



November 6, 2023
File: 23016

4933 Vic Court Globizen LP
2720 Dundas Street West, Suite 608
Toronto, Ontario
M6P 0C3

Attention: Mr. Rick Sole, Globizen Group

Dear Mr. Sole,

**Re: Slope Stability Assessment Letter Report
Proposed Residential Development, 4933 Victoria Avenue North, Vineland, Ontario**

This letter is provided by Landtek Limited (herein "*Landtek*") in response to comments received from the Niagara Peninsula Conservation Authority (herein "*NPCA*") pertaining to the proposed residential development of the site identified as civic address 4933 Victoria Avenue North in Vineland, Ontario.

According to the NPCA, the property is located in part within a regulated slope area, and it is understood that the NPCA has requested a geotechnical review be undertaken to establish the location of the Long-Term Stable Top of Slope (herein "*LTSTS*") and appropriate construction setback distances relative to the proposed development.

Background

Based on the Concept Plan drawing "*Site Plan – Ground Floor*", reference A103, it is understood that the proposed development along the eastern property boundary is to comprise of the following:

- A stepped, five-storey to 17-storey residential tower with three partial, above-ground parking levels and a three- and four- storey podium;
- A stepped, four-storey to 14-storey residential tower with a four-storey podium courtyard; and,
- A new deck, dock and access ramp in the north.

It is understood that one level of basement parking is also proposed and will cover the development footprint in full. No significant grade changes are anticipated, with foundations anticipated at depths of between approximately 4.0 m and 5.0 m below existing ground level.

For the purposes of this letter, the evaluation study area is focused to the table land area within the existing property boundary and extending eastwards from civic address 4933 Victoria Avenue North in Vineland.

The slope assessment is required by the NPCA to, from a geotechnical perspective:

- Assess the condition and stability of the slope adjacent to the property when considering the slope in its current condition;
- Establish the LTSTS relative to the existing slope and the proposed development; and,
- Determine whether the proposed development and associated basement level will have a detrimental impact on the existing slope.

This letter-format report was prepared in general accordance with the guidelines of the Ministry of Natural Resources (herein “MNR”) document “*Natural Hazards Technical Guides*”, and the supporting “*Geotechnical Principles for Stable Slopes*” document.

Site Characterization

Site Location and Description

The site is located in Vineland Station, Ontario, and is centered at approximate grid reference 630435, 4783500 (UTM 17T coordinates). The Geodetic elevation of the ground surface within the property boundary ranges between approximately 73.0 m and 80.0 m. The topography of the site is generally flat-lying, with a shallow slope towards the creek to the east.

The site is bound to the north by Lake Ontario, the west by Victoria Avenue North and the Millenium Forest Park, the east by a wooded area and a river valley system of Prudhomme Creek, and to the south by residential properties.



Figure 1: Site location and setting.

The site location is presented in Figure 1.

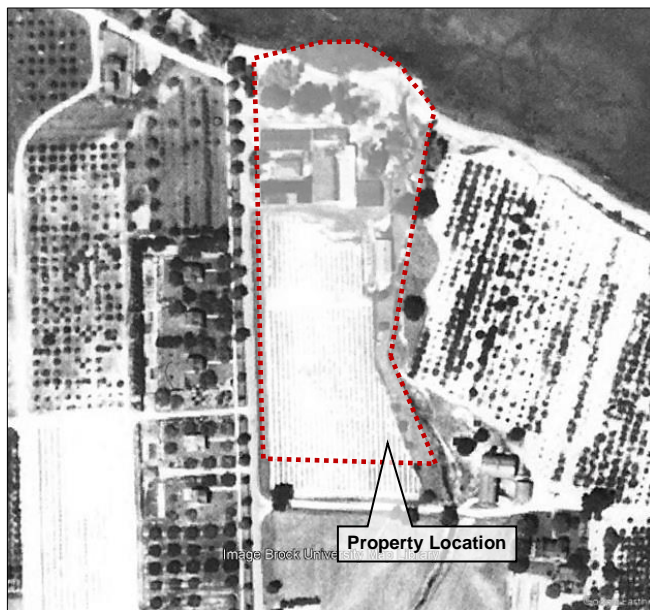


Figure 2: 1934 aerial photograph extract.

an approximately 1.0 m change in elevation across the tableland area. The top of the Martindale Pond slope, as identified by the NPCA, is inferred to pass through the existing residential structure to the north of the rear garden area.

Aerial photographs available for the property indicate the area to have been developed for a significant time. The slope area and slope crest are noted to be densely vegetated with mature trees and shrubs.

Prior to development in its current layout, the property appears to have been of agricultural use, with aerial photography from 1934 (see Figure 2) showing the site to be within an area of maintained farmland.

