

December 12, 2025

**SHOREPLAN**

Mr. Richard Weldon  
Interra Lands Corporation  
7 Hoggs Lane  
Toronto ON M3B 2W5

Dear Sir,

**Re: Dynamic Beach Assessment  
1 Dunsford Lane, Tiny Township  
Our File: 11-1673**

This letter report describes an updated dynamic beach assessment completed for your Wymbolwood Beach property at 1 Dunsford Lane, Tiny. It was intended to determine the dynamic beach hazard limit along a section of the shore not included in a previous assessment, but it also confirmed our previous findings. The dynamic beach hazard is one of the three natural hazards defined by the Provincial Planning Statement (PPS) and the MNR (2001) Technical Guides prepared to support the PPS. It is our understanding that this letter will be submitted to Tiny Township in support of an application for site development to allow you to re-build closer to Georgian Bay than permitted by municipal bylaws.

### **Previous Assessments**

Shoreplan completed an initial natural hazards assessment for this property in 2013. That report, dated June 26, 2013, described the erosion hazard, the flooding hazard, and the dynamic beach hazard as defined in the MNR (2001) Technical Guides. There is no erosion hazard at this site. The flooding hazard was calculated from a wave uprush analysis using typical profiles derived a survey completed by Shoreplan staff. Existing retaining walls were determined to provide a physical barrier to beach profile adjustments and thus defined the dynamic beach limit.

A second assessment was completed on December 20, 2021 to update the flood hazard assessment following a period of record high Georgian Bay mean water levels. That assessment used a provided topographic survey prepared by J. D. Barnes Ltd and a design wave condition determined from an updated wave hindcast produced by the U.S. Army Corps of Engineers.

### **Existing Conditions**

The subject property is located on the east shore of Nottawasaga Bay immediately north of the 7<sup>th</sup> concession road allowance in the Township of Tiny. We originally reviewed the site on December 21, 2011 when the water level was approximately 176.0 metres. It was revisited on November 11,

2021 when the water level was approximately 176.6m, although that water level was measured during an approximately 0.4m setdown due to easterly wind conditions. A final site review was completed on June 30, 2025 when the water level was approximately 176.4m

Site details and grades were obtained from the topographic plan provided for our 2021 assessment (Plan of Survey Part of Lot 19 Concession 7 Township of Tiny County of Simcoe, prepared by J D Barnes Limited, dated 11/30/2021). Figure 1 of this report is based on that plan. All elevations discussed in this letter are relative to the geodetic datum CGVD1928:1978.

The property is triangular with a width in the order of 125 metres in the vicinity of the 178 metre contour line. Figure 1 shows a plan of the site. There are three existing building structures on the property, as shown in Figure 1. In the central part of the site, the structures are fronted by a low stone wall that blends into the dunes near the edges of the site. The land above the wall has been terraced with graded berms and stone and timber retaining walls. The dunes were once re-graded in front of the stone wall, but a new foredune has started to form.

Photo 1 to Photo 4 show matched pairs of 2021 and 2025 photographs with similar views in each matched pair. These show the extent of new dune formation that has occurred since our 2021 review.

### **Dynamic Beach Hazard Limit**

There is no doubt that this site meets the criteria for a dynamic beach as defined in the MNR 2001 Technical Guides. Dynamic beach limits can be established in the field by mapping the edge of the foredune on undisturbed beaches, but prior re-grading of the dunes precludes that option for this property. The technical guides' default definition of the dynamic beach allowance is a 30-metre setback from the limit of wave uprush under design conditions, but there is no scientific basis for that value, and it is always found to be excessive when detailed analyses are completed for sites like Wymbolwood Beach. The technical guides note that the default dynamic beach allowance is used in the absence of a site-specific study using accepted scientific and engineering methods. This report describes such a study and therefore supersedes the default allowance.

