

**re: Slope Stability Assessment**  
**Proposed Residential Development**  
**122 Old Mill Lane – Appleton, Ontario**

**to:** Southwell Homes Ltd. - **Mr. John Southwell** – [johnsouthwell@rogers.com](mailto:johnsouthwell@rogers.com)

**date:** May 4, 2022

**file:** PG6241-MEMO.01

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Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide the slope stability assessment for the proposed residential development to be located at the aforementioned site.

The following sections provide a summary of our analysis of the slope conditions and recommendations to achieve stable slope setbacks for the proposed development.

## **1.0 Proposed Development**

Based on the review of the drawings provided by the client, it is understood that the proposed residential development will consist of single-family residential dwellings with associated driveways, roadways, and access lanes. It is further anticipated that the proposed development will be privately serviced, with a septic system at the rear of each dwelling.

## **2.0 Field Observations**

Paterson conducted subsurface investigations in 2008, 2015, 2016 and 2018 which consisted of advancing a total of 56 test pits and 5 boreholes to a maximum depth of 12.1 m below the existing ground surface. The locations of the test holes are shown on Drawing PG6241-1 – Limit of Hazard Lands Plan attached to this report.

Further, Paterson conducted a site visit on April 20, 2022 to review the site conditions and complete an assessment of the slope located along the northern boundary of the subject site. Two (2) slope cross-sections (Sections A-A and B-B) were studied as the worst-case scenarios. The cross-section locations are presented on Drawing PG6241-1 – Limit of Hazard Lands Plan attached to this report. The following provides a summary of the field observations and assessment.

## **Surface Conditions**

The subject site is located along the south shore of the Mississippi River and adjacent to the Appleton Swamp. The subject site is currently undeveloped. The existing ground surface across the subject site is generally level at approximate geodetic elevation 126 to 128 m, but slopes moderately downward in the vicinity of the Mississippi River to approximate geodetic elevation 118 m.

## **Subsurface Profile**

Generally, the soil profile at the subject site consists of a thin layer of topsoil or fill underlain by bedrock. A layer of variable thickness of silty sand or silty clay, and a discontinuous glacial till, were also encountered underlying the fill at various test holes. The fill layer extends down to depths ranging between approximately 0.2 to 7.0 m below ground surface, and was observed to consist of brown silty sand and/or sandy silt, some gravel, and variable amounts of crushed stone, concrete, organics, glass, metal, or plastic debris.

Practical refusal to excavation or augering was encountered in several test holes at approximate depths ranging between 0.1 and 3.0 m below ground surface.

Reference should be made to the Soil Profile and Test Data sheets, attached to this report, for the details of the subsurface soil profile encountered at each test hole location.

## **Bedrock**

Based on the available geological mapping, the subject site is underlain by dolostone of the Oxford Formation.

## **Groundwater**

Groundwater levels were measured during the previous subsurface investigations. The measured groundwater level readings are provided on the Soil Profile and Test Data sheets attached to the present report.

However, it should be noted that the groundwater levels can fluctuate periodically throughout the year and higher levels could be encountered at the time of construction.

### **3.0 Slope Stability Assessment**

The slope conditions at the northern boundary of the subject site were reviewed by Paterson field personnel on April 20, 2022. Photographs from our site visit are attached following this memo. Paterson also surveyed the top of slope location on this date using a mobile GPS unit.

The slope at the northern boundary of the subject site is generally well vegetated with no observed signs of active erosion. Two (2) slope cross-sections (Sections A-A and B-B) were studied as the worst-case scenarios. The cross-section locations are presented on Drawing PG6241-1 – Limit of Hazard Lands Plan attached to the current memo report.

A slope stability analysis was carried out to evaluate the stability of the slope under existing and proposed conditions.

#### **Slope Stability Assessment**

The analyses of the stability of the slopes were carried out using SLIDE, a computer program which permits a two-dimensional slope stability analysis using several methods, including the Bishop's method, which is a widely used and accepted analysis method. The program calculates a factor of safety, which represents the ratio of the forces resisting failure to those favouring failure. Theoretically, a factor of safety of 1.0 represents a condition where the slope is stable.

However, due to intrinsic limitations of the calculation methods and the variability of the subsoil and groundwater conditions, a factor of safety greater than 1.0 is usually required to ascertain that the risks of failure are acceptable. A minimum factor of safety of 1.5 is generally recommended for conditions where the failure of the slope would endanger permanent structures.

The cross-sections were analyzed based on the existing conditions observed during our site visit, and review of the available topographic mapping. The slope stability analysis was completed at each slope cross-section under worst-case-scenario by assigning cohesive soils under fully saturated conditions. Subsoil conditions at the cross-sections were inferred based on nearby boreholes and general knowledge of the area's geology.

The effective strength soil parameters used for static analysis were chosen based on the subsoil information recovered during the geotechnical investigation. The effective strength soil parameters used for static analysis are presented in Table 1 on the following page.

<b>Table 1 – Effective Soil and Material Parameters (Static Analysis)</b>			
<b>Soil Layer</b>	<b>Unit Weight (kN/m<sup>3</sup>)</b>	<b>Friction Angle (degrees)</b>	<b>Cohesion (kPa)</b>
Fill	18	33	0
Brown Silty Clay	17	33	5
Silty Sand	20	35	0
Bedrock	22	-	1,000

The total strength parameters for seismic analysis were chosen based on the subsurface conditions observed in the test holes, and our general knowledge of the geology in the area. The strength parameters used for seismic analysis at the slope cross-sections are presented in Table 2 below.

<b>Table 2 – total Stress Soil and Material Parameters (Seismic Analysis)</b>			
<b>Soil Layer</b>	<b>Unit Weight (kN/m<sup>3</sup>)</b>	<b>Friction Angle (degrees)</b>	<b>Undrained Shear Strength (kPa)</b>
Fill	18	33	0
Brown Silty Clay	17	-	100
Silty Sand	20	35	0
Bedrock	22	-	1,000 kPa

### **Static Loading Analysis**

The results for the slope stability analyses under static conditions at Sections A-A and B-B are shown on Figures 2A and 3A, attached to the present memorandum. The factors of safety were found to be 1.2 and 0.9 at Section A-A and B-B under static conditions, respectively. Therefore, stable slope setback allowances from the top of slope have been provided to obtain a factor of safety greater than or equal to 1.5.

### **Seismic Loading Analysis**

An analysis considering seismic loading was also completed. A horizontal acceleration of 0.16 g was considered for all slopes. A factor of safety of 1.1 is considered to be satisfactory for stability analyses including seismic loading. The results of the slope stability analyses under seismic conditions are shown on Figures 2B and 3B attached to the present memorandum.



The results indicate a factor of safety are greater than 1.1 under seismic conditions at Section A-A. Therefore, the slope is considered stable under seismic conditions at this location.

However, the results indicate a factor of safety less than 1.1 beyond the top of slope for Section B-B. Based on these results, a stable slope setback of 7 m from the top of slope is required to achieve a factor of safety of at least 1.1 in the area of Section B-B. It should be noted that the stable slope setback associated with the seismic loading analysis governs the required stable slope setback over the static analysis for Section B-B.

### **Geotechnical Setback – Limit of Hazard Lands**

Typically, the Limit of Hazard Lands setback is comprised of a stable slope allowance, toe erosion, and 6 m erosion access allowance. The Limit of Hazard Lands designation line for the subject site is indicated on Drawing PG6241-1 – Limit of Hazard Lands Plan, attached to the end of this memorandum.

Based on the analysis results, stable slope setbacks of 3 and 7 m at the locations of Sections A-A and B-B, respectively, are required for the slope to be stable under static and seismic conditions.

The toe erosion allowance is based on the nature of the soils, the observed current erosion activities, and the width and location of the current watercourse. Based on the soil profile encountered at the test hole locations, and our site observations as part of the slope stability assessment, a 1 m toe erosion allowance is considered suitable for the subject site.

Further, based on the generally accepted guidelines, a 6 m erosion access allowance is recommended for the subject site.

The results of the slope stability assessment indicate that Limit of Hazard Lands setbacks of 10 and 14 m, as measured from the top of the slope, should be provided for any proposed structures at the subject site in the areas of Section A-A and B-B, respectively, in order to provide a suitable factor of safety of 1.5 under static conditions and 1.1 under seismic conditions.

It should be noted that other setbacks may be applicable from the top of slope, such as those from the municipality or other regulatory agencies, and which may exceed the above-noted Limit of Hazard Lands setbacks.

## 4.0 General Recommendations

The existing vegetation on the slope face should not be removed as it contributes to the stability of the slope and reduces erosion. If the existing vegetation needs to be removed, it is recommended that a 100 to 150 mm of topsoil mixed with a hardy seed be placed across the exposed slope face. The use of an erosion control blanket may be necessary to minimize rill-type erosion until the vegetation takes root.

