

September 19, 2023

Mr. Sam Kerzner
Sophies Landing Grimsby Inc.
3310-88 Bloor St. E.
Toronto, Ontario, M4W 3G9

Dear Mr. Kerzner,

RE: Shoreline Hazard Assessment
165 Lake St., Grimsby, Ontario
Our file 21-3490

This letter presents our assessment of the natural hazards at the above noted property and provides comment on how the hazard limits will affect the development setbacks. We have considered the erosion, flooding, and dynamic beach hazards at the site as defined by the Natural Hazards Policy 3.1 of the 2020 Provincial Policy Statement. We have also considered the Niagara Peninsula Conservation Authority's (NPCA) policies, procedures, and guidelines for the application of Ontario Regulation 155/06.

The site was visited by Shoreplan Engineering Limited (Shoreplan) multiple times in preparation of this report and an aerial survey was conducted by AGUAV on May 15, 2023. The photographs presented in this letter report were taken during the AGUAV aerial survey.

Existing Conditions

The subject property is located in Grimsby on the south shore of Lake Ontario. The shoreline is approximately 115 metres long and faces the north-north-east direction. For the purpose of the descriptions provided in this report, we approximate that the shoreline faces north.

The shoreline of the subject property generally consists of a high bank which has both protected and unprotected sections. The existing condition of the shoreline is shown in Photos 1 to 3. The first approximately 5 m of the western end of the property is protected by a stacked armour stone wall with a cap elevation of approximately 78.1 m. This seawall extends onto the subject property from the adjacent property to the west.

Moving eastward, the next approximately 60 m of shoreline consists of an unprotected high till bank which has a crest elevation of approximately 82.0 m to 84.5 m. The bank is fronted by a narrow beach. Armour stones are scattered in the nearshore area of the beach.

The following 32 m of shoreline are protected by a concrete block revetment that transitions to an armour stone revetment with a top elevation of approximately 78.0 m. The armour stone revetment is backed by a concrete block and stone patio and stacked armour stone retaining wall. The retaining wall has a cap elevation of approximately 78.0 m. The bank behind the armour stone wall continues up to an elevation of approximately 84.0 m.

The last 18 m of the eastern end of the property are protected by an informal armour stone and rubble revetment. It appears to be a transition to an armour stone revetment on the adjacent property to the east. All stone is informally placed and relatively small in comparison to the armour on the adjacent property. The revetment has a crest elevation of approximately 77.0 m. The backshore is undeveloped land, which is characterized with mature trees, shrubs, and grasses.

The protection works on the adjacent property to the east is an armour stone revetment. It has a top elevation of approximately 77.0 m.

Natural Hazards

The natural hazards considered for this assessment included the dynamic beach hazard, the erosion hazard, and the flood hazard. Each hazard is discussed separately below. Our assessment also relied in part on information in the Lake Ontario Shoreline Management Plan Update (LOSMPU) (Baird, 2009).

Dynamic Beach Hazard

There is no dynamic beach at this site so there is no dynamic beach hazard. The sand and gravel deposits do not meet the definitions of a dynamic beach.

Flood Hazard

The Provincial Policy Statement and accompanying Technical Guides (MNR, 2001) require that uprush and overtopping calculations be undertaken for a 20-year return period storm occurring at the 100-year instantaneous water level. MNR (1989) determined the 100-year instantaneous water level for this part of Lake Ontario to be 76.0 m. However, the recent high water levels on Lake Ontario in 2017 and again in 2019 have caused us to re-assess design water levels. Based on our analysis we consider 76.4 m GSC to be more

representative of appropriate design water levels. This higher water level has been used in assessment of the flood hazard.

The actual wave run up will depend on the details of future shore protection works. For the initial shoreline hazard assessment, we propose to use the surveyed top of bank as the flood hazard “place holder” to be adjusted once shore protection works are designed. Given the height of the bank at this site, the bank will not be overtopped under design conditions. The flood hazard is not the governing hazard, and the erosion hazard will govern with respect to any development setbacks at this site.

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Erosion Hazard

The erosion hazard limit consists of two components: an erosion allowance plus a stable slope allowance. The erosion allowance is based on a 100-year time frame and is applied first so that the stable slope allowance can be applied from the point where the shoreline is expected to be in 100 years.

An important step in locating the erosion hazard is determining the position and elevation of the toe of bank. For our assessment, we have used a smoothed and rationalized alignment of the surveyed bottom of slope for the natural toe of bank and the estimated back of the toe of the existing protection works. We have assumed an elevation of 76.0 m for the natural toe of bank.