There are two key aspects to the dynamic beach allowance. One is to ensure that profile changes during design events do not damage infrastructure. The second is to ensure that new development does not encroach on the defined portion of the dynamic beach. The technical guides note that *“Defined portions of the dynamic beach means those portions of the dynamic beach which are highly unstable and/or critical to the natural protection and maintenance of the first dune feature and/or beach profile where development would create or aggravate flooding or erosion hazards, cause updrift and/or downdrift impacts and/or cause adverse environmental impacts.”*

The existing stone wall and timber retaining walls are a barrier between the beach where dunes can form and the existing buildings. Sand on the landward side of those walls will not play any role in the natural protection and maintenance of the first dune feature or beach profile. The walls form a physical limit to the dynamic beach allowance.

The current development plans show proposed buildings both to the north and south of the existing walls, so a more detailed assessment was required to determine the dynamic beach limit in those areas.

We have completed several peer reviewed dynamic beach hazard limit assessments on the Lake Huron shoreline within the jurisdiction of the St. Clair Region Conservation Authority (SCRCA) consistent with their prescribed methods. Their procedure is described in the following extract from correspondence with SCRCA:

**SCRCA General Policies and Guidelines for Determining the Dynamic Beach Hazard Limit and Re-Development within the Dynamic Beach Hazard**

**Determining the Dynamic Beach Hazard Limit**

*A proper study to further evaluate the dynamic beach limit typically involves a two-step process. The first step is an initial site reconnaissance to determine if further, more detailed analysis would be warranted. The initial reconnaissance would be accompanied by a review of existing data on the coastal processes and geomorphology of the area. The second step involves site specific field surveys of the nearshore and beach/dune profiles, compiling offshore bathymetric data, collecting sand samples and testing for grain size, determining design flood levels and wave conditions and numerical modeling of the likely limit of the dynamic beach hazard under storm and high water conditions using appropriate cross-shore beach profile models. (SCRCA SMP)*

We applied this same approach for 1 Dunsford Lane. Our site review showed that a more detailed analysis was required so we completed a numerical analysis of the dynamic beach hazard limit under storm and high water conditions using the DHI Litpack profile evolution model, which is an appropriate cross-shore beach profile model and is based on accepted scientific and engineering principles.

Storm conditions were selected from the results of the U.S. Army Corps of Engineers WIS hindcast for station 93383, which is located offshore of the site, where the water depth is 31m. The WIS data consists of hourly significant wave height, peak wave period and mean wave direction for the

45-year period from 1979 to 2023. The station 93383 WIS data was used for the wave uprush analysis described in our 2021 assessment report.

A storm selection process identified 10 storm events where the minimum peak event wave height was 3.75m and the event had at least 12 hours of wave heights greater than 1.0m. Figure 2 shows the wave height profiles for the top 5 of those storms, ranked by the peak wave height. Two of those storms were selected for the profile evolution modeling: Event 3 and Event 8. Event 3 had a duration of 45 hours. The storm peak wave condition had a significant wave height of 4.0m, a peak wave period of 9.3s and a mean wave back azimuth direction of 310 degrees at the hindcast location. Event 8 had a duration of 45 hours. The storm peak wave condition had a significant wave height of 4.4m, a peak wave period of 8.4s and a mean wave back azimuth direction of 300 degrees at the hindcast location.

Each of these storm events was transferred into a point on the 6m contour (chart datum), offshore of the site. Recorded water levels during the storm events were scaled up so that the peak of the storm was modeled at the 100-year instantaneous water level. Representative sediment parameters were taken from grain size distribution plots presented in SPL (2015). Those plots are presented in Figure 3. Sample TP15-03 GS#2, which was a medium sand with a median diameter of 0.45mm, was considered representative of the beach sand at this site. Sample TP15-03 GS#1, which was a fine sand with a median diameter of 0.2mm, was the finest sand sampled and was used for sensitivity testing during the profile evolution modeling.

Figure 1 shows the location of 6 profile lines labeled A to F. Profiles A to E were used during our 2021 wave uprush analysis and profile F was added for this assessment. These profiles were derived from the 2021 J.D. Barnes topographic survey and represent beach conditions following a period of high lake levels. This makes them well suited for profile evolution modeling under design conditions as no adjustment is necessary to represent a high water level equilibrium condition.