It is also recommended that the future roof drains which may be intended to discharge onto the slope be directed elsewhere, such as into 19 mm crushed stone drainage pits located on the property, and away from the top of slope.

We trust that the current submission meets your immediate requirements.

Best Regards,

**Paterson Group Inc.**



Fernanda Carozzi, PhD. Geoph.



Scott S. Dennis, P.Eng.

### Attachments

- Photographs from Site Visit on April 20, 2022
- Figure 1 – Key Plan
- Drawing PG6241-1 – Limit of Hazard Lands Plan
- Soil Profile and Test Data sheets
- Figures 2 and 3 – Slope Stability Sections

### Report Distribution

- Southwell Homes Ltd. (e-mail Copy)
- Paterson Group Inc. (1 copy)

## Paterson Group Inc.

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North Bay – Ontario – P1B 8Z4  
Tel: (705) 472-5331

## Photographs from Site Visit – April 20, 2021

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Photo 1: Photograph of area taken from top of slope looking to the east. Slope observed to be heavily covered with vegetation.



Photo 2: Photograph taken from top of slope looking to the north. Area of slope observed to be generally covered with mature vegetation such as bush, trees and grass. No signs of active erosion observed.





## Photographs from Site Visit – April 20, 2021

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Photo 3: Photo of face of slope taken from top of slope. Face of slope observed to be generally covered with vegetation and no signs of active erosion.



Photo 4: Photo of face of slope taken from toe of slope. Vegetation observed to be established throughout the surface. Subject site throughout left portion of photograph.





## Photographs from Site Visit – April 20, 2021

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Photo 5: Photo of slope taken from top of slope. Slope observed to be covered with mature vegetation. No signs of active erosion observed



Photo 6: Photo of general area of slope taken from top of slope, looking north. No signs of erosion observed through the area.

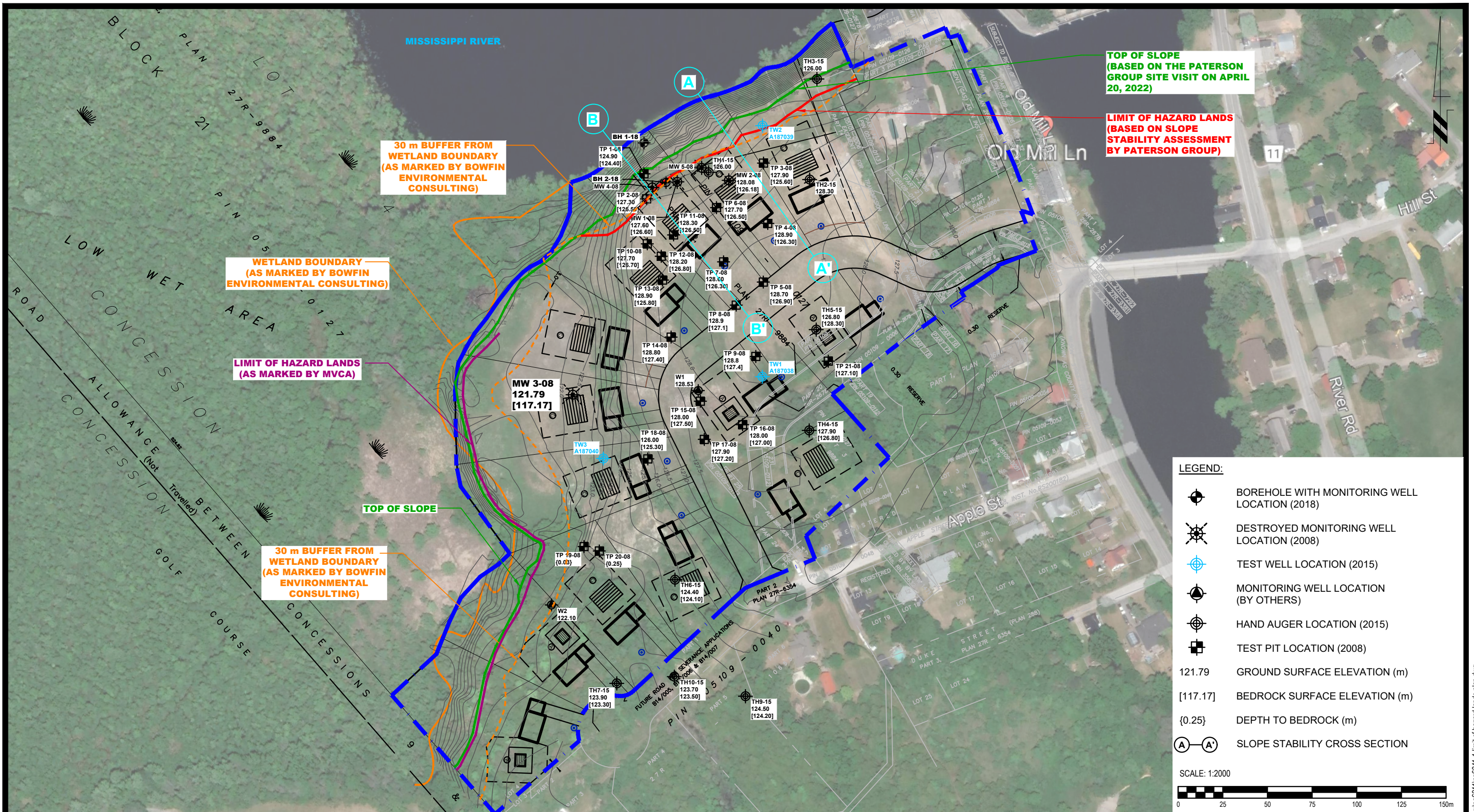




# FIGURE 1

## KEY PLAN





**TOP OF SLOPE  
(BASED ON THE PATERSON  
GROUP SITE VISIT ON APRIL  
20, 2022)**

**LIMIT OF HAZARD LANDS  
(BASED ON SLOPE  
STABILITY ASSESSMENT  
BY PATERSON GROUP)**

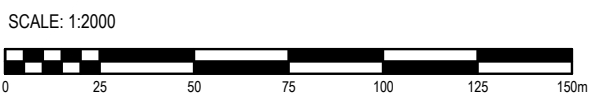
**30 m BUFFER FROM  
WETLAND BOUNDARY  
(AS MARKED BY BOWFIN  
ENVIRONMENTAL  
CONSULTING)**

**WETLAND BOUNDARY  
(AS MARKED BY BOWFIN  
ENVIRONMENTAL  
CONSULTING)**

**LIMIT OF HAZARD LANDS  
(AS MARKED BY MVCA)**

**30 m BUFFER FROM  
WETLAND BOUNDARY  
(AS MARKED BY BOWFIN  
ENVIRONMENTAL  
CONSULTING)**

- LEGEND:**
- BOREHOLE WITH MONITORING WELL LOCATION (2018)
  - DESTROYED MONITORING WELL LOCATION (2008)
  - TEST WELL LOCATION (2015)
  - MONITORING WELL LOCATION (BY OTHERS)
  - HAND AUGER LOCATION (2015)
  - TEST PIT LOCATION (2008)
  - 121.79 GROUND SURFACE ELEVATION (m)
  - [117.17] BEDROCK SURFACE ELEVATION (m)
  - {0.25} DEPTH TO BEDROCK (m)
  - (A)-(A') SLOPE STABILITY CROSS SECTION



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NO.	REVISIONS	DATE	INITIAL

**SOUTHWELL HOMES LTD.**  
**GEOTECHNICAL INVESTIGATION**  
**PROPOSED RESIDENTIAL SUBDIVISION**  
**122 OLD MILL LANE** **ONTARIO**

**APPLETON,**  
Title: **LIMIT OF HAZARD LANDS PLAN**

Scale:	1:2000	Date:	05/2022
Drawn by:	YA	Report No.:	PG6241-1
Checked by:	FC	Dwg. No.:	<b>PG6241-1</b>
Approved by:	SD	Revision No.:	

p:\autocad\drawings\geotechnical\pg6241\pg6241-1-limit of hazard lands plan.dwg



**DATUM** Ground surface elevations provided by G. A. Smith Surveying Ltd.

**REMARKS**

**BORINGS BY** Backhoe

**DATE** August 26, 2008

**FILE NO.** PE1114

**HOLE NO.** TP 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %	20	40		60
<b>GROUND SURFACE</b>						0	124.90						
25mm Topsoil over brown <b>SILTY SAND</b> with some clay and gravel													
End of Test Pit TP terminated on bedrock surface @ 0.48m depth		G	1										

100 200 300 400 500  
**RKI Eagle Rdg. (ppm)**  
▲ Full Gas Resp. △ Methane Elim.



## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 2**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
								20	40	60	80	
GROUND SURFACE						0	127.28					
TOPSOIL	0.10											
FILL: Brown silty sand with cinder blocks	0.53	G	1					▲				
Brown SILTY SAND	0.81	G	2					▲				
End of Test Pit												
TP terminated on bedrock surface @ 0.81m depth												

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.


FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 3**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE						0	127.94	20	40	60	80		
<b>FILL:</b> Dark brown silty clay with gravel and brick pieces  Grey-brown <b>SILTY CLAY</b> with sand		G	1			1	126.94						▽
						2	125.94						
End of Test Pit  TP terminated on bedrock surface @ 2.34m depth  (GWL @ 1.6m depth)													

100 200 300 400 500  
**RKI Eagle Rdg. (ppm)**  
 ▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.


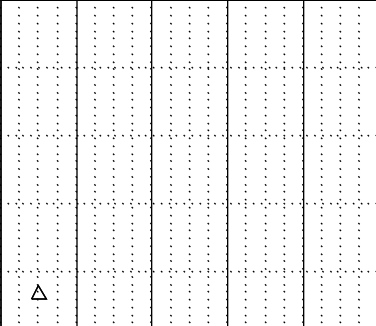
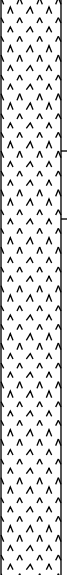
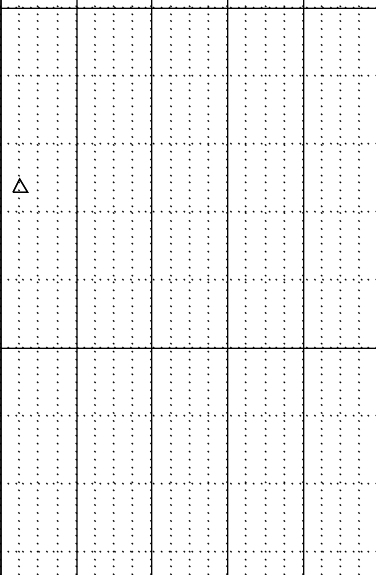
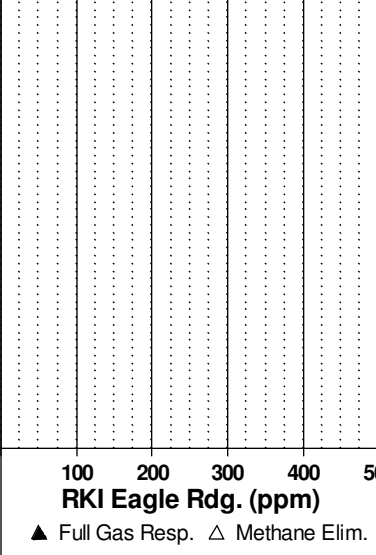
FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 4**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	128.92	20	40	60	80	
<b>FILL:</b> Brown sand and gravel with rubble  0.97		G	1			1	127.92					
<b>GLACIAL TILL:</b> Brown silty sand with clay, gravel and cobbles  2.67		G	2			2	126.92					
End of Test Pit  TP terminated on bedrock surface @ 2.67m depth												

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.



REMARKS

BORINGS BY Backhoe

DATE August 26, 2005

FILE NO. **PE1114**

HOLE NO. **TP 5**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE						0	128.72	20	40	60	80		
FILL: Brown silty sand with gravel and clay		G	1										
						1	127.72						
GLACIAL TILL: Brown silty clay with sand and gravel		G	2										
End of Test Pit TP terminated on bedrock surface @ 1.83m depth													

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.




FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 6**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	127.70	20	40	60	80	
FILL: Dark brown silty sand with topsoil		G	1									
0.53												
Brown SILTY SAND, some clay		G	2									
0.99												
GLACIAL TILL: Grey-brown silty clay with sand, gravel and cobbles		G	3			1	126.70					
1.20												
End of Test Pit												
TP terminated on bedrock surface @ 1.20m depth												
								100	200	300	400	500
								RKI Eagle Rdg. (ppm)				
								▲ Full Gas Resp. △ Methane Elim.				

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletext Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

REMARKS

BORINGS BY Backhoe

DATE August 26, 2008

FILE NO. **PE1114**

HOLE NO. **TP 7**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	128.63	20	40	60	80	
FILL: Brown silty sand with gravel		G	1									
0.48												
FILL: Dark brown silty sand with clay and concrete pieces		G	2									
0.84												
FILL: Brown silty sand with gravel		G	3			1	127.63					
1.22												
GLACIAL TILL: Light brown silty sand with clay, gravel and cobbles		G	4									
2.34						2	126.63					
End of Test Pit												
TP terminated on bedrock surface @ 2.34m depth												

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

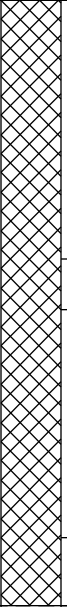
FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 8**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			<input type="radio"/> Volatile Organic Rdg. (ppm) <input type="radio"/> Lower Explosive Limit %				
GROUND SURFACE						0	128.92	20	40	60	80	
<b>FILL:</b> Brown silty sand with clay, cobbles, steel and topsoil		G	1			1	127.92					▲
		G	2									
End of Test Pit TP terminated on bedrock surface @ 1.78m depth	1.78											

100 200 300 400 500  
**RKI Eagle Rdg. (ppm)**  
 ▲ Full Gas Resp. ▲ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

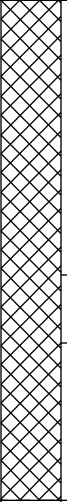
FILE NO. **PE1114**

REMARKS

HOLE NO. **TP 9**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	128.84	20	40	60	80	
<b>FILL:</b> Sand and gravel with concrete and steel pieces  End of Test Pit  TP terminated on bedrock surface @ 1.47m depth		G	1			1	127.84					
								100	200	300	400	500
								<b>RKI Eagle Rdg. (ppm)</b>				
								▲ Full Gas Resp.    △ Methane Elim.				



## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP10**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	127.73					
TOPSOIL		G	1									
Brown <b>SILTY SAND</b> , trace clay	0.23	G	2									
	0.48	G	3									
<b>GLACIAL TILL:</b> Grey-brown silty clay with sand, gravel and cobbles		G										
	0.99											
End of Test Pit												
TP terminated on bedrock surface @ 0.99m depth												

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

**DATUM** Ground surface elevations provided by G. A. Smith Surveying Ltd.

**FILE NO.**  
**PE1114**

**REMARKS**

**HOLE NO.**  
**TP11**

**BORINGS BY** Backhoe

**DATE** August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			<input type="radio"/> Volatile Organic Rdg. (ppm) <input type="radio"/> Lower Explosive Limit %					
GROUND SURFACE						0	128.34	20	40	60	80		
FILL: Silty sand with gravel, concrete, metal and slag pieces	[Cross-hatched pattern]	G	1										
			0.60										
Brown SILTY CLAY with sand	[Diagonal hatched pattern]	G	2										
			1										
End of Test Pit						1.83							
								100	200	300	400	500	
								<b>RKI Eagle Rdg. (ppm)</b>					
								▲ Full Gas Resp. △ Methane Elim.					

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP12**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
								20	40	60	80	
<b>GROUND SURFACE</b>						0	128.16					
<b>FILL:</b> Brown sand with gravel	0.15											
<b>TOPSOIL</b>												
Brown <b>SILTY CLAY</b> with sand	0.33	G	2					△				
	0.53	G	1					△				
		G	3					△				
<b>GLACIAL TILL:</b> Light brown silty sand with clay, gravel and cobbles		G	4			1	127.16	△				
	1.37											
End of Test Pit												
TP terminated on bedrock surface @ 1.37m depth												

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

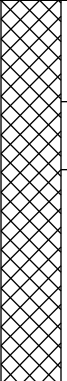
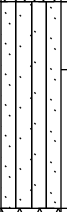

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP13**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	128.85	20	40	60	80	
FILL: Sand and gravel with topsoil		G	1									
	1.12					1	127.85					
Brown SILTY SAND, some clay		G	2									
	1.73					2	126.85					
GLACIAL TILL: Light brown silty sand with clay, gravel and cobbles		G	3									
	3.05					3	125.85					
End of Test Pit												
TP terminated on bedrock surface @ 3.05m depth												

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP14**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	128.82	20	40	60	80	
<b>FILL:</b> Brown silty sand with clay, concrete and steel  1.30 <b>GLACIAL TILL:</b> Light brown silty sand with clay, gravel and cobbles 1.42 End of Test Pit  TP terminated on bedrock surface @ 1.42m depth		G	1			1	127.82					
		G	2									

100 200 300 400 500  
**RKI Eagle Rdg. (ppm)**  
 ▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

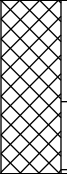
FILE NO. **PE1114**

REMARKS

HOLE NO. **TP15**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE						0	128.04	20	40	60	80		
<p><b>FILL:</b> Mixture of topsoil, sand, silty clay, gravel and wood</p> <p>0.51</p> <p>End of Test Pit</p> <p>TP terminated on bedrock surface @ 0.51m depth</p>		G	1				▲						
								100	200	300	400	500	

**RKI Eagle Rdg. (ppm)**  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.


FILE NO. **PE1114**

REMARKS

HOLE NO. **TP16**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE						0	127.95	20	40	60	80		
FILL: Sand and gravel with clay, wood and slag		G	1										
		G	2										
End of Test Pit													
TP terminated on bedrock surface @ 0.91m depth													

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

REMARKS

BORINGS BY Backhoe

DATE August 26, 2008

FILE NO. **PE1114**

HOLE NO. **TP17**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	127.85	20	40	60	80	
FILL: Sand, gravel, wood and slag		G	1									
End of Test Pit	0.66											
TP terminated on bedrock surface @ 0.66m depth												
								100	200	300	400	500

RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.



DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP18**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0	125.97	20	40	60	80	
<p><b>FILL:</b> Silty sand with clay, topsoil, wood and slag</p> <p>End of Test Pit</p> <p>TP terminated on bedrock surface @ 0.63m depth</p>	0.63	G	1					▲				
								100	200	300	400	500

**RKI Eagle Rdg. (ppm)**  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

**DATUM** Ground surface elevations provided by G. A. Smith Surveying Ltd.

**REMARKS**

**BORINGS BY** Backhoe

**DATE** August 26, 2008

**FILE NO.**  
**PE1114**

**HOLE NO.**  
**TP19**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %	20	40		60
GROUND SURFACE						0							
TOPSOIL End of Test Pit	0.03												
TP terminated on bedrock surface @ 0.03m depth													

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.



## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.


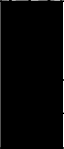

FILE NO. **PE1114**

REMARKS

HOLE NO. **TP21**

BORINGS BY Backhoe

DATE August 26, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rgd. (ppm)	○ Lower Explosive Limit %				
<b>GROUND SURFACE</b>						0	128.19						
<b>FILL:</b> Brown silty sand with clay and gravel		G	1					△					
	0.20												
<b>TOPSOIL</b>		G	2					△					
	0.63												
<b>GLACIAL TILL:</b> Brown silty clay with sand, gravel and cobbles		G	3					△					
	1.12					1	127.19						
End of Test Pit													
TP terminated on bedrock surface @ 1.12m depth													

100 200 300 400 500  
RKI Eagle Rgd. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Phase II-Environmental Site Assessment  
Former Appletex Mill  
Appleton, Ontario

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.


FILE NO. **PE1114**

REMARKS

HOLE NO. **MW 1-08**

BORINGS BY CME 55 Power Auger

DATE 26 Aug 08

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80	
FILL: Silty sand with gravel		AU	1			0	127.46					
	0.86	RC	1	91	0	1	126.46					
		RC	2	90	60	2	125.46					
		RC	3	88	82	3	124.46					
		RC	4	100	44	4	123.46					
BEDROCK: Limestone		RC	5	90	73	5	122.46					
		RC	6	95	92	6	121.46					
		RC	7	100	78	7	120.46					
		RC	8	97	80	8	119.46					
		RC	9	100	100	9	118.46					
		RC	10			10	117.46					
		RC	11			11	116.46					
		RC	12			12	115.46					
End of Monitoring Well (GWL @ 9.86m-Sept. 2/08)	12.19											

100 200 300 400 500  
Gastech 1314 Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

FILE NO. **PE1114**

REMARKS

HOLE NO. **MW 2-08**

BORINGS BY CME 55 Power Auger

DATE 26 Aug 08

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Lower Explosive Limit %				
GROUND SURFACE						0	128.08	20	40	60	80	
FILL: Silty sand with gravel and concrete pieces						1	127.08					
		1.90				2	126.08					
BEDROCK: Limestone		RC	1	85	73	3	125.08					
		RC	2	93	60	4	124.08					
		RC	3	100	100	5	123.08					
		RC	4	97	87	6	122.08					
		RC	5	92	82	7	121.08					
		RC	6	100	93	8	120.08					
		RC	7	93	88	9	119.08					
		RC	8	100	100	10	118.08					
		RC	7	93	88	11	117.08					
		RC	8	100	100	12	116.08					
End of Monitoring Well (GWL @ 7.30m-Sept. 2/08)	12.19											

100 200 300 400 500  
Gastech 1314 Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

DATUM Ground surface elevations provided by G. A. Smith Surveying Ltd.

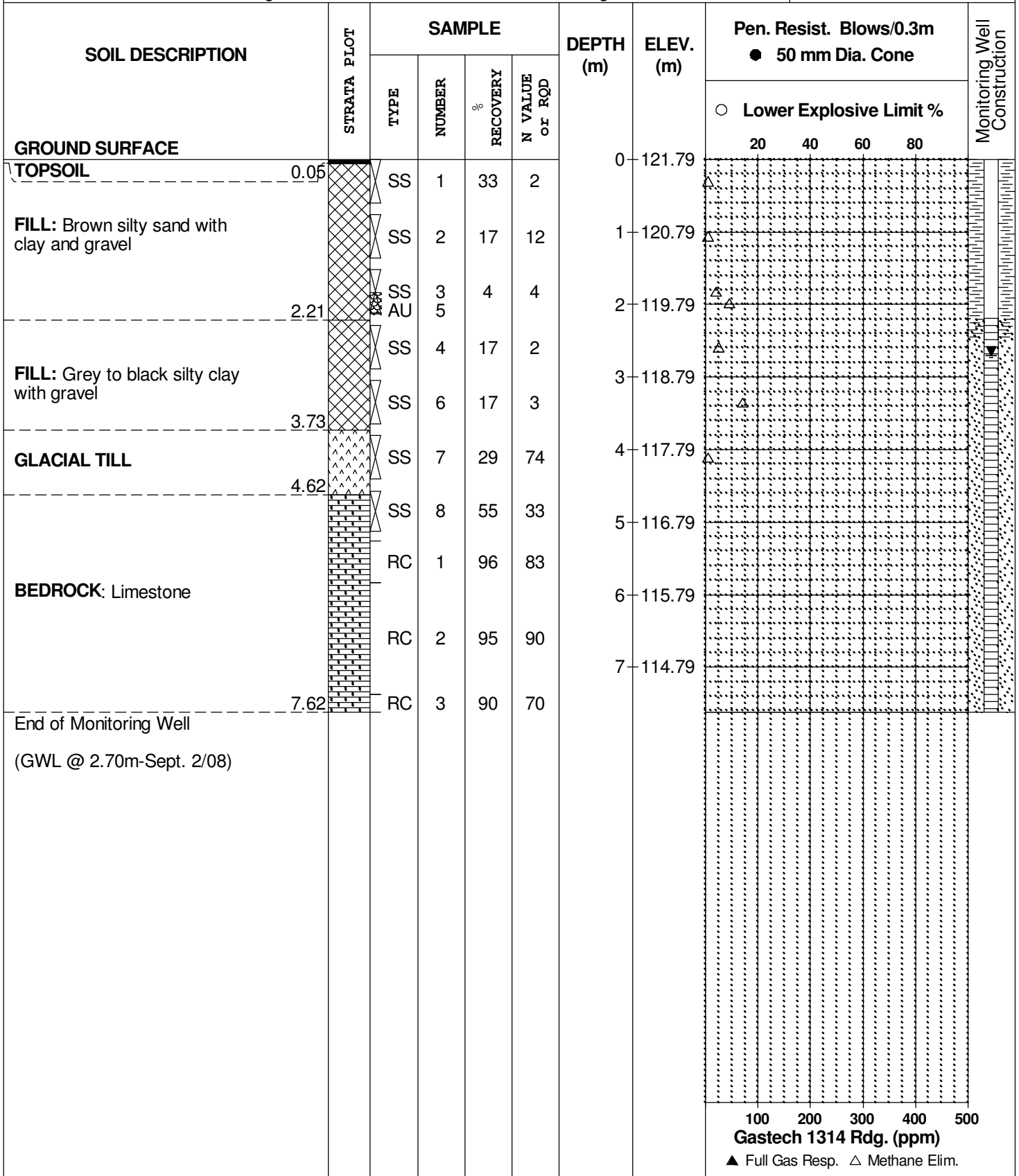
FILE NO. **PE1114**

REMARKS

HOLE NO. **MW 3-08**

BORINGS BY CME 55 Power Auger

DATE 26 Aug 08



100 200 300 400 500  
Gastech 1314 Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith  
Surveying Limited and, as such, are approximate only.


