



V.A. WOOD (GUELPH) INCORPORATED
CONSULTING GEOTECHNICAL ENGINEERS

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
TELEPHONE: 519-763-3101

SLOPE STABILITY STUDY
FOR AN
URBAN RESIDENTIAL SUBDIVISION
NORTH HALF OF LOT 31, CONCESSION 1
(FORMERLY TOWNSHIP OF EAST LUTHER)
TOWNSHIP OF EAST LUTHER GRAND VALLEY, ONTARIO

Ref. No. G3525-4-11
November, 2014

Amended
October 16, 2015

Prepared for:

Moco Farms Limited
c/o Cortel Group
2800 Highway 7 West, Suite 304
Vaughan, Ontario
L4K W49

Attn: Mr. Luka Kot

Distribution:

- (1) Copy – Moco Farms Ltd.*
- (1) Copy - Valdor Engineering Inc.*
- (1) Copy - Innovative Planning Solutions*
- (2) Copies - V.A. Wood (Guelph) Inc.*



CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 FIELD WORK	2
3.0 SUBSURFACE CONDITIONS	3
4.0 GROUNDWATER CONDITONS	5
5.0 DISCUSSION AND RECOMMENDATIONS	6
6.0 SLOPE ASSESSENT	6
7.0 STATEMENT OF LIMITATIONS	10

APPENDIX

APPENDIX 'A'	Statement of Limitations
APPENDIX 'B'	Slope Assessment Enclosures

ENCLOSURES

	<u>No.</u>
BOREHOLE LOCATION PLAN	1
SITE LOCATION PLAN	2
BOREHOLE LOGS	3 - 13
GRAIN SIZE DISTRIBUTION CURVES	14 - 15

1.0 INTRODUCTION:

V. A. Wood (Guelph) Inc. was retained by Moco Farms Ltd. to carry out a slope stability study for a proposed urban residential subdivision on North Half of Lot 31, Concession 1 in the Township of East Luther Grand Valley, Ontario

The purpose of the investigation was to reveal the subsurface conditions and determine the soil parameters to carry out the slope stability analysis.

2.0 FIELD WORK:

The fieldwork was carried out on November 10 to 12, 2014 and consisted of eleven (11) boreholes at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a track-mounted, power-auger machine equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Borehole Logs as N-values. The subsurface soils were visually inspected, logged and sampled at the borehole locations.

The boreholes were laid out by personnel from V.A. Wood (Guelph) Inc. and a soils technician supervised the fieldwork program. The ground elevation at each borehole was interpolated from a drawing prepared by submitted to us by Valdor Engineering Inc. and dated April 29, 2014.

3.0 SUBSURFACE CONDITIONS:

Full details of the soils encountered in each borehole are given on the Borehole Logs, Enclosures 2 to 12, inclusive and the following notes are intended to summarize this data.

*The boreholes encountered a surficial deposit of **topsoil** ranging between 100mm and 250mm thick.*

*The topsoil at the boreholes was underlain by a deposit of brown **clay and silt** to depths ranging between 0.8 to 4.6 metres below grade. Standard Penetration tests in this material gave N-values ranging between 2 and greater than 100 blows/300mm and the natural moisture content was found to be between 7 and 25%. A typical grain size distribution curve for this material can be found on Enclosure 13.*

Based on the test results, the deposit of clay and silt is considered to have a generally soft to hard consistency.

*The clay and silt at Borehole 8 was underlain by a deposit of brown **sand** to a depth of 1.5 metres below grade followed by a deposit of brown **sand and gravel** to a depth of 1.8 metres below grade. A Standard Penetration test in the sand gave an N-value of 20 blows/300mm.*

Based on the test results, the deposits of sand and, sand and gravel are considered to have a generally compact relative density.

*The clay and silt at Boreholes 1, 2, 4, 5, 6 and the sand and gravel at Borehole 8 was underlain by a deposit of brown **clay and silt till**. This deposit extended to a depths ranging between 4.6 and 7.7 metres below grade. Standard Penetration tests in this material gave N-values ranging between 27 and greater than 100 blows/300mm and the natural moisture content was found to range between 7 and 14%. A typical grain size distribution curve for this material can be found on Enclosure 13.*

Based on the test results, the deposit of clay and silt till is considered to have a generally very stiff to hard consistency.

*The clay and silt at Borehole 3 was underlain by a deposit of brown **sand and gravel** to a depth of 7.6 metres below grade. Standard Penetration tests in this material gave N-values ranging between 24 and greater than 100 blows/300mm and the natural moisture content was found to be about 10%.*

Based on the test results, the deposit of sand and gravel is considered to have a generally compact to very dense relative density although the presence of gravel in this deposit may have resulted in high N-values and these may not accurately represent the relative density of the soil..

*The clay and silt till at Boreholes 6 and 7 and clay and silt at Boreholes 10 and 11 was underlain by a deposit of brown **silty clay** to the full depth of the investigation (i.e. 5.0 metres below grade). Standard Penetration tests in this material gave N-values ranging between 24 and greater than 100 blows/300mm and the natural moisture content was found to be about 12%. A typical grain size distribution curve for this material can be found on Enclosure 14.*

Based on the test results, the deposit of silty clay is considered to have a generally very stiff to hard consistency.

*The clay and silt till at Boreholes 1, 2, 4, 5, 8, 9 and sand and gravel at Borehole 3 was underlain by a deposit of grey **silty clay till**. This deposit extended to the full depth of the investigation (i.e. 5.0 to 12.6 metres below grade). Standard Penetration tests in this material gave N-values ranging between 19 and greater than 100 blows/300mm and the natural moisture content ranged between 7 and 10%.*

Based on the test results, the deposit of silty clay till is considered to have a generally very stiff to hard consistency.

4.0 GROUNDWATER CONDITIONS:

Boreholes 6, 7, 9 and 11 were dry and open to the full depth of the investigation on completion of the fieldwork program. Boreholes 1 to 5, inclusive, 8 and 10 encountered cave-in at elevations ranging between 457.1m± and 470.8m± (i.e. 1.5 to 8.5± metres below grade).

Free water surfaces were encountered at Boreholes 1, 3, 4, 5, 8 and 10 at elevations ranging between 464.2m± and 471.4m± (i.e. 0.6 to 4.3± metres below grade) on completion of the fieldwork program.

An examination of the soil samples indicated that they were generally moist to wet.

It is noted that no sub-artesian water pressures were encountered in any of the boreholes.

A colour change from brown to grey was noted in the samples in Boreholes 4 to 9, inclusive at depths of about 4.6 metres below grade.

Based on the foregoing, the permanent groundwater table is considered to be located below 471.4m±, although perched groundwater conditions can be expected in the looser upper zones underlain by the less permeable tills.

5.0 DISCUSSION AND RECOMMENDATIONS:

5.1 General:

The boreholes encountered surficial deposits of topsoil underlain by soft to hard clay and silt/clay and silt till/silty clay till with seams of sand and/or sand and gravel.

The permanent groundwater table is considered to be located below elevations 471.5m±, although perched groundwater conditions can be expected in the looser upper zones underlain by the less permeable tills.

6.0 SLOPE ASSESSMENT:

The property is within the area regulated by the Grand River Conservation Authority (GRCA). Prior to any development or alteration on the property a permit is required from the GRCA in accordance with the Regulation of Development, Interference with Wetlands and Alterations to Coastlines and Watercourses per Ontario Regulation 150/06.