Baseline condition modeling was completed by considering both storm event 3 and storm event 8, described above, with the medium beach sand. The profile changes were similar, with each storm eroding away the beach both above and below the waterline and forming a nearshore bar. Figure 4 shows an example of the baseline condition modeling results for profile F.

Model sensitivity analyses were considered for both storm duration and sediment size. Storm duration sensitivity was tested by modeling storm events 3 and 8 back-to-back, which effectively ignores the beach rebuilding that occurs between major storm events. Sediment size sensitivity was tested by modeling the fine sand distribution rather than the medium sand representative of site conditions. Figure 5 and Figure 6 show the results of those analyses for profile F. The profile change modeling is more sensitive to storm duration than to sediment size.

Table 1 summarizes the distances that the 178m contour receded on each profile for the storm events modeled with the medium beach sand. The 178m contour was selected to provide a consistent benchmark for comparison. These values do not represent the full width over which the beach profile changed.

**Table 1 178m Contour Recession Distances**

Profile	Storm Event 3	Storm Event 8	Storm Events 3 & 8
<b>A</b>	9.8	10.2	11.9
<b>B</b>	12.2	12.3	14.1
<b>C</b>	17.4	17.3	19.5
<b>D</b>	11.0	11.0	12.8
<b>E</b>	13.8	14.0	15.4
<b>F</b>	13.2	13.5	14.5
<b>minimum</b>	9.8	10.2	11.9
<b>maximum</b>	17.4	17.3	19.5
<b>average</b>	12.9	13.0	14.7

Using the same approach as applied for similar studies on Lake Huron, the dynamic beach hazard limit was defined using the results of the worst-case sensitivity analysis profile evolution modeling. That produced the dynamic beach hazard limit shown on Figure 7.

### Development Plans

A GIS shapefile of the dynamic beach hazard limit shown on Figure 7 has been provided to the project team to assist other aspects of the project. Development that takes place landward of this limit will not impact the dynamic beach. It will not create or aggravate flooding or erosion hazards, cause updrift and/or downdrift impacts, or cause adverse environmental impacts.

Cantilevering second storey floors or decks beyond the dynamic beach hazard limit will have no impact on the dynamic beach hazard. Foundation walls constructed close to the hazard limit must have buried scoured protection as an addition safeguard should design conditions be exceeded. It is important that maintenance access to that scour protection not be obstructed.

### Conclusions

This report describes a site-specific analysis of the dynamic beach hazard limit using accepted scientific and engineering methods. The dynamic beach hazard is the governing natural hazard at this site. Its location is shown on

Figure 7. Development that takes place landward of this limit will not impact the dynamic beach. It will not create or aggravate flooding or erosion hazards, cause updrift and/or downdrift impacts, or cause adverse environmental impacts.

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### **Closing Comments**

We trust that these comments will assist you in your dealings with Tiny Township. Do not hesitate to call should you have any questions regarding this letter report.

Yours truly

Shoreplan Engineering Limited



Bruce Pinchin, P.Eng.



### **References**

MNR, 2001. Great Lakes - St. Lawrence River System and Large Inland Lakes. Technical Guides for flooding, erosion and dynamic beaches in support of natural hazards policies 3.1 of the provincial policy statement. Watershed Science Centre. ISBN: 9780968819616

SPL (2015). Report on Preliminary Geotechnical, Investigation Wymbolwood Beach Resort, 1 Dunsford Lane, Township of Tiny, Ontario. Unpublished report prepared by SPL Consultants Limited for Romspen Investment Corporation. SPL Project No. 10001448. April 13, 2015