Prudhomme Creek is also noted to be in its current alignment and that vegetation across the eastern area of the property boundary and creek slope comprises dense vegetation and a notable tree canopy.

The majority of the property is generally flat-lying, being for the most part within the tableland area of Prudhomme Creek, with a minimal gradient ($\pm 2^\circ$ to 5°) that results in

Published Geology

According to the Ontario Geological Survey (herein “OGS”) Map P.0764 “*Quaternary Geology of the Niagara Area*”, the site is underlain by interbedded deposits of Lake Iroquois stratified sands and silt and clay till of the Halton Till Formation. The Ontario Department of Mines (herein “ODM”) Map 2344 “*Paleozoic Geology of the Niagara Area*” indicates that the superficial geology is underlain at shallow depth (i.e., approximately 3.0 m) by an interbedded sequence of red shales, siltstones and sandstones of the Queenston Formation.

Landtek completed Geotechnical, Environmental and Hydrogeological Investigations at the site in 2022 and 2023 that included the drilling of a number of boreholes across the site area, and the installation of groundwater monitoring wells. Of these investigations, boreholes BHMW1D-23, BH7-23, BHMW8S-23 and BHMW9D were located along the eastern property boundary and have provided confirmation of the published geology recorded from historical boreholes records.

Hydrology and Hydrogeology

The nearest surface water feature is Prudhomme Creek that bounds the property to the east, as seen on Figure 3. Water flow rates are reported by the NPCA to be low to moderate. Prudhomme Creek outfalls into Lake Ontario that bounds the property to the north.

Except for the construction of coastline defense systems, the alignment of the Prudhomme Creek outfall and Lake Ontario shoreline shows no significant deviation since at least 1934, as shown in the aerial photograph extract presented as Figure 2.

Aerial photography data shows there to be no evidence of erosion by surface water action within the tableland and slope area, indicating that water migration during heavy rainfall events within the site area is directed to topographically flatter or lower areas or through natural percolation.

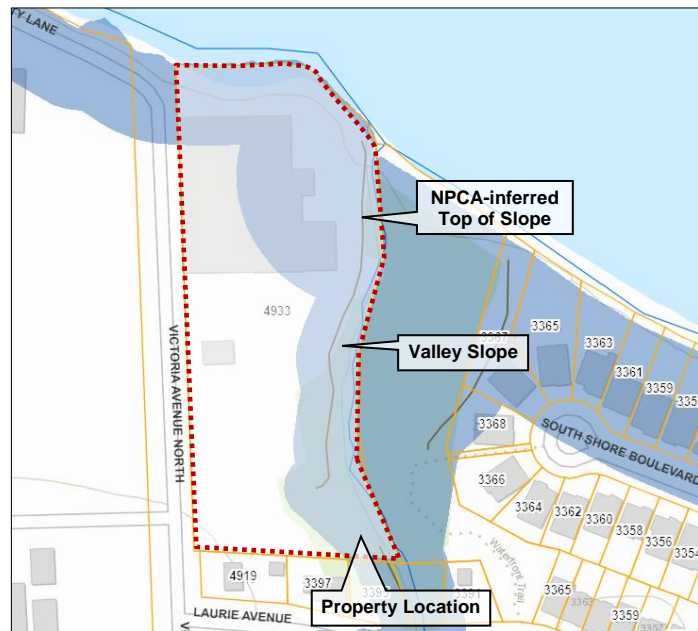


Figure 3: NPCA Watershed Explorer extract.

According to the OGS, static groundwater levels in the vicinity of the site are generally associated with the Queenston Formation bedrock and are inferred to be in hydraulic continuity with Lake Ontario. It is also anticipated that Prudhomme Creek is also in hydraulic continuity with Lake Ontario by proximity.

No groundwater seepages were observed in the slope face, suggesting that any groundwater regime present beneath the property is likely to be within the bedrock and in hydraulic continuity with the water of Prudhomme Creek and Lake Ontario.

Monitoring wells installed in boreholes BHMW1D-23, BHMW8S-23 and BHMW9D, and subsequent phases of groundwater monitoring have identified groundwater presence within the bedrock underlying the site. Groundwater resting levels are reported to be at Geodetic elevations between approximately 74.8 m and 75.2 m. These levels are in direct correlation with Lake Ontario water levels, being in the order of Geodetic elevations 74.6 m to 75.3 m.

A copy of the borehole and groundwater monitoring well logs for boreholes BHMW1D-23, BH7-23, BHMW8S-23 and BHMW9D are attached as Enclosure 1.

Site Geomorphology

The tableland area is generally flat-lying to becoming a very shallow gradient ($\pm 2^\circ$ to 4°) in the south and west, and comprises primarily of gravel pavements, maintained and rough grassland and existing structures bordered in by mature trees to the east.