The permit requires that a slope assessment be carried out to determine the limits of the regulated stream valley in accordance with the GRCA Policies for the Administration of O.Reg 150/06. The enclosures for the slope assessment are shown in Appendix 'B'.

6.1 Description of the Slope:

The property is located on the west valley slope and tableland of a northerly flowing tributary to the Grand River. The slopes are generally 4 to 6m high and the slope angles vary from 2H:1V to shallower than 10H:1V. The creek is slightly meandering and is generally more than 15m from the toe of the slope. The slope is steepest in these areas, indicating that the creek may have caused the erosion of the creek bank and the local steepening of the slope. The areas where the toe of the slope is within 15m from the creek are shown on Enclosure 1.

The slope is vegetated with tall grass and no relict landslips or signs of slope instability were observed, indicating that the slopes have recently been stable.

The creek is generally 3 to 8m wide and is relatively shallow. Except for areas where the creek has meandered close to the bank, significant creek bank erosion was not observed.

The table land above the slope is very gently sloping. The top of slope (understood to be staked by GRCA) is shown on the site plan in Enclosure 1.

6.2 Regulated Stream Valley:

Based on GRCA Policies, there are three allowances required to determine the limits of the regulated stream valley. These are the toe erosion allowance, the stable slope allowance, and the 15m allowance from the top of the stable slope.

To carry out the assessment three sections of the slope have been developed along the lines shown in Enclosure 1. The developed sections are shown in Enclosures 2, 3 and 4.

6.2.1 Toe Erosion Allowance:

A toe erosion allowance is required if the toe of the slope is within 15m from the creek and evidence of toe erosion is present. In accordance with the policies, the toe erosion allowance is determined by multiplying the average annual recession rate (based on an engineering study or observations over at least 25 years) by 100 years. In the absence of an annual recession rate or where the toe of the slope is less than 15m from the watercourse, a toe erosion allowance of 15m from the bank of the stream is used.

The toe erosion allowance is applicable to the section of the slope where the toe is located less than 15m from the creek, as shown in Enclosure 1. The 15m toe erosion allowance is shown in Section B-B'.

For the remainder of the slopes the creek is more than 15m from the toe of the slope and toe erosion is not suspected, and a toe erosion allowance is not required.

6.2.2 Stable Slope Allowance:

The slope is vegetated with tall grass and no relict landslips or signs of slope instability were observed. These indicate that the slopes have recently been stable. Based on the policies, the stable slope allowance is the distance between the actual valley top of slope and the point at which a stable slope angle intersects the ground surface and includes a factor of safety. This stable slope angle is determined from a geotechnical study or engineering assessment.

For this assessment, the stable slope allowance was determined for sections of the slope with an inclination of 3H:1V or steeper by using a stable slope angle of 3H:1V. This stable slope angle are shown in Sections A-A', B-B' and C-C'. Geotechnical slope stability analyses were carried out to show that this stable slope angle has a satisfactory factor of safety.

For sections of the slope with an inclination shallower than 3H:1V, the slope is considered to be stable and the existing top of slope is also the stable top of slope.

To show that the 3H:1V stable slope angle is satisfactory, slope stability analyses using geotechnical principals were carried out. The analyses were carried out for Sections A-A' and B-B', which represent the steepest sections of the slope.

The analyses were carried out using the commercial slope program G-Slope. This is a limit equilibrium slope stability analysis program which calculates the Factor of Safety (FOS) against circular failure of different slope configurations using the assessed soil and groundwater parameters. The FOS is the factor by which the soil strength must be reduced in order to bring the slope into a state of limit equilibrium (or imminent failure) along a given slip surface. Bishops's Modified Method was used in the analysis. Based on previous experience, Conservation Authorities require a FOS of at least 1.5 for stable slopes.

The geology was based on the Boreholes Lots (mainly BH 2), which indicate that the site is underlain by a surficial layer of stiff clay and silt, followed by very stiff to hard clay and silt till, and silty clay till. The ground water table is assumed to be located 5m± below grade under the proposed street location, and dips down the slope and merges with the top of the creek.

No laboratory soil strength tests were carried out, and the soil parameters used were based on previous experience on similar materials. The soil parameters used are shown on the upper left corner of the slope sections. It is noted that these soil parameters are consistent with and on the conservative side of the parameters given in Table 2.4 to 2.6 of the Geotechnical Principals of Stable Slopes (Ministry of Natural Resources, November 2007).

The results of the analyses are shown on Enclosures 5 and 6, and reference to these show that slip circle extending to the top of stable slope has a minimum FOS of at least 1.8. The calculated FOS are considered to be satisfactory and conservative.

6.2.4 Erosion Hazard Limit:

Based on the foregoing, the top of stable slope has been annotated on the sections. The top of stable slope is also the erosion hazard limit and this has been plotted on the site plan in Enclosure 7.

6.2.5 Regulated Stream Valley:

The 15m allowance was added landward from the erosion hazard limit to determine the limit of the regulated stream valley. Based on the policies, where the valley slopes have an inclination of 6.7H:1V or shallower the limit of the regulated area is the top of slope plus an allowance of 15m.

The resulting limit of the regulated stream valley is shown in Enclosure 8. As shown, all of the lots, except for a thin slice (maximum 6m wide) of three lots, are outside of the regulated stream valley.

All of the lots are outside of the riverine erosion hazard limit.

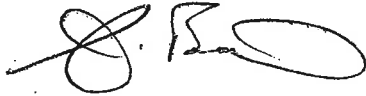
6.3 Erosion Control:

The vegetation aids in increasing slope stability against shallow failures by increasing the effective cohesion with the surficial soils. The vegetation on the slope should, therefore, be maintained. To minimize slope surface erosion, run-off should be diverted away from the slope. The disturbed ground surface during construction should be sodded or protected from erosion as soon as possible after construction.

7.0 STATEMENT OF LIMITATIONS:

The Statement of Limitations presented on Appendix 'A' is an integral part of this report.

V. A. WOOD (GUELPH) INC.





J. Broad, B.A.
General Manager

JB:sm

Encls.

2 copies



V. Wood, M. Eng., P. Eng.
Chief Engineer

APPENDICES

STATEMENT OF LIMITATIONS:

The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature, which may be available, for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction, which would not be detected or anticipated at the time of the soil investigation.