**Photo 1, November 2021**



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**Photo 2, June 2025**



Photo 3, November 2021



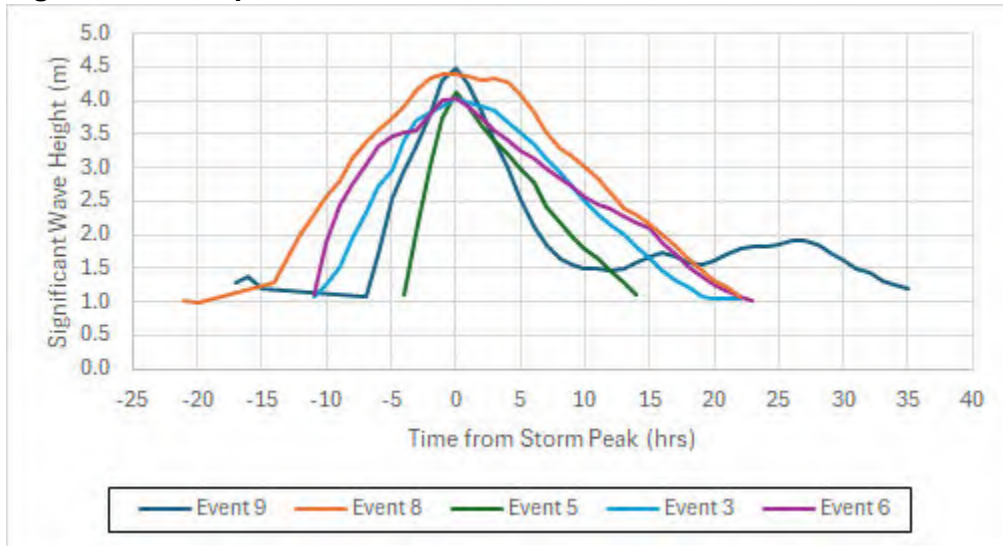
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Photo 4, June 2025