In the vicinity of the site, the Prudhomme Creek valley is classified by the Ontario Ministry of Natural Resources technical guide as a “*Confined Stream System*”. From slope crest to water level, the slope within the property boundary is approximately 3.0 m to 4.0 m (calculated) in height, between approximately 10.0 m and 27.0 m in profile width, and appears to be generally uniform in profile, with overall slope angles of approximately 10° to 20° (calculated).

No areas of exposed, bare soils are noted, with trees, shrubs and detritus covering the slope area. The trees create a dense canopy and comprise of semi-mature and mature trees. Aerial photography for the site area indicates that the slope alignments have remained unchanged since at least 1934, and that slope vegetation has remained consistent, with some densification in places.

Field Observations

A site visit/reconnaissance was conducted on August 16, 2023, by a representative of Landtek. The visual assessment of the slope was conducted in accordance with the MNR’s Technical Guide “*River and Stream Systems: Erosion Hazard Limit*”.

As identified by the historical review, the property is located within the tableland associated with the western slope of Prudhomme Creek. The tableland is generally flat lying with local grading of approximately 2° towards the north and northwest. The tableland consists of a gravel cover edged by maintained and rough grass, and is fringed by dense, mature and semi-mature trees along the eastern boundary.

The transition between the tableland and the slope is clearly defined by the relatively flat tableland area abutting the approximately 3.0 m to 4.0 m high slope area. The crest of the slope is marked by clear changes in vegetation and topography. The field-measured angles of the slopes in their entirety, range between 16° and 21° (approximately 3H:1V) with local reduction to between 10° and 12° where the slope faces locally shallow to become more of a raised bench profile.

The slope is heavily vegetated with mature and semi-mature trees and low-level shrubs. Limited grass cover was noted, being due to the density of the tree canopy. The trees yield trunks of up to approximately 0.8 m diameter and are straight and true. No significant arcing or bowing to the trunks of the trees was noted within the study area, indicating there to be no active or historical ground movement occurring or having occurred.

Some leaning to trees was observed in the south of the site, where tree trunks lean towards the west on both sides of the valley. This is indicative of a prevailing wind influence during tree growth rather than soil subsidence. This is particularly as the trees on the site-side of the valley are uniformly leaning away from the slope instead of towards, as would be expected from soil creep or translational slope failure/erosion.

The toe of the slope is inferred as the waters edge of Prudhomme Creek. No evidence of active slope or toe erosion was noted during the site visit, with the slope faces observed being generally consistent in profile and appearance.

Shallow, surficial soils were exposed using a hand trowel and were noted to comprise a generally moist, brown, silt and clay till soils with variable fractions of sand and gravel. Red shale exposures were noted in the lower sections of the slopes and also locally exposed in the riverbed. This is consistent with the geology reported for the area and the measured slope angles are considered to be below the natural internal angle of friction (ϕ) of the exposed soils and completely weathered shale under natural moisture conditions.

The visual assessment of the tableland and slope area also identified no evidence of water seepage, spring activity or surface water runoff that would influence the moisture content of the soils of the slope. The slope area and associated vegetation cover of the western valley floor and slope areas also appear to have remained unchanged for a significant time-period, as is consistent with the information provided by the aerial photograph of 1934.

The Slope Stability Rating Chart completed for the slope, as included as Enclosure 2 for reference, assigned the slope a Stability Rating of 23, indicating a "...stable slope with no toe erosion; no evidence of past instability..." and "...no structures within [the] slope height or crest...". Selected photographs (Photographs 1 to 3) of the tableland area, slope crest and slope face are presented as Enclosure 3.

An initial review of the investigated slope was made using measurements on site and topographical information provided to Landtek. General features at the site are shown on Drawing 23016-01 "*Site Features Plan and Section*", attached as Enclosure 4, together with two representative cross-sections of the steepest and shallowest slope areas and their relationship to the current property footprint.

Discussion and Recommendations

Based on the findings of the site reconnaissance, it is considered by Landtek that the Top of Slope identified by the NPCA on their Watershed Explorer, as shown in Figure 3, is in general conformance with the available contour information and observations made during the site reconnaissance, as presented on Drawing 23016-01 "*Site Features Plan and Section*", attached as Enclosure 4.

Given the findings of the historical review, the site reconnaissance, slope rating and the measured slope angles being between 16° and 21° (approximately 3H:1V), it is considered that the full modelling of the slope is not necessary. On this basis, the actual Top of Slope presented on Drawing 23016-01 "*Site Features Plan and Section*" is also considered by Landtek to be the LTSTS.

Development Impact Considerations and Construction Offsets

In assessing the slope to determine construction offsets there are three principal requirements to consider for confined systems:

1. the '*Toe Erosion*' allowance;
2. the '*Stable Slope*' allowance; and,
3. the '*Erosion Access*' allowance.