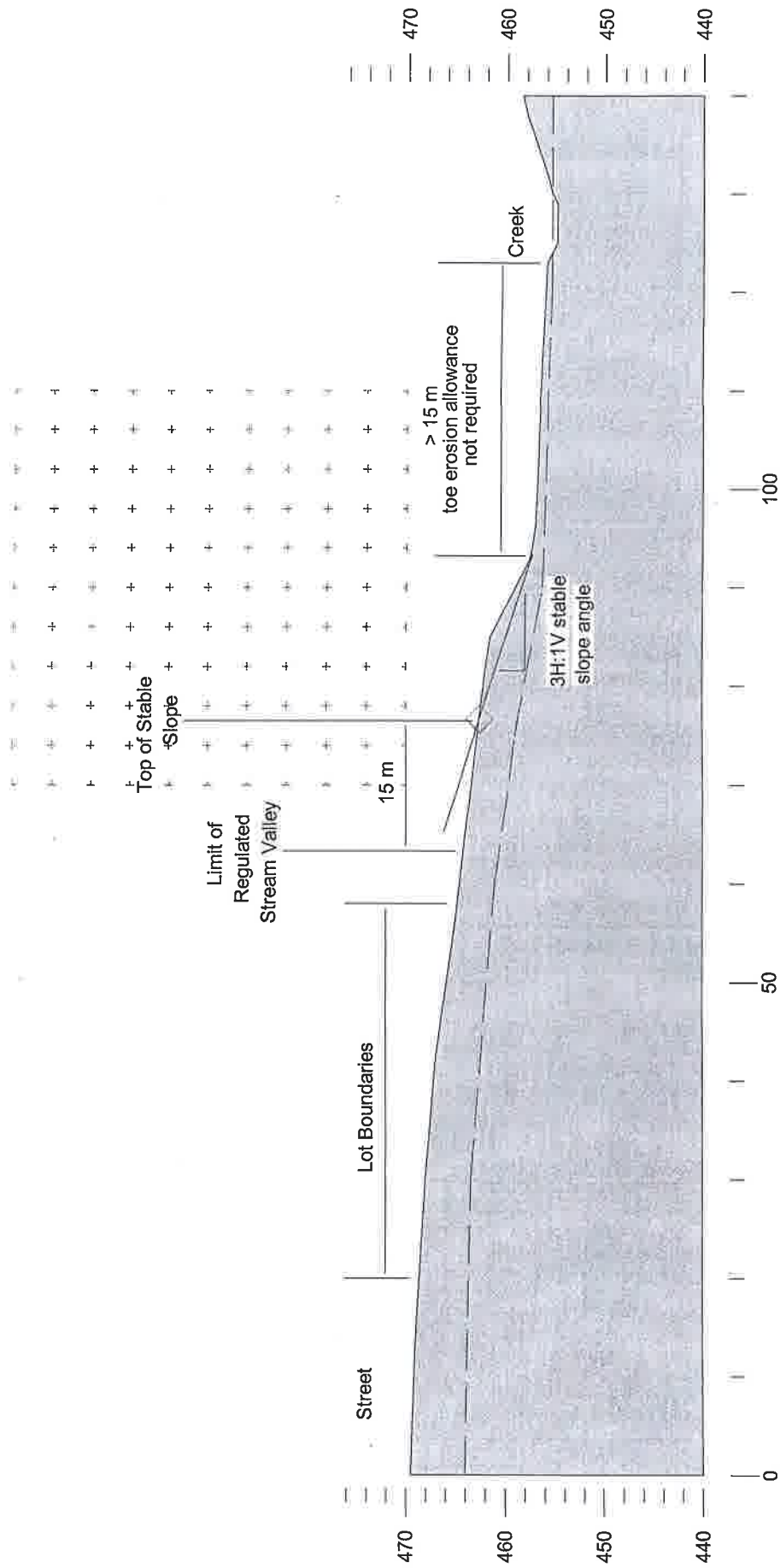
*We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. **In cases where this recommendation is not followed the company's responsibility is limited to interpreting accurately the information encountered at the boreholes.***

This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.

This report was prepared by V. A. Wood (Guelph) Inc. for Moco Farms Ltd. The material in it reflects V.A. Wood (Guelph) Inc. judgment in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Parties. V. A. Wood (Guelph) Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

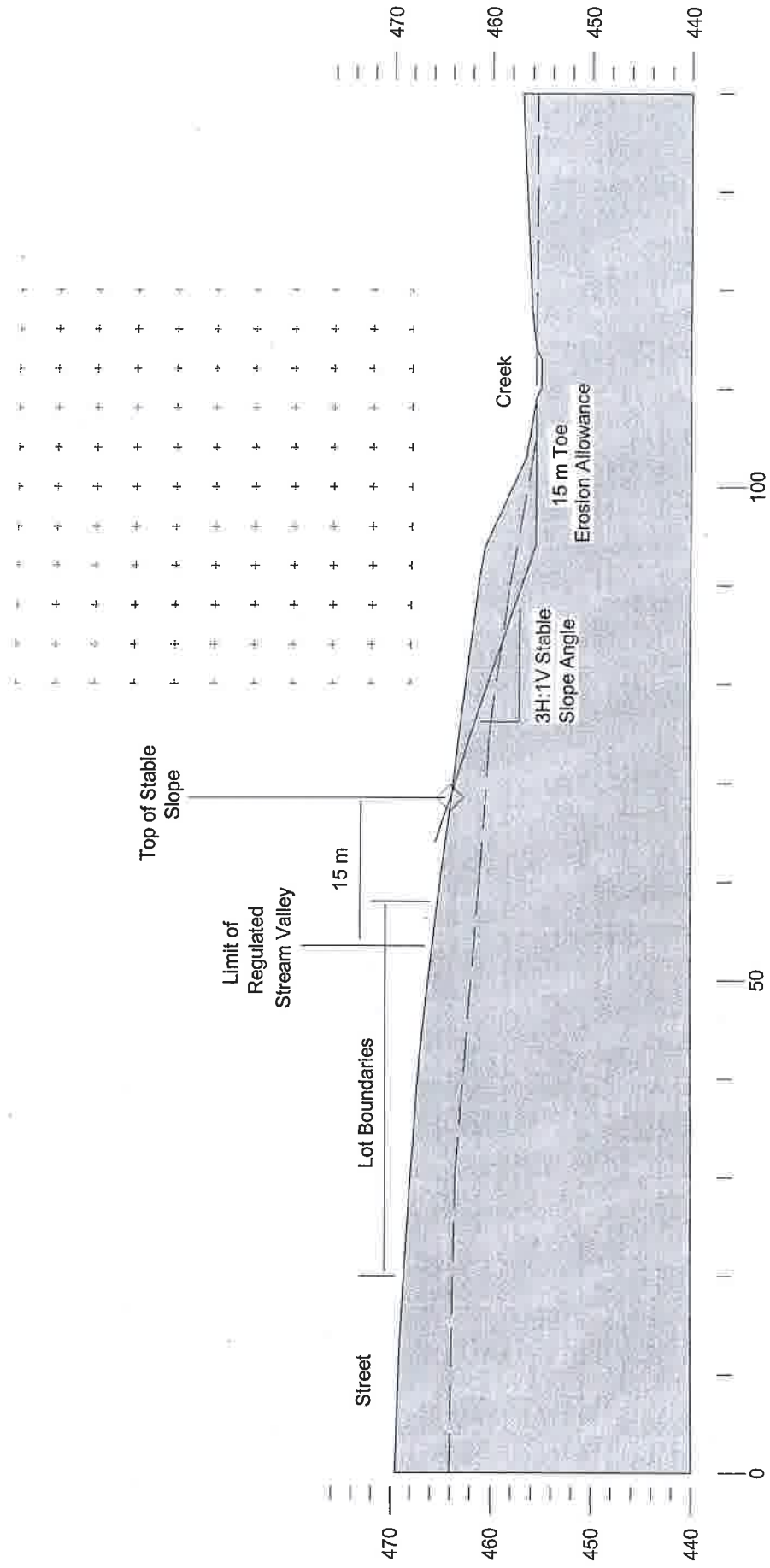
APPENDIX 'B'
SLOPE ASSESSMENT ENCLOSURES

V.A. Wood Associates - Scarborough, ON
 G3525-4-11
 N 1/2 Lot 31, Con 1, Township of East Luther
 December 2014
 Slope Assessment
 Section A-A'