**REMARKS**

**FILE NO.**  
**PH2723**

**HOLE NO.**  
**TH 1**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Dark brown silty sand with gravel		G	1			0	126.0					
						1	125.0					
End of Test Hole	1.55											
								20	40	60	80	100
								<b>Shear Strength (kPa)</b>				
								▲ Undisturbed    △ Remoulded				



## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
**PH2723**

**HOLE NO.**  
**TH 2**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Dark brown silty sand with gravel		G	1			0	128.3					
						1	127.3					
End of Test Hole												

1.55

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.


**FILE NO.**  
**PH2723**

**REMARKS**

**HOLE NO.**  
**TH 3**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Dark brown silty sand with gravel		G	1			0	126.0					
						1	125.0					
End of Test Hole	1.55											
								20	40	60	80	100
								<b>Shear Strength (kPa)</b>				
								▲ Undisturbed    △ Remoulded				

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

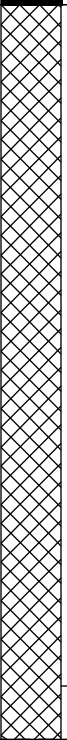
**REMARKS**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

**FILE NO.**  
PH2723

**HOLE NO.**  
TH 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE						0	127.9	20	40	60	80	
TOPSOIL	0.05											
<b>FILL:</b> Dark brown silty sand with some gravel and cobbles to sand-gravel, trace silt and clay		G	1									
						1	126.9					
End of Test Pit	1.13											
Practical refusal to augering on inferred bedrock surface at 1.13m depth												

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith  
Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
**PH2723**

**HOLE NO.**  
**TH 5**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Light brown silty sand		G	1			0	127.9					
Very stiff, brown <b>SILTY CLAY</b> , trace gravel		G	2			1	126.9					
End of Test Hole Practical refusal to augering on inferred bedrock surface at 1.05m depth												

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

**FILE NO.**  
**PH2723**

**REMARKS**

**HOLE NO.**  
**TH 6**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
<b>GROUND SURFACE</b>						0	128.6	20	40	60	80	
<b>TOPSOIL</b>	0.06											
<b>FILL: Brown silty sand with clay</b>	0.35											
End of Test Hole Practical refusal to augering on inferred bedrock surface at 0.35m depth												

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith  
Surveying Limited and, as such, are approximate only.

**FILE NO.**  
**PH2723**

**REMARKS**

**HOLE NO.**  
**TH 7**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.04				0	123.9							
FILL: Brown silty sand with clay													
End of Test Hole	0.65												
Practical refusal to augering on inferred bedrock surface at 0.65m depth													
								20	40	60	80	100	
								<b>Shear Strength (kPa)</b>					
								▲ Undisturbed    △ Remoulded					

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
**PH2723**

**HOLE NO.**  
**TH 8**

**BORINGS BY** Hand Auger

**DATE** August 28, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.04				0	124.7							
FILL: Brown silty sand with clay	[Cross-hatched pattern]												
		0.91											
End of Test Hole													
Practical refusal to augering on inferred bedrock surface at 0.91m depth													
								20	40	60	80	100	
								<b>Shear Strength (kPa)</b>					
								▲ Undisturbed    △ Remoulded					

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
PH2723

**HOLE NO.**  
TH 9

**BORINGS BY** Hand Auger

**DATE** September 9, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.03				0	124.5							
SILTY SAND with clay	0.34	G	1										
End of Test Hole													
Practical refusal to augering on inferred bedrock surface at 0.34m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded



## SOIL PROFILE AND TEST DATA

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith  
Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
PH2723

**HOLE NO.**  
TH10

**BORINGS BY** Hand Auger

**DATE** September 9, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0	123.7						
SILTY SAND		G	1										
End of Test Hole Practical refusal to augering on inferred bedrock surface at 0.22m depth	0.22												

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
Old Mill Lane  
Appleton, Ontario

**DATUM** Ground surface elevations interpolated from topo plan prepared by G.A. Smith Surveying Limited and, as such, are approximate only.

**REMARKS**

**FILE NO.**  
**PH2723**

**HOLE NO.**  
**TH11**

**BORINGS BY** Hand Auger

**DATE** September 9, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.02				0	124.6							
SILTY SAND, some clay	0.18												
End of Test Hole													
Practical refusal to augering on inferred bedrock surface at 0.18m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP1**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Brown sand, silt, clay, rock and burnt wood debris. Slightly moist.		G	1			0	126.25					
0.70												
<b>FILL:</b> Brown sand, silt and broken stone. Dry.		G	2			1	125.25					
1.10												
<b>FILL:</b> Gravel, old wires, black plastic pieces. Drainage tile (pea stone) at 1.3m depth.		G	3									
1.30												
<b>FILL:</b> Brown sand, silt and fabric debris												
1.60												
End of Test Pit												
Refusal on bedrock at 1.60 m depth												

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP2**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
<b>FILL:</b> Brown silt, sand and clay with gravel. Slightly moist. 0.20		G	4			0	128.17						
<b>FILL:</b> Light brown silt, sand, some gravel. Slightly moist. 0.40		G	5										
<b>FILL:</b> Black sand and silt, trace clay and charcoal. Slightly moist. 0.70		G	6										
<b>FILL:</b> Light brown coarse sand, silt, gravel. Moist. 1.70		G	8			1	127.17						
		G	7										
End of Test Pit													
Refusal on bedrock at 1.70 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP3**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	128.60						
<b>FILL:</b> Dark brown sand, silt, clay topsoil. Moist	0.10												
<b>FILL:</b> Light brown sand, silt, clay and gravel. Slightly moist.		G	8			1	127.60						
End of Test Pit	1.83												
Refusal on bedrock at 1.83 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP4**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<p><b>FILL:</b> Brown sandy silt, trace clay topsoil. Slightly moist.</p> <p>0.09</p>	X				0	127.95						
<p><b>FILL:</b> Light brown sand, silt, clay, gravel with debris (wood and plastic). Slightly moist.</p> <p>1.92</p>	X	G	9		1	126.95						
<p>End of Test Pit</p> <p>Refusal on bedrock at 1.92 m depth</p>												

20 40 60 80 100  
Shear Strength (kPa)  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP5**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	128.78						
<b>FILL:</b> Brown sandy silt with roots topsoil. Moist.	0.11												
<b>FILL:</b> Light brown fine sand, silt, some clay and gravel. Slight moist.		G	10										
	1.17					1	127.78						
End of Test Pit													
Refusal on bedrock at 1.17 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP6**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	127.88						
<b>FILL:</b> Brown sandy silt topsoil. Slightly moist.													
<b>FILL:</b> Light brown sandy silt, some clay and gravel. Moist.		G	11			1	126.88						
End of Test Pit													
Refusal on bedrock at 1.51 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded



DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP7**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0	128.42						
FILL: Brown sandy silt topsoil. Dry.													
0.38													
FILL: Light brown sandy silt, trace clay, debris. Dry.		G	12										
1.17						1	127.42						
End of Test Pit													
Refusal on bedrock at 1.17 m depth													

20 40 60 80 100  
Shear Strength (kPa)  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
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DATUM Geodetic

REMARKS

BORINGS BY Backhoe

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FILE NO. **PH2723**

HOLE NO. **TP8**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0							
FILL: Brown to light brown sandy silt. Dry.		G	13			1							
						1.76							
End of Test Pit													

20 40 60 80 100  
Shear Strength (kPa)  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP9**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
					0	128.31							
<b>FILL:</b> Brown sandy silt topsoil. Slightly moist.	0.56												
<b>FILL:</b> Light brown to grey sandy silt, gravel and wood debris. Slightly moist.	1.18	G	14		1	127.31							
End of Test Pit Refusal on bedrock at 1.18 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP10**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0	127.85						
FILL: Brown topsoil. Slightly moist. ----- 0.31													
FILL: Brown sandy silt, some clay. Slightly moist. ----- 0.55		G	15										
End of Test Pit  Refusal on bedrock at 0.55 m depth													

○ Water Content %

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
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REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP11**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80	
GROUND SURFACE						0	127.55					
FILL: Dark brown sandy topsoil. Dry.												
FILL: Brown sandy silt, clay and gravel. Dry.		G	16									
End of Test Pit												
Refusal on bedrock at 0.49 m depth												

20 40 60 80 100  
Shear Strength (kPa)  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP12**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	127.85						
<b>FILL:</b> Dark brown sandy silt topsoil. Slightly moist.													
0.49													
<b>FILL:</b> Light brown fine sand, silt, trace clay. Dry.		G	17										
0.88													
End of Test Pit Refusal on bedrock at 0.88 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

## SOIL PROFILE AND TEST DATA

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REMARKS

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DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP13**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Brown mixture of sand, silt, clay and gravel. Dry.  End of Test Pit Refusal on bedrock at 1.27 m depth		G	18			0	128.03					
						1	127.03					
								20	40	60	80	
								20	40	60	80	100

**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

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FILE NO. **PH2723**

HOLE NO. **TP14**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	126.89						
<b>FILL:</b> Brown sandy silt, gravel. Slightly moist.	0.28	G	19										
End of Test Pit													
Refusal on bedrock at 0.28 m depth													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded



DATUM Geodetic



REMARKS

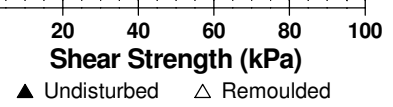
BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP15**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Brown sandy silt, clay, boulders, concrete, asphalt, plastic and steel debris. Slightly moist.		G	20			0	121.62					
						1	120.62					
<b>FILL:</b> Grey/black clay, sand, gravel and organics. Very moist.		G	21			2	119.62					
						3	118.62					
End of Test Pit Test pit terminated due to maximum reach of backhoe.												