These three requirements are addressed as follows:

Toe Erosion Allowance: Field observations made during the site reconnaissance identified no evidence of toe erosion to the slope face to the east of the development footprint. Though water flow, albeit very limited, is noted at the slope toe, exposed bedrock can be observed in the riverbed and lower slope areas. Slope angles noted during the site reconnaissance are also very shallow, reducing scour potential during higher waterflow events.

On this basis, it is considered by Landtek that a toe erosion allowance of 0.0 m may be applied, as is acceptable for bedrock in an erosive environment. As such, consideration for active toe erosion is to be zero in the application of the construction offset.

Stable Slope Allowance: The slope is considered to be stable in its current condition. As such, the actual slope crest is considered representative of the LTSTS.

It is therefore considered that, with the slope stable in its current form, a stable slope allowance equal to the width of the current slope profile (i.e., equating to a setback distance of 0.0 m) is to be applied.

Erosion Access Allowance: As defined by the NPCA, the accepted minimum construction offset from the LTSTS for residential development is to be considered as 7.5 m. However, given the presence of shallow bedrock and the stable conditions identified by this assessment, a reduction of the access allowance from 7.5 m to 6.0 m per MNR guidance can be both justified and supported.

This reduction in the access allowance will require NPCA approval.

Using the previously detailed parameters, the following construction offset from the LTSTS is to be applied to the proposed additions at the site:

$$\begin{aligned} & \text{'Toe Erosion' allowance} + \text{'Stable Slope' allowance} + \text{'Erosion Access' allowance} \\ &= 0.0 \text{ m} + 0.0 \text{ m} + 7.5 \text{ m} \\ &= 7.5 \text{ m (or 6.0 m, if approved) from the actual Top of Slope (i.e., the LTSTS).} \end{aligned}$$

Based on the information provided to Landtek, the proposed development is to be situated approximately 6.0 m away from the actual Top of Slope (i.e., the LTSTS) at its closest and therefore approximately 1.5 m inside of the NPCA's construction offset requirements but in line with MNR construction offset requirements.

In considering the stable nature of the slope, it is considered by Landtek from a geotechnical perspective, that the proposed residential development and associated basement level at the property will not have any adverse affect on the existing slope condition such that the global stability of the slope is compromised.

As required by the NPCA, the actual Top of Slope and LTSTS have been defined on Drawing 23016-01 together with the required, calculated NPCA and MNR construction offsets.

Development and Construction Drainage Considerations

The erosional behaviour of fine sediments deposits in slope profiles is known to be influenced significantly by water flow, particularly from surface runoff, and not necessarily just by creek erosion at the toe of the slope.

A number of papers have been written that have evaluated the environments of such slopes, particularly during periods of heavy rainfall. "A hydrochemical study of urban landslides caused by heavy rain: Scarborough Bluffs, Ontario, Canada" (Eyles & Howard, 1988) particularly identifies the influence of surface water runoff resulting from snow melt and heavy rainfall in the summer of 1973 which "...caused a rapid increase in hydrostatic pressure within fissures..." that ultimately resulted in significant failures.

The most appropriate solution to reducing any potential for any future shallow-seated rotational or translational failures to the existing slope profile at the site is to control surface water flow from above the slope in order to prevent water from flowing over the slope face. It is therefore important to ensure that any surface water controls (roof drains etc.) associated with the proposed development are not directed towards the slope area. Such drainage is to be drawn away from the slope via a positive drainage system or directed to the front of the property.

It is also important to ensure that appropriate considerations and controls are applied at the construction stage of the development project. As with any construction adjacent to a slope face, controlling surface water and managing soil stockpiles will be essential to ensure that the slope is not subjected to increases in water volume or surface loads. On this basis, it is recommended that all excavation and construction activities, materials storage etc. remain outside of the regulation-required and/or agreed construction offset, as defined by this assessment.

Closure

We trust that this letter report is satisfactory for your purposes at this time, and please do not hesitate to call if you have any questions or would like to discuss the findings of this assessment in more detail.

Kind regards,

LANDTEK LIMITED



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James Dann, B.Eng. (Hons.) ACSM
Manager, Geotechnical Projects



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Ralph Di Cienzo, P.Eng.
Consulting Engineer

Encls:

- Enclosure 1: Landtek Limited Borehole Logs
- Enclosure 2: Slope Stability Rating Chart
- Enclosure 3: Site Photographs 1 to 3
- Enclosure 4: Drawing 23016-01: "Site Features Plan and Section"