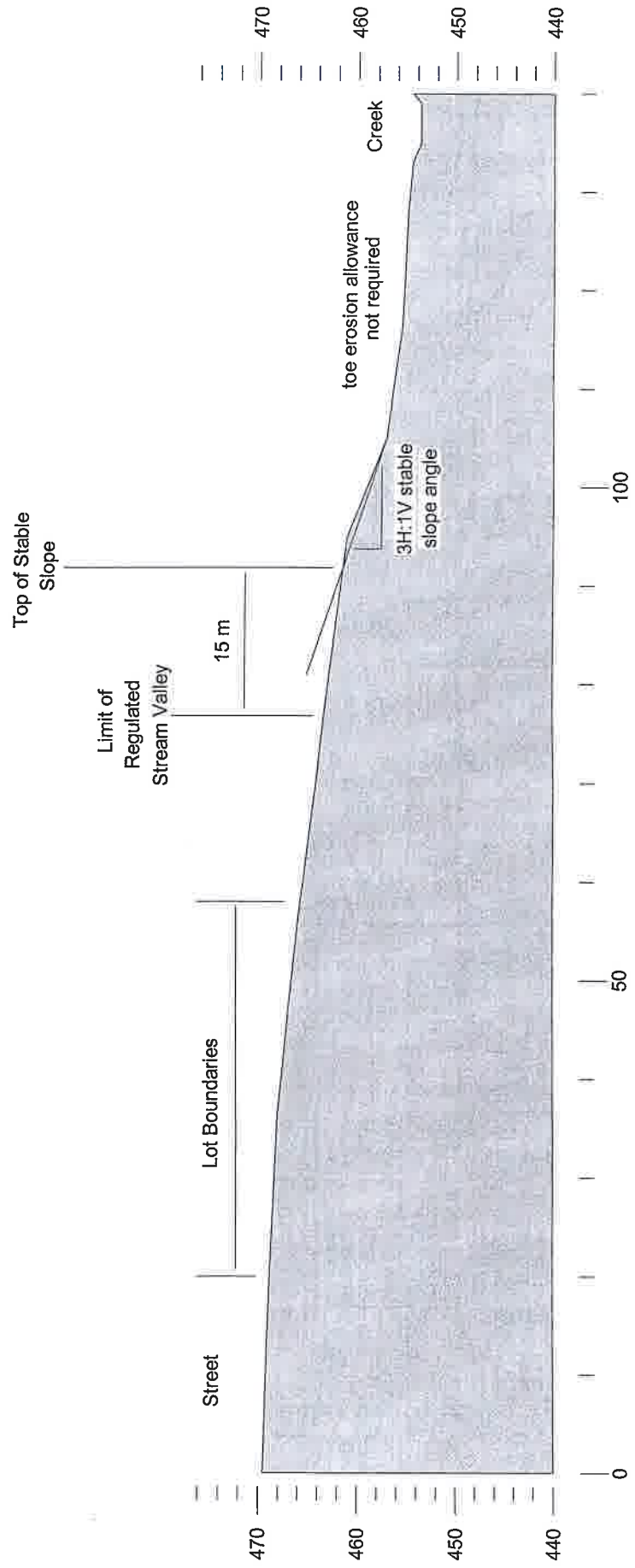
Enclosure 2, Section A-A'

V.A. Wood Associates - Scarborough, ON
 G3525-4-11
 N 1/2 Lot 31, Con 1, Township of East Luther
 December 2014
 Slope Assessment
 Section B-B'



Enclosure 3, Section B-B'

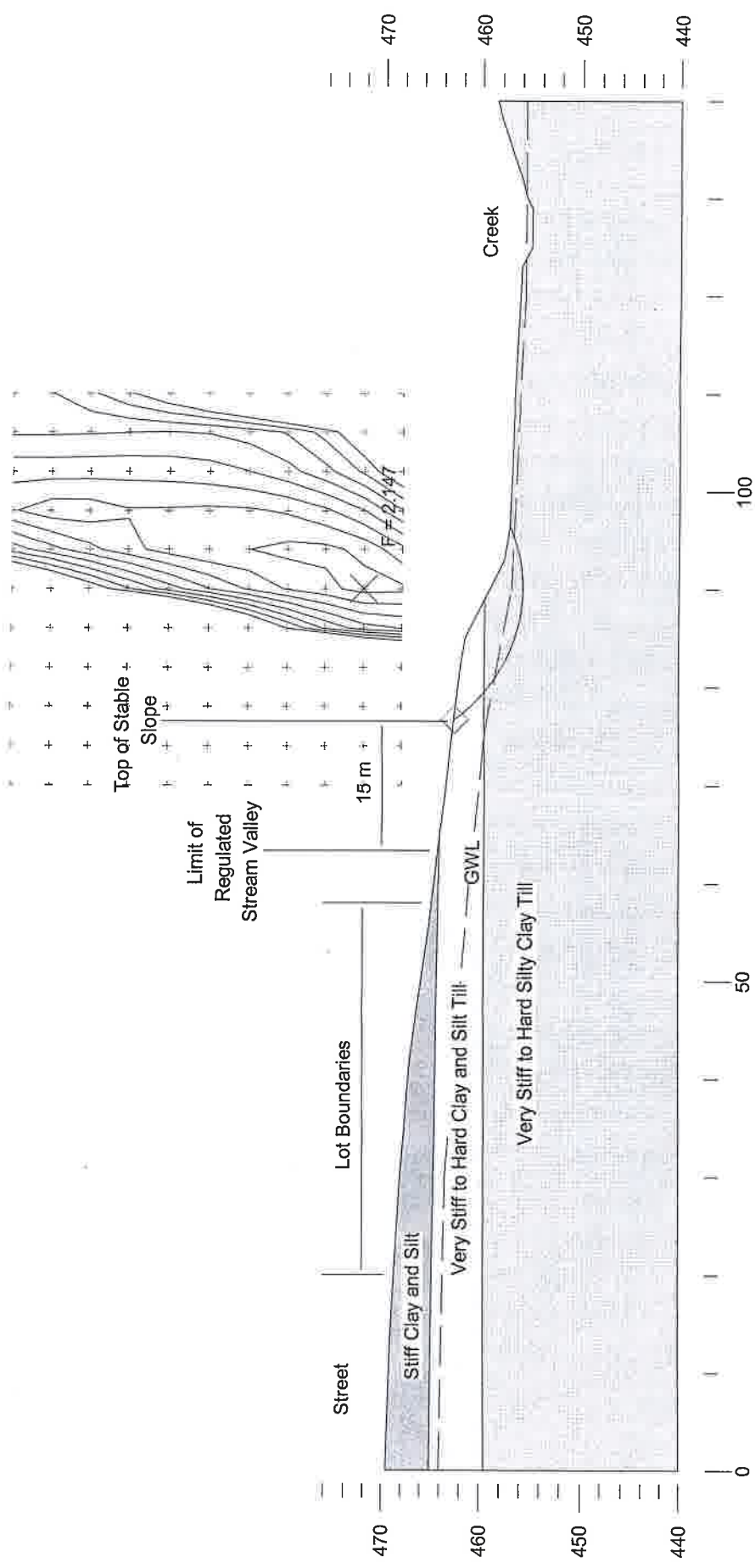
V.A. Wood Associates - Scarborough, ON
G3525-4-11
N 1/2 Lot 31, Con 1, Township of East Luther
December 2014
Slope Assessment
Section C-C'



Enclosure 4, Section C-C'

V.A. Wood Associates - Scarborough, ON
 G3525-4-11
 N 1/2 Lot 31, Con 1, Township of East Luther
 December 2014
 Slope Assessment
 Section A-A'