**Figure 2 Top Storm Events from WIS Hindcast**

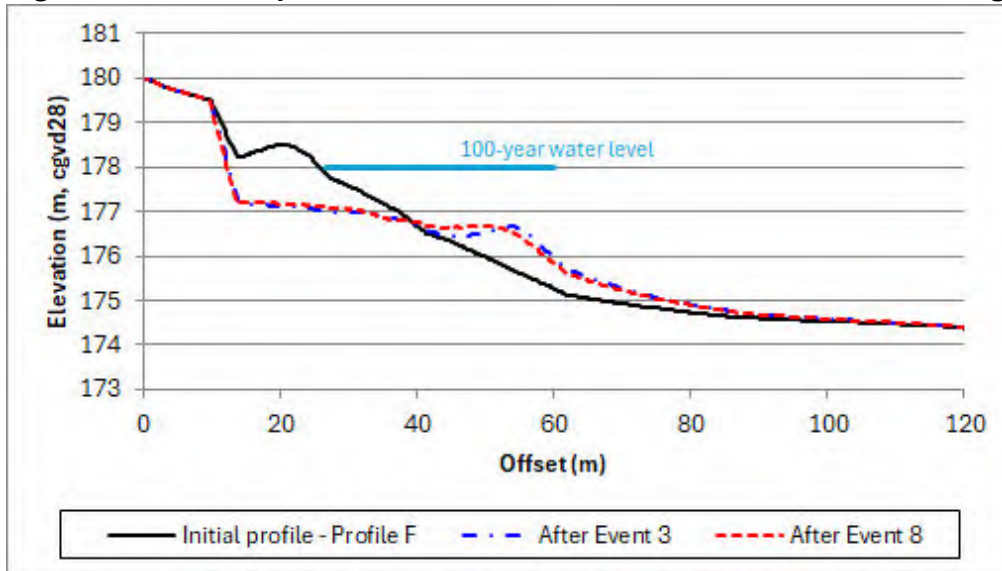


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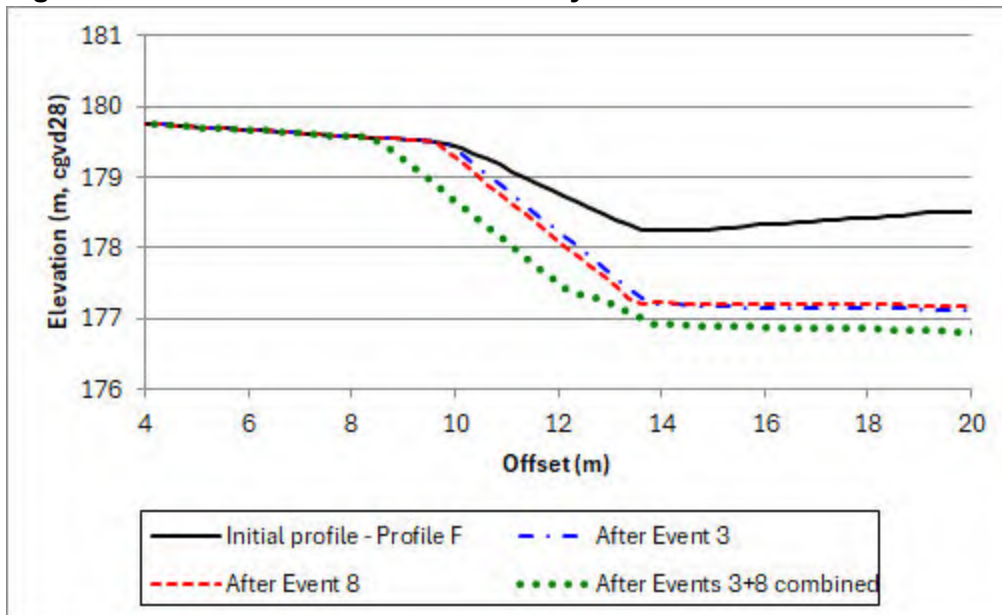
**Figure 3 Grain Size Distribution Plots**



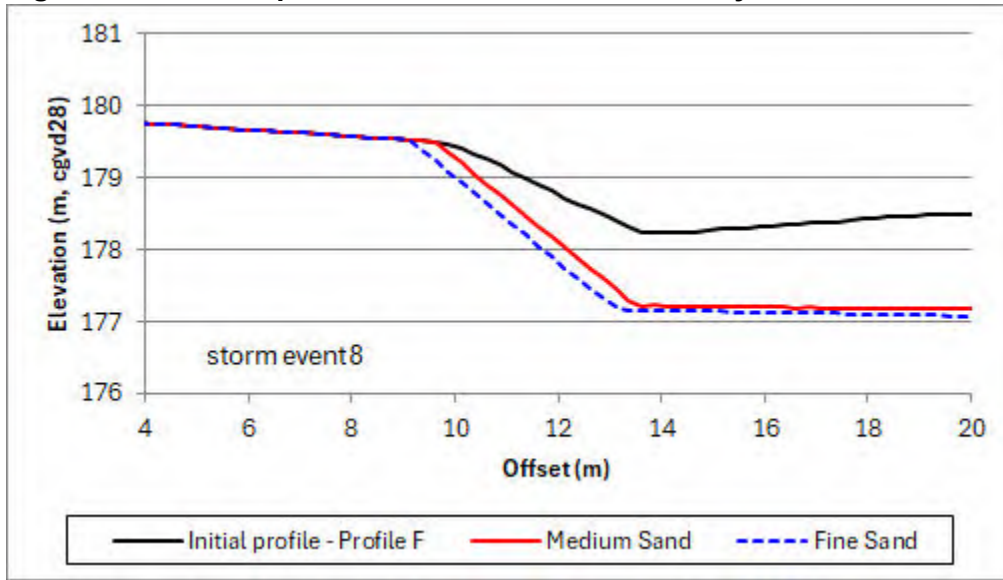
**Figure 4 Example of Baseline Condition Profile Evolution Modeling**



**Figure 5 Profile Evolution Sensitivity to Storm Duration**



**Figure 6 Example of Profile Evolution Sensitivity to Sand Size**



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**Figure 7 Dynamic Beach Hazard Limit**