The erosion allowance is calculated as 100 times the average annual erosion rate (AAR) for an unprotected shoreline. The technical guide to the PPS describes the parameters to be used to determine site specific erosion rates and provides a provincial wide default to be used in the absence of such data. The subject property is located within Reach 7 of the Lake Ontario Shoreline Management Plan Update (LOSMPU) (Baird, 2009). We note that the AAR for Reach 7 reported in Table 4.3 results in an AAR of 0.30 m/year. Using the AAR of 0.30 m/year applied over a 100 year time frame gives an erosion allowance of 30 metres, measured horizontally from the toe of bank.

The stable slope allowance is the product of the bluff height and the stable slope. The Technical Guides give a “default” stable slope of 3h:1v (MNR, 2001). The LOSMPU recommended that the default 3h:1v be used in the absence of a site specific geotechnical assessment. A geotechnical investigation was completed by Soil Engineers Ltd. Their report dated September 2023 noted a stable slope of 2.5h:1v between the toe of the bank and elevation 82.0 m and a stable slope of 3h:1v above elevation 82.0 m are appropriate for this site. This study is considered to be a site-specific geotechnical assessment. As such, the position of the stable slope allowance is based on the 2.5h:1v stable slope extending upward from an assumed toe

elevation of 76.0 m up to an elevation of 82.0 m and then a stable slope of 3h:1v from elevation 82.0 m to existing grade.

Development Setbacks

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The possibility of encroachment into a shoreline hazard limit is considered by all relevant documents, including the Provincial Policy Statement, the Technical Guides (MNR, 2001), and the NPCA Policy Document, Policies for the Administration of Ontario Regulations 155/06 and the Planning Act (NPCA, 2020).

A new shoreline protection structure, consisting of an armour stone revetment with a 50-year design life, is proposed to be designed and constructed along the shoreline of the property. An application for a permit to construct these protection works will be submitted for approval to the NPCA in due course. With the protection works in place, the new development can then encroach into the erosion hazard. With a fifty-year design life the erosion hazard allowance would be reduced to one half. The development setback with the proposed structure is indicated on Figure 1 as Development Setback with 50 Year Design Life.

Further, NPCA includes specific provisions for development within the erosion allowance. Sections 5.2.5.1 (c) of NPCA Policy Document (NPCA 2020) states that:

New Habitable Buildings/Structures, including redevelopment and ground floor additions:

(c) May be permitted within the erosion allowance provided:

- i) It meets the requirements of the protection work standard to the maximum extent and level possible based on site-specific conditions.
- ii) It utilizes maximum lot depth and width.
- iii) As a minimum, uses a setback from the stable slope allowance of 7.5 metres. At the discretion of the NPCA, any setback that is proposed to be less than 7.5 m may be required to be supported by a geotechnical study.
- iv) The NPCA is satisfied that no practical alternative exists to locate the proposed structure outside of the erosion hazard

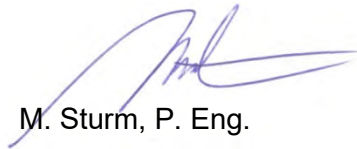
The line located 7.5 m landward of the stable slope allowance is also shown on the Figure 1. It has been our experience that NPCA accepts this 7.5 m development setback when robust shore protection works with maintenance access are provided. The maintenance access must be at least 5 metres wide

from a public road to and along the back of structure, as per NPCA policy 5.2.13.

Closing Comments

We trust that these comments will assist you as you develop your plans for this property. Please do not hesitate to call us if you have any questions regarding this letter.

Yours truly,
Shoreplan Engineering Limited



M. Sturm, P. Eng.



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References

Niagara Peninsula Conservation Authority (NPCA) (2011) *Policies, Procedures and Guidelines for the Administration of Ontario Regulation 155/06 and Land Use Planning Policy Document*.

Ontario Ministry of Natural Resources (MNR) 1989. *Great Lakes Flood Levels and Water Related Hazards*, Provincial Shoreline Management Program, Conservation Authorities and Water Management Branch, Ontario Ministry of Natural Resources, February 1989.

Ontario Ministry of Natural Resources (MNR), 2001. *Great Lakes, St. Lawrence River System and Lake Inland Lakes: Technical Guide for Flooding, Erosion and Dynamic Beaches*, in support of Natural Hazards Policies 3.1 of the Provincial Policy Statement.

W. F. Baird and Associates Coastal Engineers Limited (Baird), 2009. *Lake Ontario Shoreline Management Plan Update*, Niagara Peninsula Conservation Authority, November 2009.

Photo 1: View of the western extent of the subject property looking south.



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Photo 2: View of the center of the subject property looking south.