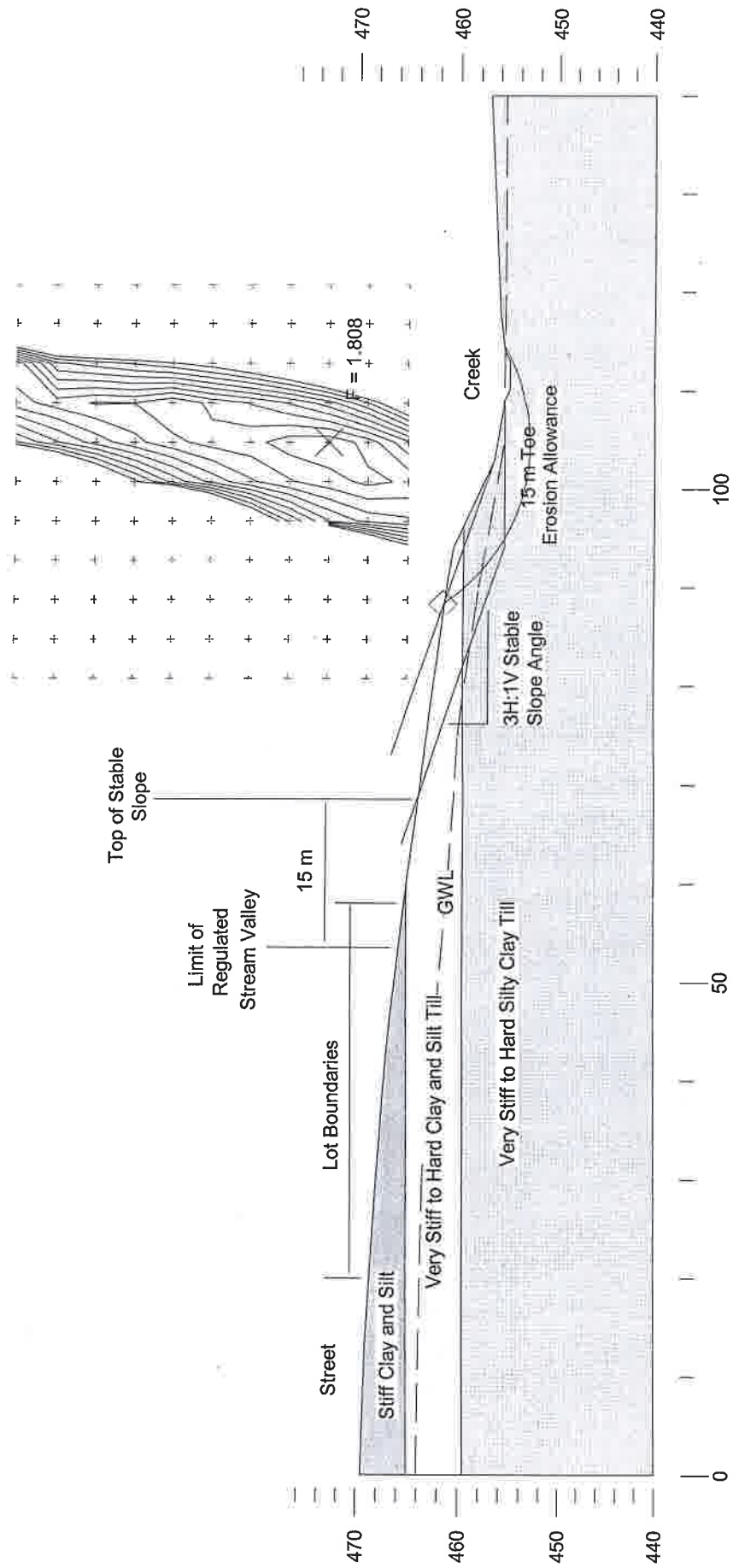
	Gamma C	Phi	Piezo
	kN/m ³	deg	Surf.
Stiff Clay/Silt	19	28	1
VS-Hard C/S Till	20	30	1
VS-Hard SClay Ti	20	30	1



Enclosure 5, Section A-A'

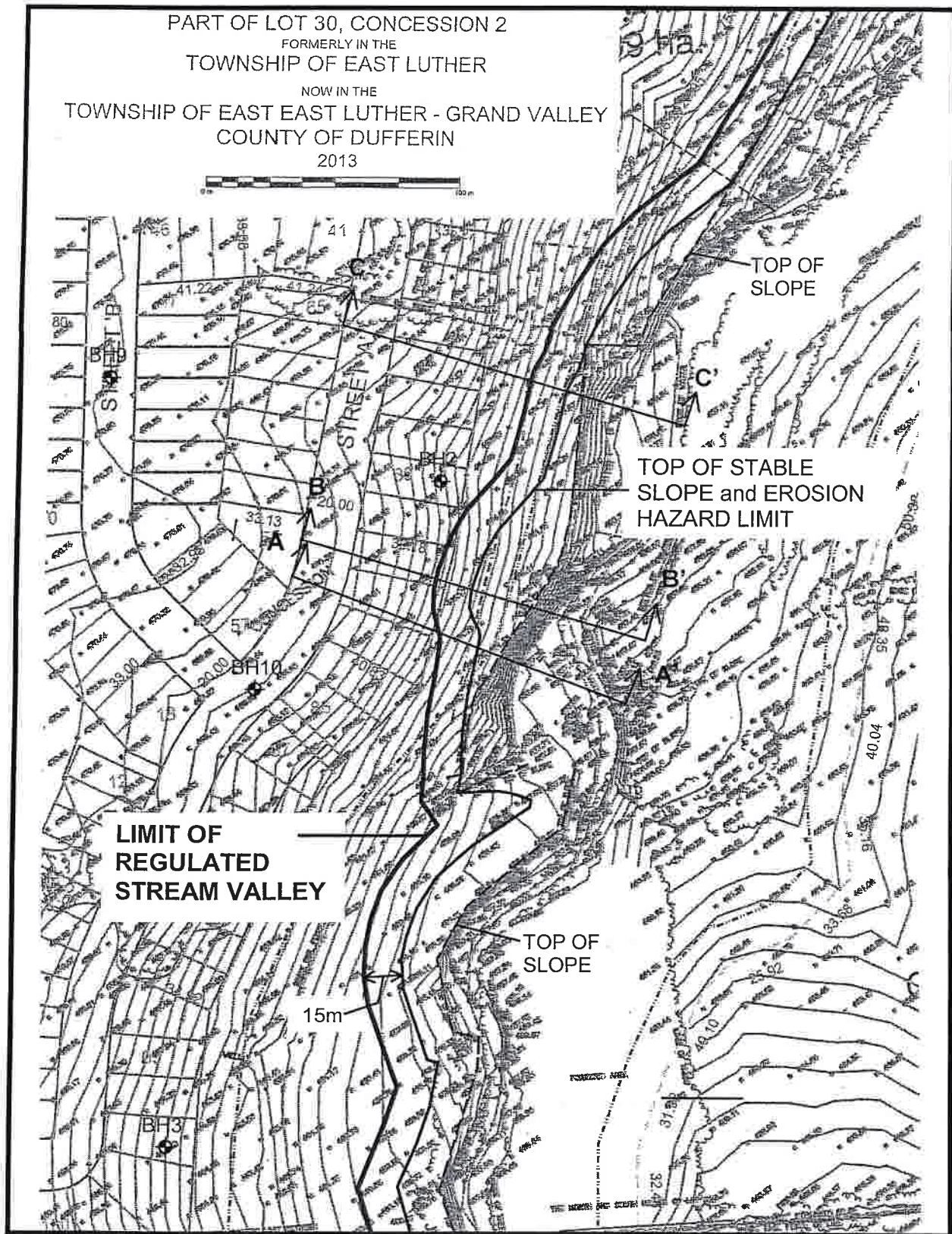
V.A. Wood Associates - Scarborough, ON
 G3525-4-11
 N 1/2 Lot 31, Con 1, Township of East Luther
 December 2014
 Slope Assessment
 Section B-B'