ENCLOSURE 1

Landtek Limited Borehole Logs



LOG OF BOREHOLE BHMW1D-23

SHEET 1 of 2

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-05 Drilling Method: Hollow Stem/Coring Datum: Ground Surface	Northing: 43.19392 Easting: -79.394279 Ground Surface Elevation: 77.9
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments
	Stratigraphic Symbol	Depth/Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	79.0	<p>Fill Crushed concrete and asphalt, trace silt, trace gravel. Very dense, grey and black, dry to moist.</p> <p>Silt Till some gravel, trace iron staining, trace red shale fragments. Compact, brown, moist.</p> <p>...dense.</p> <p>Shale Completely weathered, very dense, red, dry. Recovered as residual soil.</p>	1	SS	36 32 24 14	56	▲ 40 80 120 160 ▲	x 20 40 60 80 x	PL MC LL	○ 10 20 30 40 ○	36" Locking Vault 3/8" Bentonite Pellets #10 Well Slot Sand 2" PVC Screen	Oct. 2023		
1	77.0		2	SS	4 5 8 12	13		14.0						
2	76.0		3	SS	9 15 21 38	36		13.6						
3	75.0		4	SS	18 25 30 40	55		8.3						
4	74.0		5	SS	19 20 18 19	38		10.1						
5	73.0		6	SS	50-4*	50								
7	71.0	TCR = 100% RQD = 23% Weak, very poor.	7	CORE										
8	70.0	TCR = 100% RQD = 33% Weak, poor.	8	CORE										



Additional Notes:

1. Borehole open to approximately 10.6 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

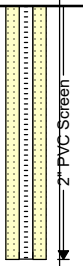
LANDTEK LIMITED
 205 Nebo Road, Unit 4B
 Hamilton, Ontario, L8W 2E1
 Ph: (905) 383-3733

LOG OF BOREHOLE BHMW1D-23

SHEET 2 of 2

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-05 Drilling Method: Hollow Stem/Coring Datum: Ground Surface	Northing: 43.19392 Easting: -79.394279 Ground Surface Elevation: 77.9
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Depth Scale (m)	Subsurface Conditions			Samples				Penetration / Strength Results				Moisture / Plasticity			Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments
	Stratigraphic Symbol	Depth/Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)				Moisture / Plasticity						
								▲	40	80	120	160	▲	PL				
							Penetration Test Values (Blows / 0.3m)				Moisture / Plasticity							
							×	20	40	60	80	×	○	10	20	30	40	○
9		69.0																
10		68.0	TCR = 99% RQD = 29% Weak, poor.	9	CORE													
11		67.0	End of Log															
12		66.0																
13		65.0																
14		64.0																
15		63.0																
16		62.0																
17		61.0																
18		60.0																



Additional Notes:

1. Borehole open to approximately 10.6 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH7-23

SHEET 1 of 1

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-06 Drilling Method: Hollow Stem Datum: Ground Surface	Northing: 43.19273 Easting: -79.394474 Ground Surface Elevation: 78.8
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments
	Stratigraphic Symbol	Depth/Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Moisture / Plasticity					
1		78.0	Fill Sandy silt, trace clay, trace gravel, trace red shale fragments. Loose, brown, moist.	1	SS	3 3 3 3	6	x	24.6					
1		78.0	...Peat, organic material, trace gravel. Very moist brown and black.	2	SS	3 2 4 4 3	6	x	>50.0					
2		77.0	Clayey Silt trace peat, trace iron staining. Firm, brown and black, very moist.	3	SS	4 3 4 4 3	7	x	22.4					
2		77.0	...wet.	4	SS	17 50-5*	50	x	9.1					
3		76.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	5	SS	18 22 50-5*	50	x	6.0					
4		75.0	End of Log											
5		74.0												
6		73.0												
7		72.0												
8		71.0												
9		70.0												
10		69.0												



Additional Notes:

1. Borehole open to approximately 3.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

LANDTEK LIMITED
 205 Nebo Road, Unit 4B
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LOG OF BOREHOLE BHMW8S-23

SHEET 1 of 1

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-04 Drilling Method: Solid Stem Datum: Ground Surface	Northing: 43.193186 Easting: -79.394465 Ground Surface Elevation: 78
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Depth Scale (m)	Stratigraphic Symbol	Depth/Elevation (m)	Subsurface Conditions Description	Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments	
				Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	Moisture / Plasticity ○ 10 20 30 40 ○	Moisture / Plasticity PL MC LL					
0		78.0	Fill Sand and gravel. Compact, brown and red, dry. Clayey Silt Stiff, red and brown, dry to moist.	1	SS	10 7 7 5	14	x	8.3	11.6	17.9	36" Locking Vault 3/8" Bentonite Pellets #10 Well Slot Sand 2" PVC Screen Oct. 2023				
1		77.0	...some gravel. Firm to stiff.	2	SS	7 5 3 2	8	x								
2		76.0	...trace sand. Firm.	3	SS	3 2 4 5	6	x								
3		75.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	4	SS	7 17 24 30	41	x								
5		75.0		5	SS	50-6"	50	x	10.8	8.2						
6		74.0	End of Log	6	SS	50-4"	50	x	5.5							