DATUM Geodetic




REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP16**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Brown sandy silt, clay and cobbles/boulders. Moist.		G	24			0	121.06					
						1	120.06					
<b>FILL:</b> Grey clay, sand		G	22			2	119.06					
						3	118.06					
Black organics, cat tails. Very wet.		G	23									
End of Test Pit Test pit terminated due to maximum reach of backhoe. (GWL @ 1.57 m depth)												

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP17**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
<b>GROUND SURFACE</b>						0	120.63						
<b>FILL:</b> Brown sandy silt topsoil. Slightly moist.	0.13												
<b>FILL:</b> Brown to dark brown sandy silt, clay, gravel, brick, plastic and concrete debris. Moist.		G	27			1	119.63						
	1.92												
<b>FILL:</b> Grey clay, sand. Very wet.		G	26			2	118.63						
	2.34												
End of Test Pit Test pit terminated due to inflow of groundwater. (GWL @ 1.78 m depth)													

20 40 60 80 100  
**Shear Strength (kPa)**  
▲ Undisturbed    △ Remoulded

DATUM Geodetic



REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP18**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0	121.74						
<b>FILL:</b> Brown silty sand, some clay, gravel. Dry		G	29			1	120.74						
						2	119.74						
<b>FILL:</b> Black to grey clay, sand, fabric, garbage bag. Slightly wet.		G	28			3	118.74						
End of Test Pit Test pit terminated due to maximum reach of backhoe.													

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP19**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
GROUND SURFACE								20	40	60	80		
<b>FILL:</b> Brown sandy silt topsoil. Slightly moist.	0.13					0	120.63						
<b>FILL:</b> Brown to dark brown sandy silt, clay, gravel, brick, plastic and concrete debris. Moist.						1	119.63						
<b>FILL:</b> Grey clay, sand. Very wet.	1.92					2	118.63						
End of Test Pit  Test pit terminated due to inflow of groundwater. (GWL @ 1.78 m depth)	2.34												

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded



## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
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BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP21**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			20	40	60	80		
GROUND SURFACE						0							
<b>FILL:</b> Brown sand, silt, clay, stone, wood and fabric debris		G	31			1							
						1.88							
End of Test Pit													

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM Geodetic



REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Dark brown sand, silt, gravel, wood, fabric, concrete, glass, metal and plastic debris. Dry.		G	33			0	123.68					
						1	122.68					
<b>FILL:</b> Brown sand, silt, metal, glass, wood and plastic debris. gravel. Dry.		G	34									
End of Test Pit Refusal on bedrock at 1.82 m depth												

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded



## SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision  
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REMARKS

BORINGS BY Backhoe

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FILE NO. **PH2723**

HOLE NO. **TP23**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
FILL: Dark brown sandy silt. Dry.						0	123.42					
	0.53											
FILL: Light brown sandy silt, some clay, gravel. Dry.		G	35			1	122.42					
	1.74											
FILL: Brown clay, some sand, silt and gravel		G	36			2	121.42					
	2.17											
End of Test Pit Refusal on bedrock at 2.17 m depth												

20 40 60 80 100  
Shear Strength (kPa)  
▲ Undisturbed    △ Remoulded

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE August 18, 2016

FILE NO. **PH2723**

HOLE NO. **TP24**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
<b>FILL:</b> Dark brown sandy silt, some clay. Slightly moist. 0.25	X	G	39			0	123.16					
<b>FILL:</b> Light brown sandy silt, some clay and gravel. Dry. 1.67	X	G	38			1	122.16					
<b>FILL:</b> Dark grey clay with sand and boulders. Wet. 2.23	X	G	37			2	121.16					
End of Test Pit  Refusal on large boulders at 2.23 m depth.												

20 40 60 80 100  
**Shear Strength (kPa)**  
 ▲ Undisturbed    △ Remoulded

DATUM

REMARKS

BORINGS BY CME 55 Power Auger

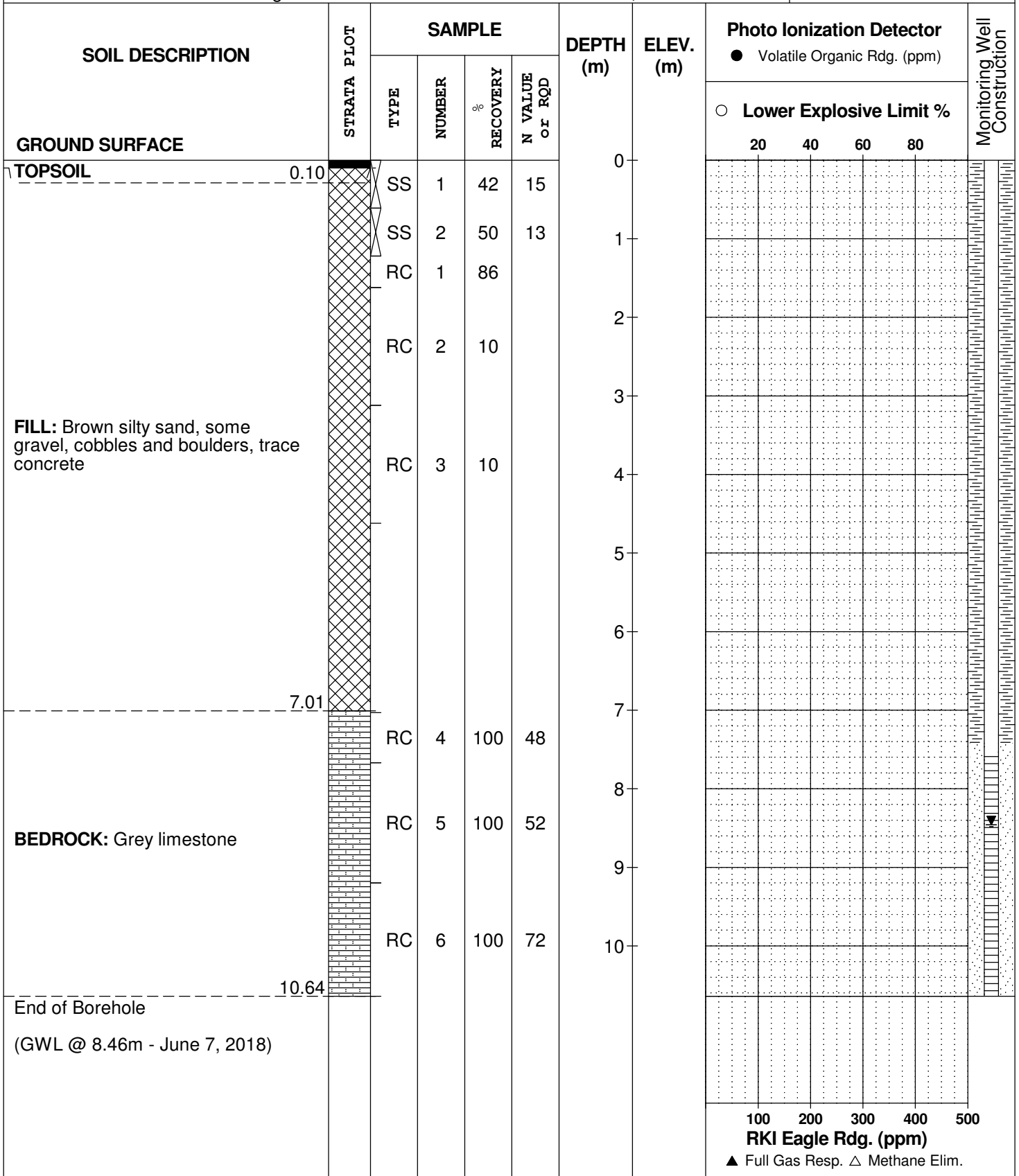
DATE March 16, 2018

FILE NO.