Stiff Clay/Silt	Gamma C kN/m ³	Phi deg	Piezo Surf.
VS-Hard C/S Till	19	28	1
VS-Hard SClay Ti	20	30	1
	20	30	1



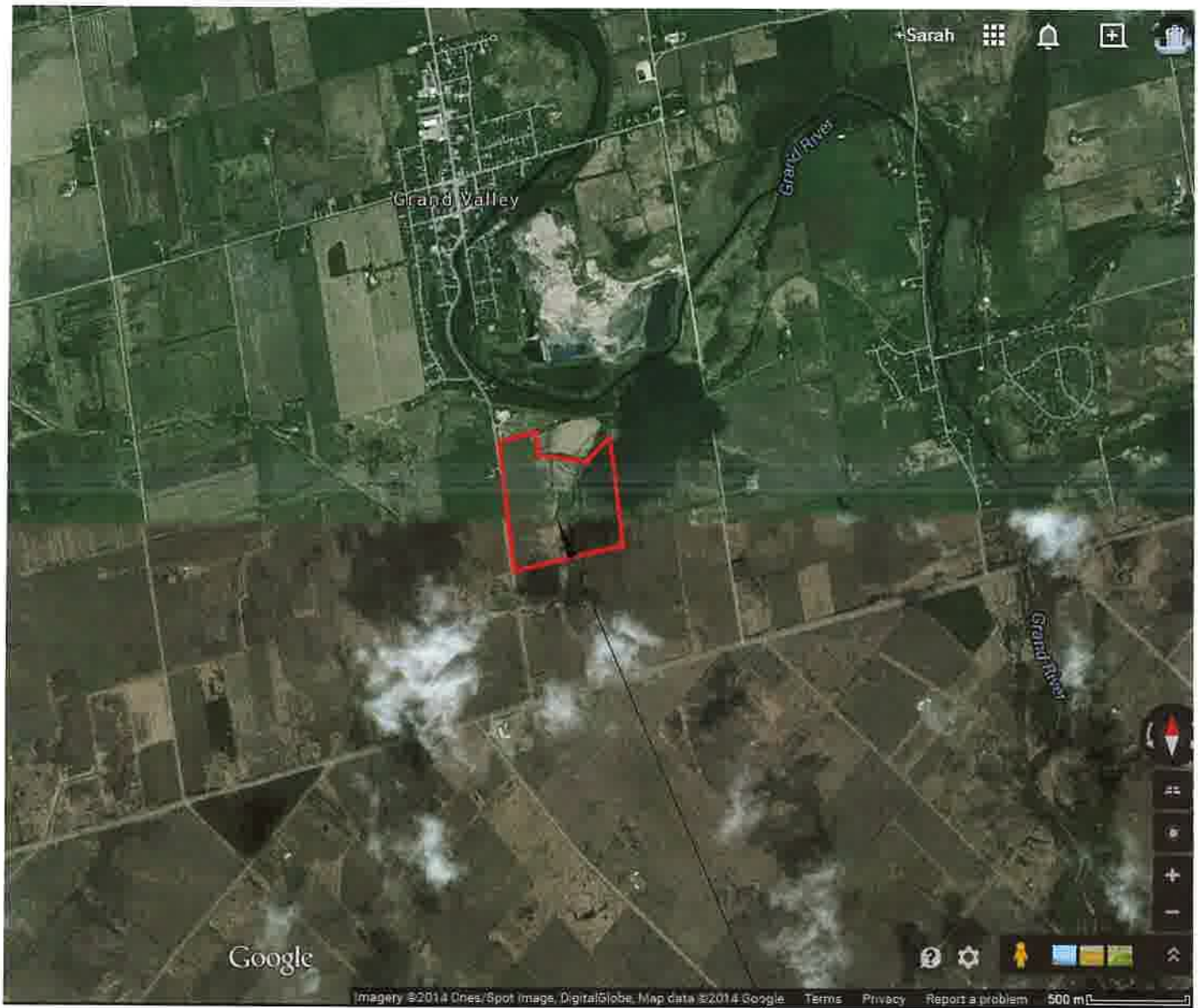
Enclosure 6, Section B-B'

PART OF LOT 30, CONCESSION 2
FORMERLY IN THE
TOWNSHIP OF EAST LUTHER
NOW IN THE
TOWNSHIP OF EAST EAST LUTHER - GRAND VALLEY
COUNTY OF DUFFERIN
2013



REGULATED STREAM VALLEY

ENCLOSURES



Site



V.A. WOOD (GUELPH) INC.
 Consulting Geotechnical Engineers

405 York Road, Guelph, Ontario N1E 3F3
 Ph. (519) 763-3101 Fax. (519) 763-5912

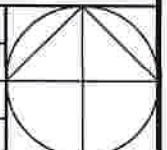
Site Location Plan
 North Half of Lot 31
 Concession 1
 Grand Valley, Ontario

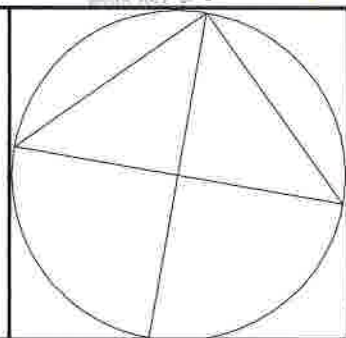
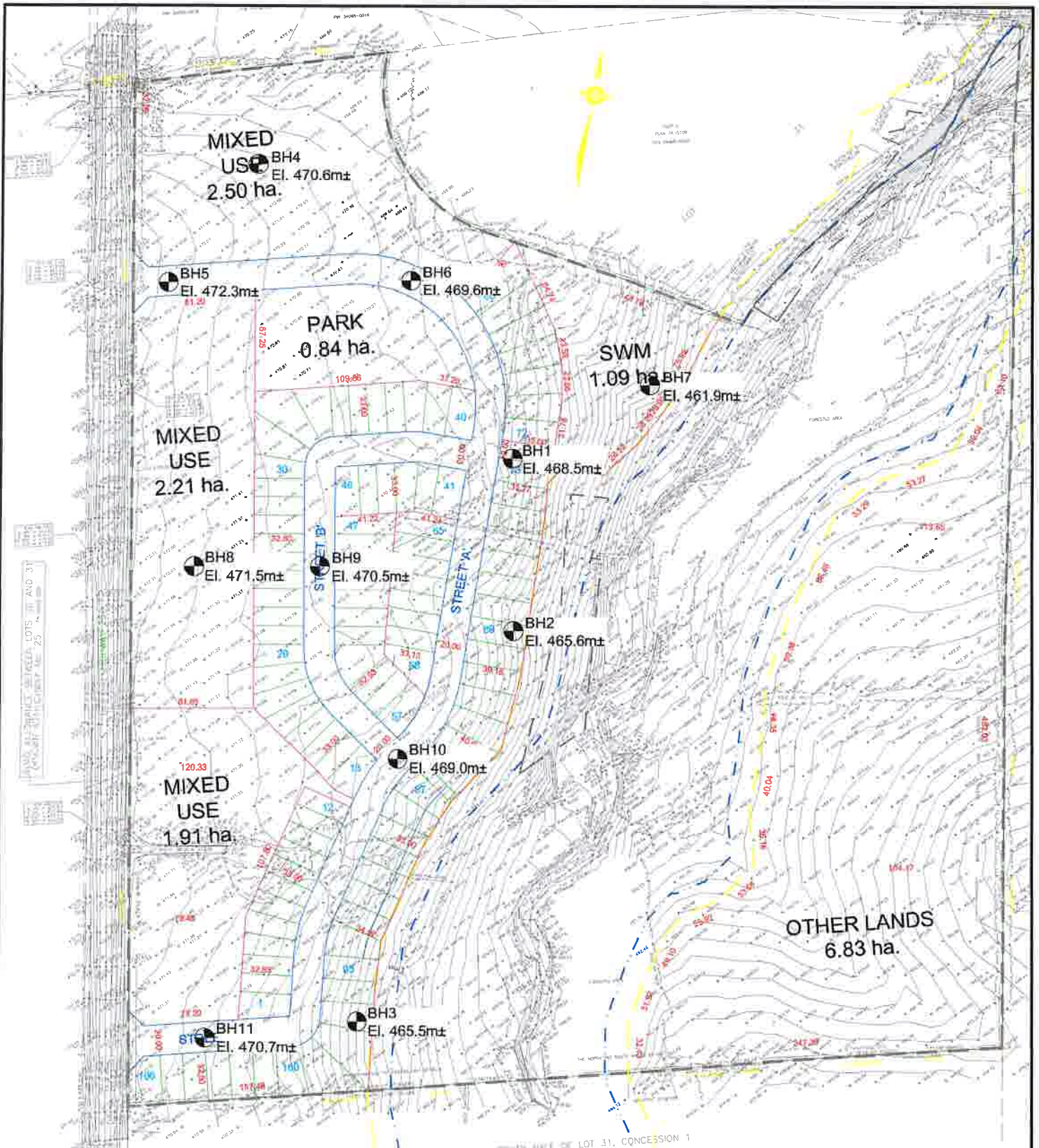
Ref. No. G3525-4-11

