*

Project Name: *49 Folkard Lane*

Sample Date: *August 4, 2017* **Sampled By:** *Michael Smit - Cambium Inc.*

Location: *BH 104-17 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-17-660*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 104-17	SS 2	0.8 m to 1.2 m	16	48	36		7.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Gravel	SP-ML	0.350	-	-	-	-

Issued By: _____ *Date Issued:* *August 22, 2017*

(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
701 The Queensway | Units 5-6 | Peterborough | ON | K9J 7J6

Grain Size Distribution Chart

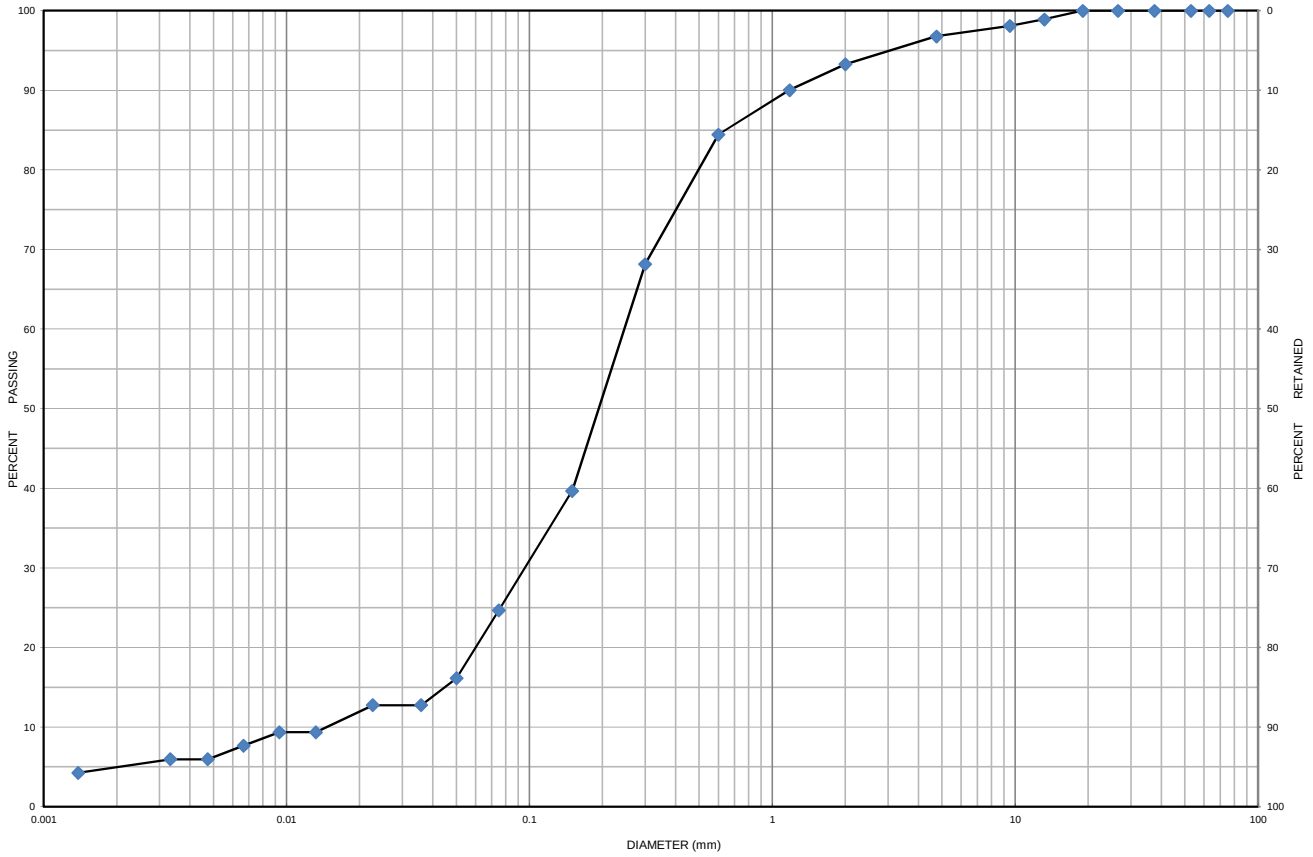
Project Number: *6563-001* **Client:** *G.D. Jewell Engineering*

Project Name: *49 Folkard Lane*

Sample Date: *August 4, 2017* **Sampled By:** *Michael Smit - Cambium Inc.*

Location: *BH 105-17 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-17-661*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 105-17	SS 2	0.8 m to 1.2 m	3	72	25		9.3

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Clay trace Gravel	SM	0.250	0.097	0.016	15.63	2.35