**PE1114**

HOLE NO.

**BH 1-18**



DATUM

REMARKS

BORINGS BY CME 55 Power Auger



DATE March 16, 2018

FILE NO.

**PE1114**

HOLE NO.

**BH 2-18**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE						0		20	40	60	80	
FILL: Topsoil with organics, trace gravel, cobbles and boulders		RC	1	100	52	1						
		RC	2	100	94	2						
BEDROCK: Grey limestone		RC	3	100	68	3						
		RC	4	100	93	5						
		RC	5	100	92	6						
End of Borehole (GWL @ 3.35m - June 7, 2018)						7						

1.83

7.11

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

# SYMBOLS AND TERMS

## SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

## SYMBOLS AND TERMS (continued)

### SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

### ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

<b>RQD %</b>	<b>ROCK QUALITY</b>
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

### SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

## SYMBOLS AND TERMS (continued)

### GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = $D_{60} / D_{10}$

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have:  $1 < Cc < 3$  and  $Cu > 4$

Well-graded sands have:  $1 < Cc < 3$  and  $Cu > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

### CONSOLIDATION TEST

$p'_o$	-	Present effective overburden pressure at sample depth
$p'_c$	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below $p'_c$ )
Cc	-	Compression index (in effect at pressures above $p'_c$ )
OC Ratio		Overconsolidation ratio = $p'_c / p'_o$
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

### PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.
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## SYMBOLS AND TERMS (continued)

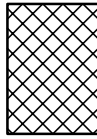
### STRATA PLOT



Topsoil



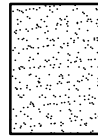
Asphalt



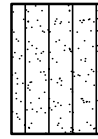
Fill



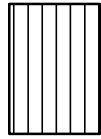
Peat



Sand



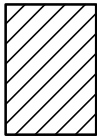
Silty Sand



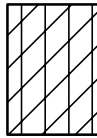
Silt



Sandy Silt



Clay



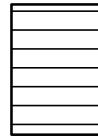
Silty Clay



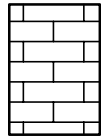
Clayey Silty Sand



Glacial Till



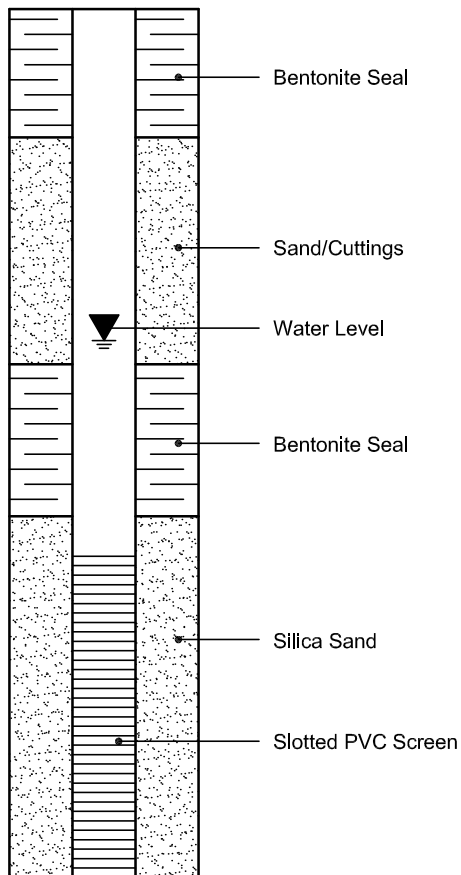
Shale



Bedrock

### MONITORING WELL AND PIEZOMETER CONSTRUCTION

#### MONITORING WELL CONSTRUCTION



#### PIEZOMETER CONSTRUCTION

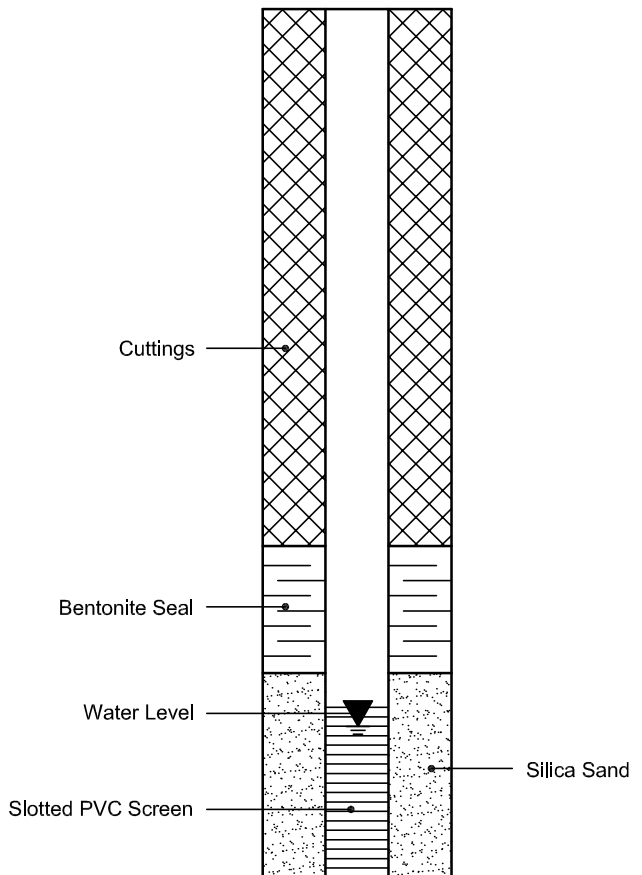
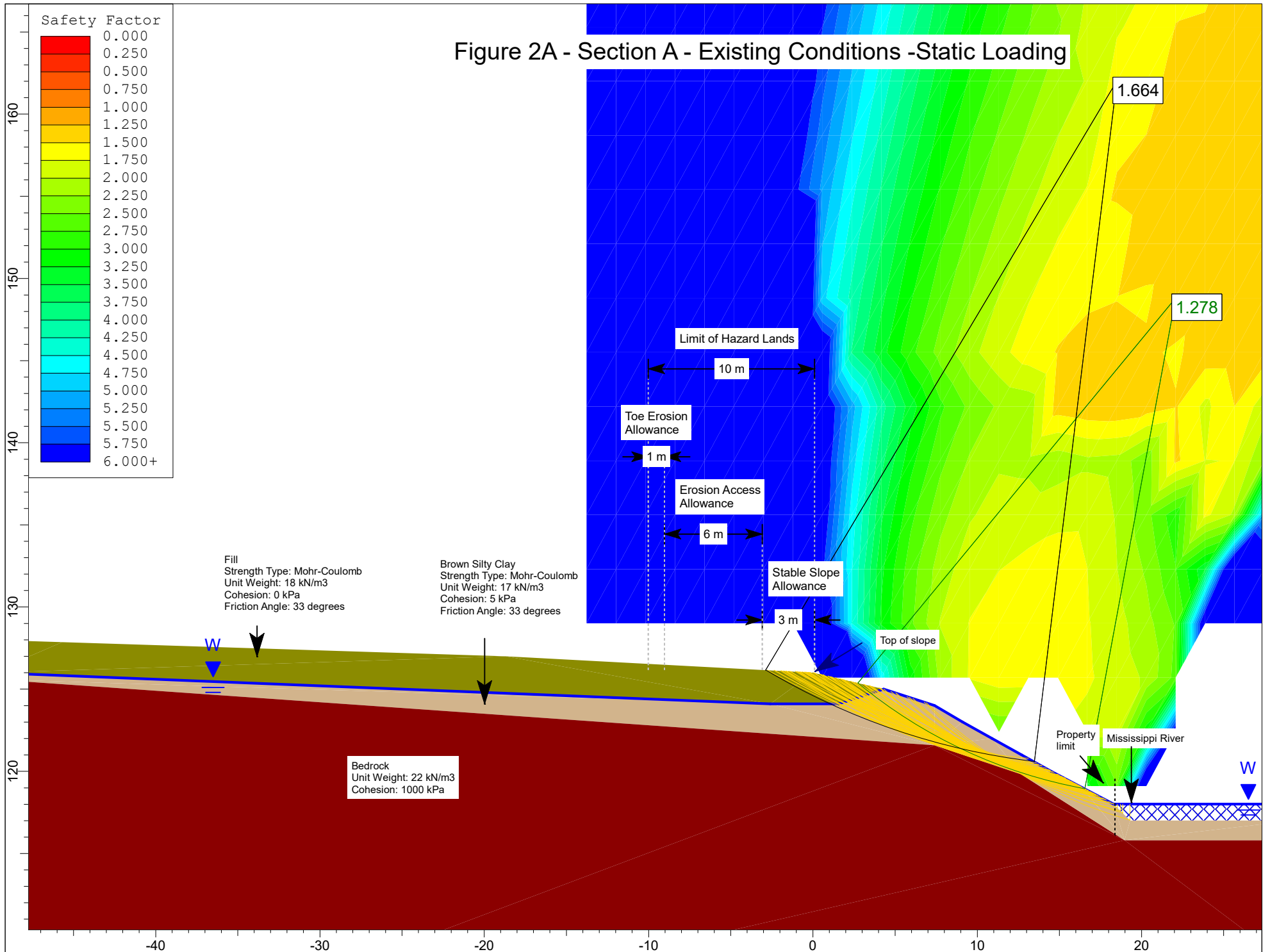