Enclosure 1

Scale: As Noted

Date: October 16, 2015





W V.A. WOOD (GUELPH) INC.
 Consulting Geotechnical Engineers
 Ph. (519) 763-3101 Fax. (519) 763-5912
 405 York Road, Guelph, Ontario N1E 3H3

Borehole Location Plan
 North Half of Lot 31
 Concession 1
 Grand Valley, Ontario

Scale: NTS	Ref. No. G3525-4-11
Date: November 20, 2014	Enclosure 2

REFERENCE No: G3525-4-11

BOREHOLE No: 1

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 3

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	468.5																		
	125mm Topsoil				1	SS	11													
	brown, stiff to hard CLAY AND SILT trace sand, trace gravel, moist				1	SS	27													
					2	SS	22													
2.3	brown, very stiff to hard CLAY AND SILT TILL trace sand, trace gravel, some wet sand and gravel seams moist to saturated	466.2			3	SS	35													
					4	SS	29													
					5	SS	34													
					6	SS	50													
					7	SS	50													
7.7	grey, hard SILTY CLAY TILL some sand, trace gravel, some wet sand and gravel seams moist to saturated	460.8			8	SS	40													
					9	SS	50													
					10	SS	50													
12.6		455.9			11	SS	50													
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: November 10 & 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 2

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS




PROJECT: Proposed Subdivision

ENCLOSURE No: 4

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25		
								0.0	Ground Surface	465.6								
1.5	200mm Topsoil	464.1			1	SS	3											
	brown, stiff CLAY AND SILT trace sand, trace gravel, moist				1	SS	12											
6.1	brown, very stiff to hard CLAY AND SILT TILL trace sand, trace gravel, moist	459.5			2	SS	11											
					3	SS	27											
					4	SS	42											
					5	SS	35											
					6	SS	35											
12.6	brown, very stiff to hard SILTY CLAY TILL some sand, trace gravel, moist	453.0			7	SS	22											
					8	SS	19											
					9	SS	28											
					10	SS	50											
	End of Borehole																	

Cave-in @ El. 457.1m (10-Nov-14)

* 75mm

DRILLED BY: London Soil Test Limited	HOLE DIAMETER: 210mm
DRILL METHOD: Hollow Stem Augers	DATUM: Geodetic
DRILL DATE: November 10, 2014	SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 3

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS





PROJECT: Proposed Subdivision

ENCLOSURE No: 5

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: B.R.F.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	465.5																		
	200mm Topsoil				1	SS	2													
	brown, soft to very stiff CLAY AND SILT trace sand, trace gravel, moist			W.L. @ El. 462.5m (10-Nov-14)	1	SS	2													
		2			SS	7														
		3			SS	20														
		4			SS	19														
		5			SS	22														
4.6		460.9			6	SS	24													
	brown, compact to very dense SAND AND GRAVEL saturated moist				7	SS	50													
7.6		457.9																		
	brown, very dense SILTY SAND AND GRAVEL TILL saturated				8	SS	54													
9.1		456.4																		
9.6	brown, very dense SILTY SAND saturated	455.9			9	SS	50													
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: November 10, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 4

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 6

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT				
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N BLOWS/0.3m	20	40	60	80	5	10	15	20	25					
0.0	Ground Surface	470.6																			
0.2	200mm Topsoil	470.4			1	SS	8	*													
3.0	brown, stiff to hard CLAY AND SILT trace sand, trace gravel, wet to moist			W.L. @ El. 470.0m (11-Nov-14)	1	SS	14	*													
					2	SS	8	*													
					3	SS	22	*													
					4	SS	48	*													
4.6	brown, hard CLAY AND SILT TILL trace sand, trace gravel, moist				5	SS	50	*													
5.0	grey, hard SILTY CLAY TILL some sand, trace gravel, moist	465.6			6	SS	50	*													
	End of Borehole																				

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 5

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 7

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	472.3																		
0.2	175mm Topsoil	472.1			1	SS	3													
	brown, stiff to very stiff CLAY AND SILT trace sand, trace gravel, moist			W.L. @ El. 471.4m (11-Nov-14)	1	SS	9													
					2	SS	11													
					3	SS	28													
2.3	brown, hard CLAY AND SILT TILL trace sand, trace gravel, moist	470.0			4	SS	50													
						5	SS	50												
4.6						467.7														
5.0	grey, hard SILTY CLAY TILL some sand, trace gravel, moist	467.3			6	SS	50													
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 6

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 8

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	IN BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	469.6																		
0.2	200mm Topsoil	469.4	{ } { }		1	SS	3													
	brown, medium to hard CLAY AND SILT trace sand, trace gravel, wet sand seams, moist		[diagonal hatching]	DRY (11-Nov-14)																
						1	SS	6												
								2	SS	5										
								3	SS	31										
3.3		466.3																		
	brown, hard CLAY AND SILT TILL trace sand, trace gravel, wet sand and gravel seam, moist		[diagonal hatching]																	
						4	SS	50												
4.6		465.0			5	SS	50													
	grey, hard SILTY CLAY TILL some sand, trace gravel wet sand seam, moist		[diagonal hatching]																	
5.0					464.6		6	SS	50											
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 7