Additional Notes:

1. Borehole open to approximately 4.5 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BHMW9D

SHEET 1 of 2

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-04 Drilling Method: Hollow Stem/Coring Datum: Ground Surface	Northing: 43.19361 Easting: -79.394363 Ground Surface Elevation: 78.5
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments			
	Stratigraphic Symbol	Depth/Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity							
0		79.0	Fill Silty sand to clayey silt, trace grey clay seams. Firm, brown and red, moist.	1	SS	3 2 5 9	7	▲	40	80	120	160	▲				
1		78.0		...sand silt, trace red shale fragments, trace gravel. Dense.	2	SS	10 14 18 28	32	×	20	40	60	80	×			
2		77.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	3	SS	36 43 50-3"	50	×									
3		76.0		4	SS	26 36 44 50-4"	50	×									
4		75.0		5	SS	50-4"	50	×									
5		74.0		6	SS	50-5"	50	×									
6		73.0		7	SS	50-6"	50	×									
7		72.0		8	SS	50-6"	50	×									
8		71.0		9	SS	50-3"	50	×									
8		70.0	TCR = 95% RQD = 65% Weak, fair.	10	CORE												

3/8" Bentonite Pellets

36" Locking Vault

Oct. 2023



Additional Notes:

1. Borehole open to approximately 12.1 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

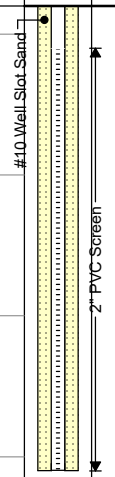
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LOG OF BOREHOLE BHMW9D

SHEET 2 of 2

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2023-07-04 Drilling Method: Hollow Stem/Coring Datum: Ground Surface	Northing: 43.19361 Easting: -79.394363 Ground Surface Elevation: 78.5
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Depth Scale (m)	Subsurface Conditions			Samples				Penetration / Strength Results				Moisture / Plasticity			Well Details	Groundwater Conditions	Headspace Vapor HEX/IBL (ppm) [LEL(%)]	Comments
	Stratigraphic Symbol	Depth/Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)				Moisture / Plasticity						
								▲	40	80	120	160	▲	PL				
							Penetration Test Values (Blows / 0.3m)				Moisture / Plasticity							
							×	20	40	60	80	×	○	10	20	30	40	○
9		69.0	TCR = 98% RQD = 13%															
10			Very weak, very poor.	11	CORE													
11		68.0																
12		67.0	TCR = 100% RQD = 77%															
13			Weak, good.	12	CORE													
14		66.0	End of Log															
15		65.0																
16		64.0																
17		63.0																
18		62.0																
19		61.0																
20		60.0																



Additional Notes:
 1. Borehole open to approximately 12.1 m depth on completion.
 2. Groundwater or water seepage not encountered during drilling.
 3.
 4.

LANDTEK LIMITED
 205 Nebo Road, Unit 4B
 Hamilton, Ontario, L8W 2E1
 Ph: (905) 383-3733

ENCLOSURE 2

Slope Stability Rating Chart



TABLE 4.2 - SLOPE STABILITY RATING CHART

Site Location: 4933 Victoria Avenue, Vineland File No. 23016
 Property Owner: 4933 Vic Court Globizen LP Inspection Date: August 16, 2023
 Inspected By: Mr. Joey Di Cienzo Weather: Clear skies, warm

1. SLOPE INCLINATION

degrees	horiz. : vert.	
a) 18 or less	3 : 1 or flatter	0
b) 18 - 26	2 : 1 to more than 3 : 1	6
c) more than 26	steeper than 2 : 1	16

2. SOIL STRATIGRAPHY

a) Shale, Limestone, Granite (Bedrock)	0
b) Sand, Gravel	6
c) Glacial Till	9
d) Clay, Silt	12
e) Fill	16
f) Leda Clay	24

3. SEEPAGE FROM SLOPE FACE

a) None or Near bottom only	0
b) Near mid-slope only	6
c) Near crest only or, From several levels	12

4. SLOPE HEIGHT

a) 2 m or less	0
b) 2.1 to 5 m	2
c) 5.1 to 10 m	4
d) more than 10 m	8

5. VEGETATION COVER ON SLOPE FACE

a) Well vegetated; heavy shrubs or forested with mature trees	0
b) Light vegetation; Mostly grass, weeds, occasional trees, shrubs	4
c) No vegetation, bare	8

6. TABLE LAND DRAINAGE

a) Table land flat, no apparent drainage over slope	0
b) Minor drainage over slope, no active erosion	2
c) Drainage over slope, active erosion, gullies	4

7. PROXIMITY OF WATERCOURSE TO SLOPE TOE

a) 15 metres or more from slope toe	0
b) Less than 15 metres from slope toe	6

8. PREVIOUS LANDSLIDE ACTIVITY

a) No	0
b) Yes	6

9. SLOPE STABILITY RATING**TOTAL 23**

Rating of ≤ 24 Stable Slope with no toe erosion; no evidence of past instability; no structures within slope height or crest.