Issued By: _____ *Date Issued:* *August 22, 2017*

(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
701 The Queensway | Units 5-6 | Peterborough | ON | K9J 7J6

Grain Size Distribution Chart

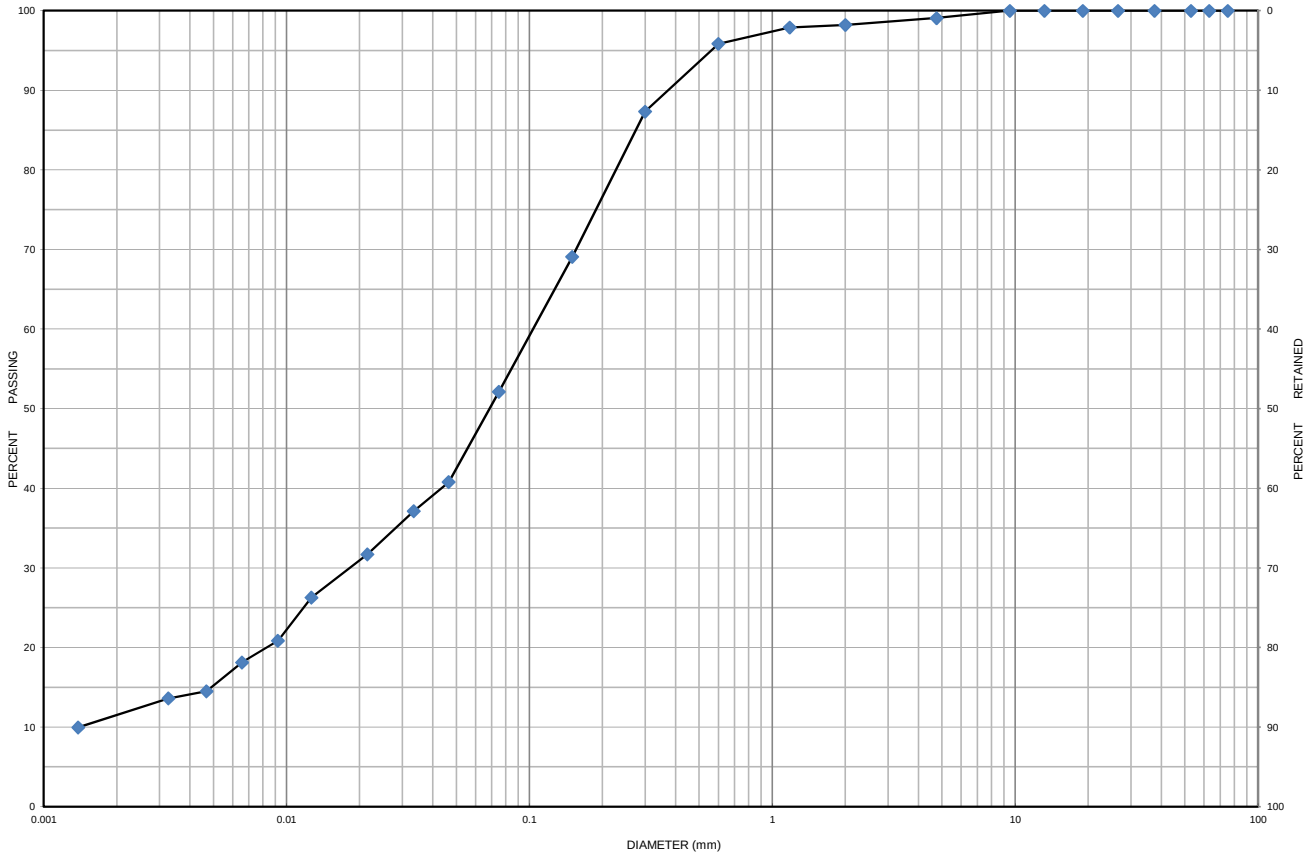
Project Number: *6563-001* **Client:** *G.D. Jewell Engineering*

Project Name: *49 Folkard Lane*

Sample Date: *August 4, 2017* **Sampled By:** *Michael Smit - Cambium Inc.*

Location: *BH 108-17 SS 1* **Depth:** *0 m to 0.6 m* **Lab Sample No:** *S-17-659*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 108-17	SS 1	0 m to 0.6 m	1	47	52		19.5

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Clay trace Gravel	SP-ML	0.110	0.019	0.0015	73.33	2.19

Issued By: _____ *Date Issued:* *August 22, 2017*

(Senior Project Manager)

Cambium Inc. (Laboratory)

866.217.7900 | cambium-inc.com

701 The Queensway | Units 5-6 | Peterborough | ON | K9J 7J6