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 9

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m													
								20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	461.9																		
0.2	200mm Topsoil	461.7			1	SS	2													
	brown, stiff to very stiff CLAY AND SILT trace sand, trace gravel, occasional wet sand seams, moist to wet			DRY (11-Nov-14)	1	SS	9													
					2	SS	11													
						3	SS	21												
						4	SS	23												
						5	SS	22												
4.6		457.3																		
5.0	grey, very stiff SILTY CLAY some sand, trace gravel, moist	456.9			6	SS	24													
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 8

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 10

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N BLOWS/0.3m	20	40	60	80	5	10	15	20	25	
0.0	Ground Surface	471.5															
0.3	250mm Topsoil	471.3			1	SS	3										
0.8	brown, medium CLAY AND SILT trace sand, trace gravel, moist	470.7			1	SS	5										
1.5	brown, compact SAND wet	470.0			2	SS	20										
1.8	brown, dense SAND AND GRAVEL wet	469.7			3	SS	35										
	brown, hard CLAY AND SILT TILL trace sand, trace gravel, occasional sand seams, moist				4	SS	36										
					5	SS	50				75mm						
4.6		466.9															
5.0	grey, hard SILTY CLAY TILL some sand, trace gravel, moist	466.5			6	SS	50				100mm						
	End of Borehole																

W.L. @ El. 470.9m (11-Nov-14)

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 9

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 11

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	470.5																		
0.2	250mm Topsoil	470.3			1	SS	3													
	brown, medium to hard CLAY AND SILT trace sand, trace gravel, moist			DRY (11-Nov-14)																
		1			SS	7														
		2			SS	18														
		3			SS	50							100mm							
		4			SS	30														
4.6		465.9																		
5.0	grey, hard SILTY CLAY TILL some sand, trace gravel, moist	465.5			6	SS	57													
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 10

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

CLIENT: Moco Farms Limited

PROJECT: Proposed Subdivision

ENCLOSURE No: 12

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT			
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N ^o BLOWS/0.3m	20	40	60	80	5	10	15	20	25				
0.0	Ground Surface	469.0																		
0.2	150mm Topsoil	468.9																		
	brown, medium to hard CLAY AND SILT trace sand, trace gravel, moist			W.L. @ El. 465.0m (11-Nov-14)	1	SS	5													
		1			SS	5														
		2			SS	14														
		3			SS	22														
		4			SS	50														
3.2		465.8																		
	grey, hard SILTY CLAY some sand, trace gravel, moist				5	SS	37													
		6			SS	38														
5.0		464.0																		
	End of Borehole																			

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 11, 2014

SHEET: 1 of 1

REFERENCE No: G3525-4-11

BOREHOLE No: 11

CLIENT: Moco Farms Limited

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Proposed Subdivision

ENCLOSURE No: 13

LOCATION: Grand Valley, ON

SUPERVISOR: J.D.

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25	
0.0	Ground Surface	470.7															
	100mm Topsoil																
	brown, medium to hard CLAY AND SILT trace sand, trace gravel, moist				1	SS	4										
					1	SS	9										
					2	SS	12										
					3	SS	20										
					4	SS	31										
					5	SS	41										
4.6		466.1															
	grey, hard SILTY CLAY				6	SS	37										
5.0	some sand, trace gravel, moist	465.7															
	End of Borehole																

DRILLED BY: London Soil Test Limited

HOLE DIAMETER: 210mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: November 12, 2014

SHEET: 1 of 1

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G3525-4-11

UNIFIED SOIL CLASSIFICATION SYSTEM

SILT & CLAY

FINE

SAND

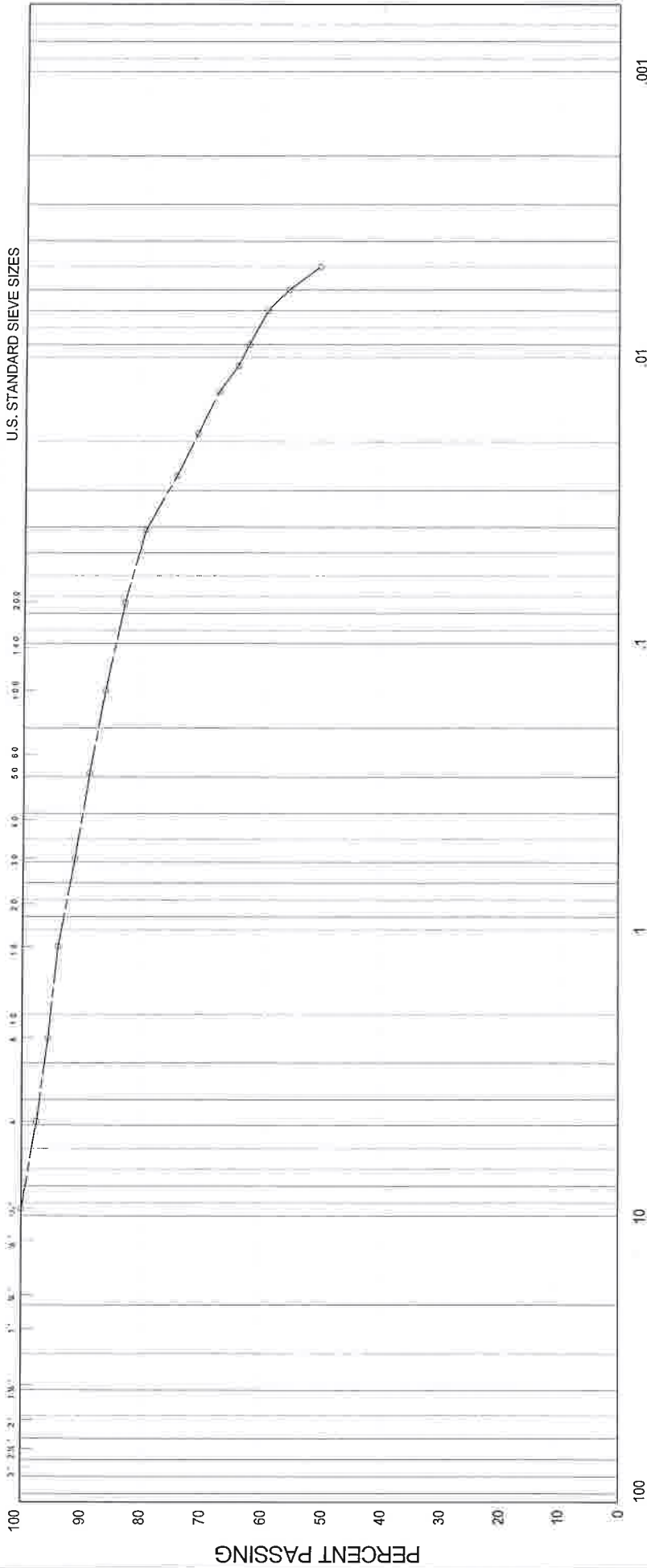
MEDIUM

COARSE

FINE

GRAVEL

COARSE



Grain Size in Millimeters

PROJECT: Proposed Residential Development
 LOCATION: North Half of Lot 31, Conc. 1, Grand Valley ON COEFFICIENT OF CURVATURE:

BOREHOLE N°: 10

SAMPLE N°: 6

DEPTH: 4.6 - 5.0m±

ELEVATION: 464.4 - 464.0m±

PLASTIC PROPERTIES

LIQUID LIMIT % = 30.3

PLASTIC LIMIT % = 16.9

PLASTICITY INDEX % = 13.4

MOISTURE CONTENT % = 5.7

Classification of Sample and Group Symbol:

SILTY CLAY, some sand, trace gravel, (CL)

ENCLOSURE N° 15