Rating of 25 – 35 Potential for instability; site should be investigated by visual inspection; no boreholes required; detailed engineering assessment of slope should include documented slope geometry & subsurface conditions based on background data review.

Rating > 35 Moderate Potential for instability; Detailed investigation required with boreholes, topographic survey & stability analysis



ENCLOSURE 3


Site Photographs 1 to 3



Photograph 1: General view of the northern table land and slope crest, looking north (February 2023).




Photograph 2: General view of the southern table land and slope crest, looking south (February 2023).

 LANDTEK LIMITED	
Project No.: 23016	Date: November 6, 2023
Slope Assessment	
4933 Victoria Avenue North, Vineland	
Reference:	Photographs 1 to 2



Photograph 3: General view of the slope face and creek valley floor, looking northeast (February 2023).

		LANDTEK LIMITED	
Project No.: 23016		Date: November 6, 2023	
Slope Assessment			
4933 Victoria Avenue North, Vineland			
Reference:		Photograph 3	

ENCLOSURE 4

Drawing 23016-01: Site Features Plan and Section





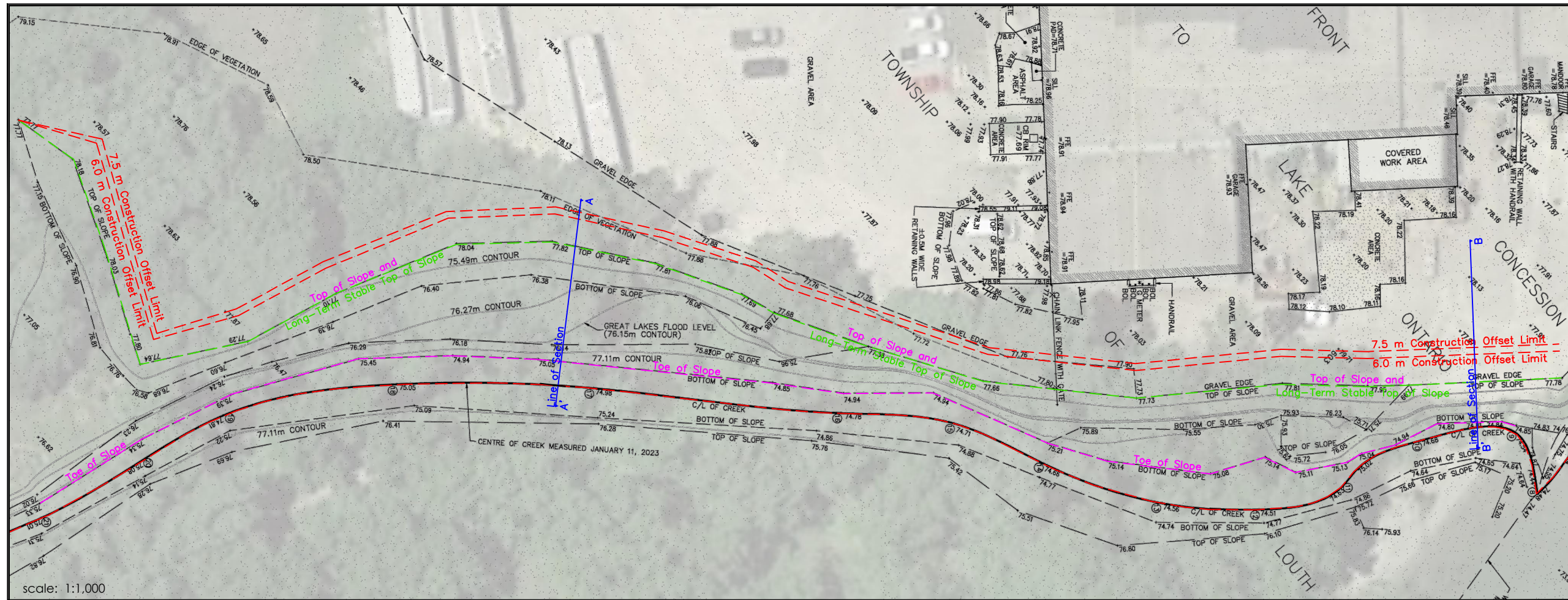
LANDTEK LIMITED

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p: +1 (905) 383-3733 o: +1 (905) 383-8433
engineering@landteklimited.com
www.landteklimited.com