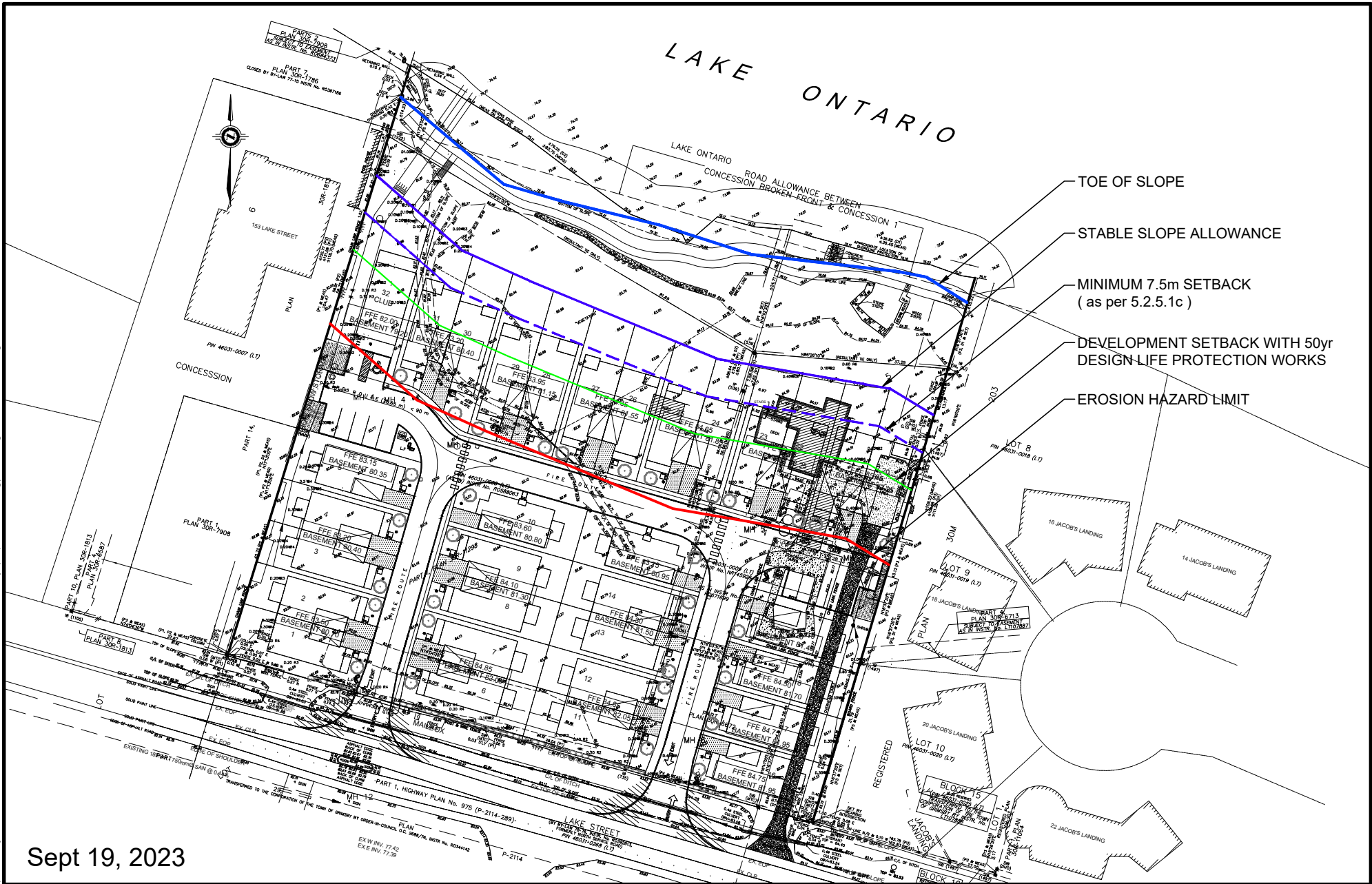


Photo 3: View of the eastern extent of the subject property looking south.



SHOREPLAN

Drawing Location: S:\Shoreplan Project Files\3400-3499\21-3490 165 Lake St Grimsby (Sophies Landing)\Drawings\21-3490 12b.dwg



Sept 19, 2023

Project # 21-3490
Scale 1:1000
SHOREPLAN

- TOE OF SLOPE
- STABLE SLOPE ALLOWANCE
- MINIMUM 7.5m SETBACK
(as per 5.2.5.1c)
- DEVELOPMENT SETBACK WITH 50yr
DESIGN LIFE PROTECTION WORKS
- EROSION HAZARD LIMIT

Figure 1
165 Lake St Grimsby
Site Plan