



March 15, 2024 (Rev. 1)
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: Shoreline Protection System – Natural Soils Slope Considerations
Proposed Tower Complex, 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 shoreline protection system being constructed as part of the proposed residential development at the site identified as civic address 4933 Victoria Avenue North in Vineland, Ontario.

Landtek completed a Geotechnical Investigation at the site in 2022 and 2023 that included the drilling of a number of boreholes across the site and the installation of groundwater monitoring wells. The findings of the investigation are presented in the following report:

- “*Geotechnical Investigation, Proposed Tower Complex, 4933 Victoria Avenue North, Vineland Station, Ontario, LOR 2E0*”, reference 23016 dated November 3, 2023.

Information provided by the above Geotechnical Investigation report has been reference, where appropriate, and this letter report should be read in conjunction with the Geotechnical Investigation report.

This letter report has been prepared for the Client, their nominated engineers, designers, and project managers pertaining to the proposed shoreline protection to be constructed at the site identified as civic address 4933 Victoria Avenue North in Vineland, Ontario. Reliance of this report is also extended to Municipalities and Regulatory Authorities but is limited to the intended purpose of the report only. Any further dissemination of this report other than to those parties detailed is not permitted without Landtek’s prior written approval.

Further details of the limitations of this report are presented in Enclosure 1.

Background

Based on the Concept Plan drawing “*Site Plan – Ground Floor*”, reference A103, it is understood that the proposed residential development includes for the replacement of an existing shoreline protection wall with a new protection structure. From Shoreplan Engineering Limited’s (herein “*SEL*”) Shoreline Natural Hazard Assessment Report, reference 22-3791 dated March 14, 2024, Figure 6, it is understood that the new shoreline protection system is approximately 6.5 m high from its base, with the upper approximately 3.5 m exposed above the design high-water level.

The protection system is to comprise of a series of armour stone layers bedded onto a rip-rap platform, incorporating the required offsets, erosion allowance and a natural soil profile slope angle of 26° (2H:1V) for the stable slope allowance. The NPCA requires a development setback of 7.5 m from the stable slope allowance.

This letter report has been issued to confirm the natural soil profile slope angle at the southernmost limit of the Shoreline Hazard Limit. For the purposes of this letter, the evaluation study area is focused to the table land area within the existing property boundary and extending northwards from civic address 4933 Victoria Avenue North in Vineland.

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.

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 and interbedded sequence of red shales, siltstones and sandstones of the Queenston Formation.

The boreholes completed for the Geotechnical Investigation provided confirmation of the published geology recorded from historical boreholes records. Existing pavement areas and/or fill material were encountered at the ground surface and extend to depths between approximately 0.6 m and 4.5 m below existing ground level.

Clayey and silty deposits, silt and clayey silt to silty clay till deposits and completely to highly weathered red shale bedrock underlies the fill material to depths between approximately 1.8 m and 12.1 m below existing ground level.

The geology in the vicinity of the proposed shoreline protection system comprises of a veneer of fill materials overlying clayey silt till deposits to depths of approximately 1.8 m to 2.3 m below existing ground level. Completed weathered shale is encountered underlying and is recovered as and behaves as, a residual soil.

Copies of the pertinent borehole logs are presented in Enclosure 2 of this letter report and their locations presented on Drawing 23016-01 “*Site Plan and Geological Section*” presented as

Enclosure 3.

Hydrology and Hydrogeology

Except for the construction of coastline defense systems, the alignment of the Lake Ontario shoreline shows no significant deviation since at least 1934. Aerial photography data shows there to be no evidence of erosion by surface water action within the tableland 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.

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 around the existing shoreline protection system, suggesting that any groundwater regime present beneath the property is likely to be within the bedrock and in hydraulic continuity with the water of Lake Ontario.

Monitoring wells installations and subsequent phases of groundwater monitoring completed by Landtek at the site 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.

Site Geomorphology

The tableland area is generally flat-lying to becoming a very shallow gradient ($\pm 2^\circ$ to $\pm 4^\circ$) 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.

Discussion

Based on the soil conditions observed at the borehole locations on site, the results of the associated engineering classification testing and Landtek's previous experiences with the shoreline profiles of Lake Ontario, it is considered from a geotechnical perspective, that the proposed shoreline protection system being established by SEL can be designed to accommodate a soils profile of 26° (i.e., 2H:1V) without having any adverse affect to its global stability.

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 letter report in more detail.

Kind regards,

LANDTEK LIMITED



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



Ralph Di Cienzo, P.Eng.
Consulting Engineer

Encs:

- Enclosure 1: Limitations of Report
- Enclosure 2: Landtek Limited Borehole Logs
- Enclosure 3: Drawing 23016-01: "Site Plan and Geological Section"



ENCLOSURE 1

Limitations of Report

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the borehole locations. Subsurface and ground water conditions between and beyond the Boreholes may be different from those encountered at the borehole locations, and conditions may become apparent during construction that could not be detected or anticipated at the time of the geotechnical investigation. It is recommended practice that Landtek be retained during construction to confirm that the subsurface conditions throughout the site are consistent with the conditions encountered in the Boreholes.