project location



Location plan an extract from Google Earth™



revisions

#	date	comment
1	september 7, 2023	issued for draft review
2	september 29, 2023	updated site plan (undated)
3	october 18, 2023	updated site plan (october 13, 2023)

client
4933 Vic Court Globizen LP

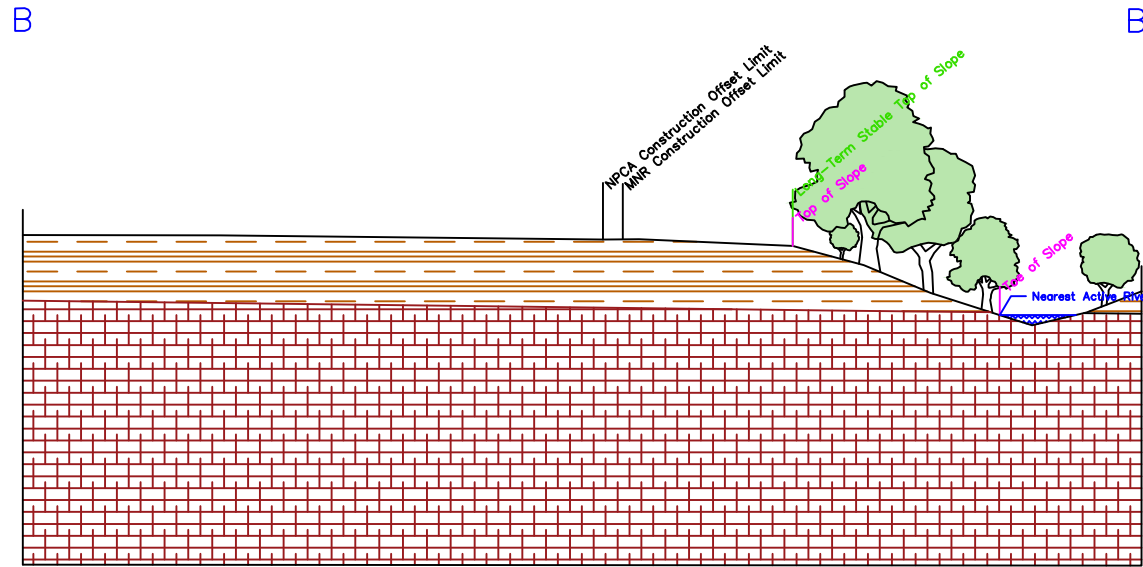
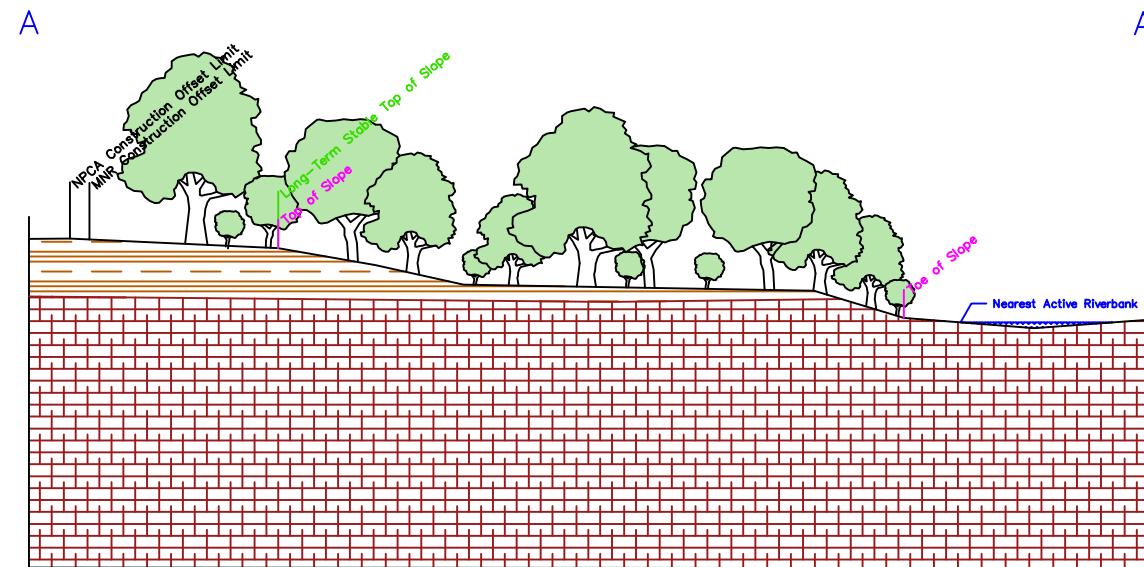
municipality
The Corporation of the
Town of Lincoln

project
Slope Assessment
4933 Victoria Avenue North

sheet
Site Features Plan and Sections

date: september 7, 2023
drawn: mdc
checked: jd
project #: 23016
scale: as shown

23016-01



scale: 1:300