Figure 2A - Section A - Existing Conditions -Static Loading



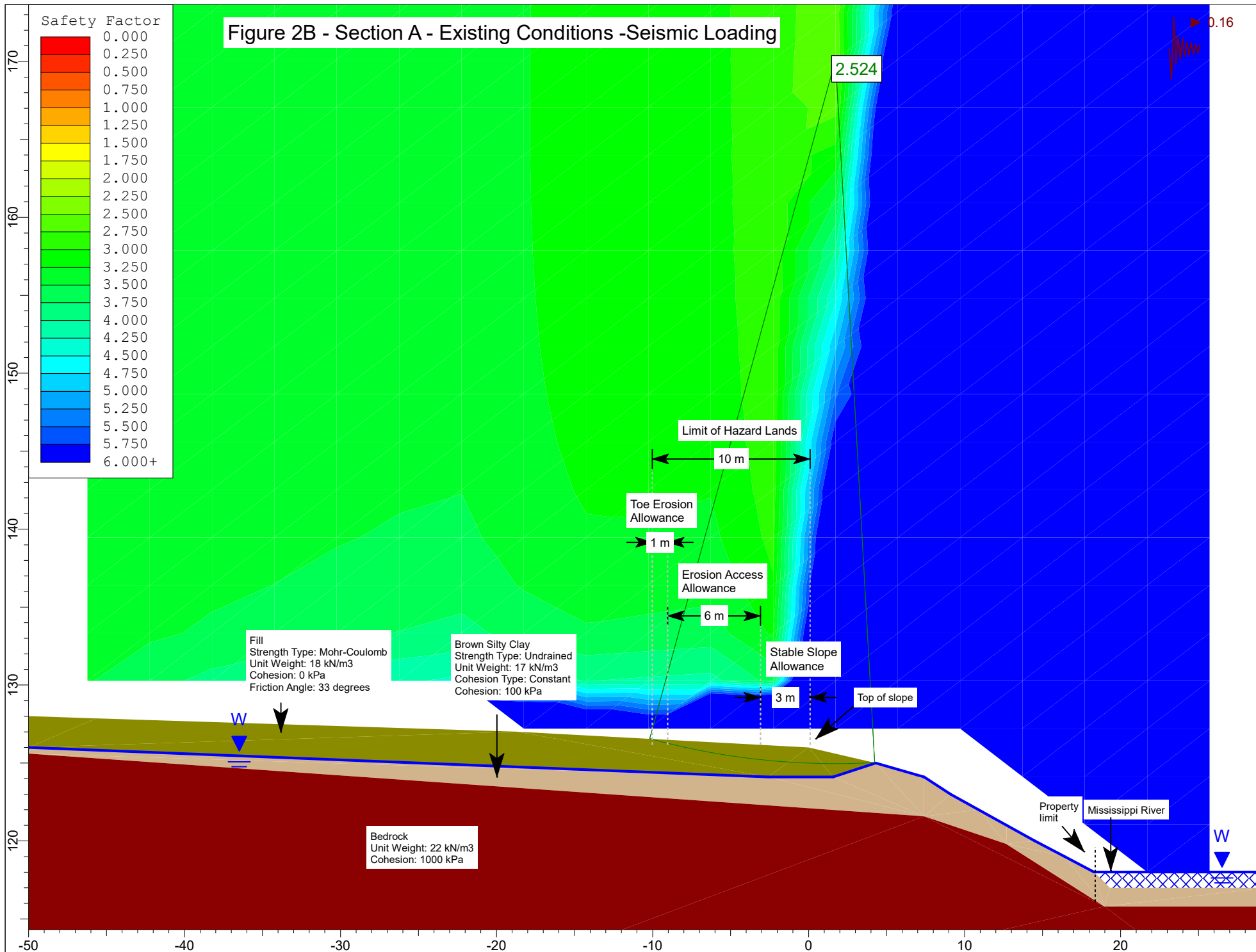


Figure 3A - Section B - Existing Conditions - Static Loading

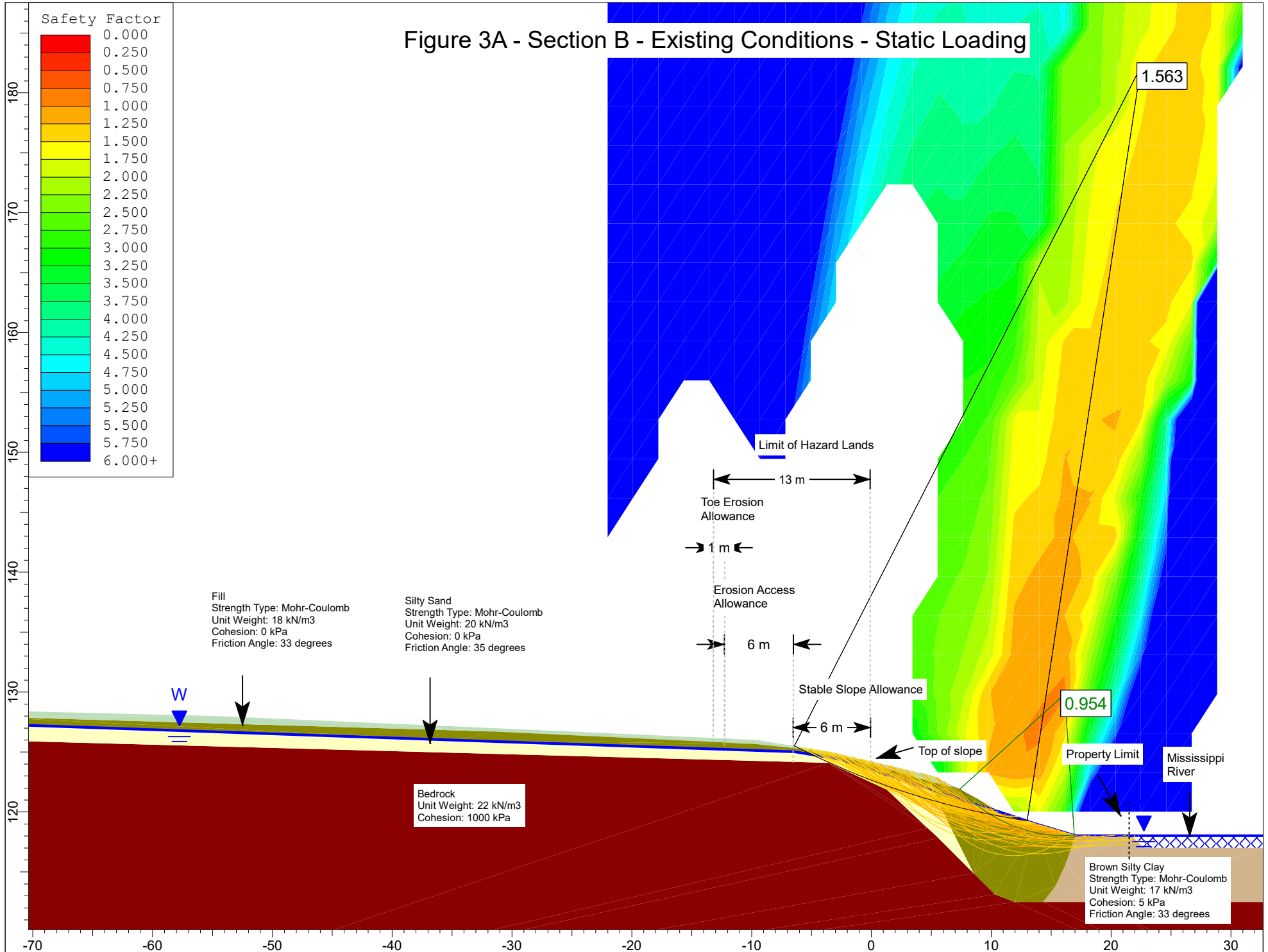


Figure 3B - Section B - Existing Conditions - Seismic Loading