The comments made in this report on potential construction problems and possible remedial methods are intended only for the guidance of the designer. The number of Boreholes may not be sufficient to determine all the factors that may influence construction methods and costs. For example, the thickness and quality of surficial topsoil or fill layers may vary markedly and unpredictably. Additionally, bedrock contact depths throughout the site may vary significantly from what was encountered at the exact borehole locations. Contractors bidding on the project, or undertaking construction on the site should make their own interpretation of the factual borehole information, and establish their own conclusions as to how the subsurface conditions may affect their work.

The survey elevations in the report were obtained by Landtek Limited or others, and are strictly for use by Landtek in the preparation of the geotechnical report. The elevations should not be used by any other parties for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Landtek Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

This report does not reflect environmental issues or concerns related to the property unless otherwise stated in the report. The design recommendations given in the report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, it is recommended that Landtek Limited be retained during the final design stage to verify that the design is consistent with the report recommendations, and that the assumptions made in the report are still valid.

ENCLOSURE 2

Landtek Limited Borehole Logs



LOG OF BOREHOLE BHMW2

SHEET 1 of 1

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2022-04-14 Drilling Method: Hollow Stem Datum: Ground Surface	Northing: 43.193615 Easting: -79.394797 Ground Surface Elevation: 78.9
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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				
1	78.0	Concrete ~475 mm. Fill Silty clay, some gravel, trace concrete fragments. Firm to stiff, brown, moist.	1	SS	2 3 5 7	8	x	40 80 120 160	x	PL MC LL	3/8" Bentonite Pellets #10 Well Slot Sand 2" Schedule 40 PVC Slot 10 Screen Sept. 2023 Flushmount			
2	77.0	Silty Clay Till trace gravel. Hard, brown and red, moist.	2	SS	2 13 25 13	38	x		o	10 20 30 40				
3	76.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	3	SS	13 21 33 50	24	x							
4	75.0		4	SS	50-6"	50	x							
5	74.0	End of Log	5	SS	50-0"	50	x							
6	73.0													
7	72.0													
8	71.0													
9	70.0													
10	69.0													



Additional Notes:

1. Borehole open to approximately 4.5 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 BH10

SHEET 1 of 1

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2022-04-27 Drilling Method: Solid Stem Datum: Ground Surface	Northing: 43.194162 Easting: -79.394529 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					MC
1		77.0	Fill Sand and gravel. Compact, grey, moist. ...brown and black. ...loose.	1	SS	9 14 14 13	28	x											
2		76.0		2	SS	18 16 8 7	24	x											
3		75.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	3	SS	3 4 2 2	6	x											
4		74.0		4	SS	14 42 50-4"	50	x											
5		73.0	End of Log																
6		72.0																	
7		71.0																	
8		70.0																	
9		69.0																	
10		68.0																	



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
 Hamilton, Ontario, L8W 2E1
 Ph: (905) 383-3733

LOG OF BOREHOLE BHMW11A

SHEET 1 of 1

Project No.: 23016 Project Name: 4933 Victoria Ave. North, Vineland Location: 4933 & 4937 Victoria Avenue, Vineland	Drill Date: 2022-04-27 Drilling Method: Solid Stem Datum: Ground Surface	Northing: 43.194158 Easting: -79.395129 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				
1		78.0	Fill Silt, with gravel. Compact, grey and brown, dry. ...clayey silt, some gravel. Firm.	1	SS	9 14 13 5	27	x			3/8" Bentonite Pellets #10 Well Slot Sand 2" PVC Screen Flushmount Sept. 2023			
			Clayey Silt Till trace gravel. Stiff, brown, moist.	2	SS	4 5 8 13	13	x						
2		77.0	Shale Completely weathered, very dense, red, dry. Recovered as residual soil.	3	SS	6 8 19 21	27	x						
				4	SS	11 18 17 30	35	x						
3		76.0		5	SS	50-2"	50	x						
4		75.0												
5		74.0	End of Log											
6		73.0												
7		72.0												
8		71.0												
9		70.0												
10		69.0												



Additional Notes:

1. Borehole open to approximately 4.5 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 3

DRAWINGS

23016-01: "*Site Plan and Geological Section*"



LANDTEK LIMITED

205 Nebo Road, Unit 4B
Hamilton, Ontario L8W 2E1
p: +1 (905) 383-3733
engineering@landtek.ca
www.landtek.ca



project location



Location plan an extract from Google Earth™

Key:

- Approximate location of borehole drilled by Landtek Limited between July 4 and 6, 2023.
- Approximate location of shallow borehole and monitoring well drilled by Landtek Limited between July 4 and 6, 2023.
- Fill/Organic Soils
- Clayey Silt Till
- Bedrock (Shale)

Notes:

Base plan an extract of the Topographical Survey for the site, reference 22-16-360-00 dated February 8, 2023, as completed by J. D. Barnes Limited.

revisions

#	date	comment
1	march 6, 2024	issued for draft report

client

4933 Vic Court Globizen LP

municipality

The Corporation of the
Town of Lincoln

project

Shoreline Protection System
4933 Victoria Avenue North

sheet

Site Plan and Geological Section

date: march 6, 2024

drawn: mdc

checked: jd

project #: 23016

scale: as shown

23016-01

scale: 1:1,000

scale: 1:250

