

## **10.2 NHAA 1 – Coastal Zone Hazards (Map 3)**

### **10.2.1 Justification**

Ocean front land in the Village of Lions Bay is subject to hazards such as flooding of low-lying terrain, erosion and instability of oceanfront slopes. Coastal zone hazards are expected to be exacerbated over the coming decades by sea level rise. NHAA 1 is intended to designate sites that should be assessed by a qualified registered professional to address coastal flood hazards, but does not preclude development. For Coastal Zone Hazards, year 2100 high water mark (HWM), and site specific factors such as wave effects, storm surge, shoreline erosion, shore face stability and associated setbacks should be considered.

### **10.2.2 Extent**

NHAA 1 extends from the existing natural boundary of the sea to a height of 8 metres CGD (Canadian Geodetic Datum) and is outlined on Map 3. The 8 metre level is conservatively selected to represent a potential future Flood Construction Level (FCL). NHAA 1 includes all lots fronting the ocean within the Village of Lions Bay.

### **10.2.3 Background**

In the Village of Lions Bay, many steep slopes into the sea are rock controlled or are fill slopes below the railway line. These are not a stability concern for residential development. Most residential lots on surficial materials are located on bouldery debris fan deposits of Magnesia, Alberta and Harvey Creeks, and while the shorefronts may be steepened to 70-80% by wave attack, the sea scarp is not tall (<6 m) and materials are coarse and relatively resistant to erosion at the timescale of the life of a structure (e.g., 100-years).

The sites most vulnerable to erosion are those low-lying areas at the south end of Brunswick Beach Road, where housing has been developed on a gravel tombolo that has linked a small rock outcrop with the mainland. The beach gravels forming the tombolo stand just above the HWM, being formed by storm waves, and the terrain between the north and south facing beaches is slightly lower, just at the high water mark (HWM). Future breaching and erosion of these beach ridges places all these low-lying areas at risk.

### **10.2.4 Guidelines and Requirements**

1. Within NHAA 1, New Development applications shall include a coastal flood hazard assessment prepared by a qualified registered professional to define the year 2100 shoreline position and the derived flood construction

level, appropriate setback and any necessary mitigation work. Determination of the Year 2100 flood construction level shall follow the Ausenco Sandwell “Combined Method” as referenced in the Flood Hazard Area Land Use Management Guidelines. The FCL is determined as the sum of:

- Allowance for future sea level rise to the year 2100;
- Allowance for regional uplift, or subsidence to the year 2100;
- Higher high water large tide (HHWLT);
- Estimated storm surge for the Designated Storm with an annual exceedance probability of 1:200, or 1:500 as per the Ausenco Sandwell method referenced in the Flood Hazard Area Land Use Management Guidelines;
- Estimated wave effects associated with the Designated Storm; and
- A minimum Freeboard of 0.6 metres. However, because the Combined Method assumes the Designated Storm occurs in conjunction with a high tide; the Freeboard may be reduced from 0.6 m to 0.3 m for situations where the full FCL may be difficult to achieve.

2. Provincial guidance refers to a 15 m ocean setback, while Village of Lions Bay applies a 7.5 m coastal setback (subject to potential variations down to 4.5 m in Brunswick Beach). Siting could be further constrained by consideration of potential erosion. A factor of safety analysis may also be required to support foundation design and determine building setbacks from escarpment crests.
3. A report by a Qualified Professional in NHAA 1 shall include recommendations for any structural measures required to achieve the FCL or protect against coastal flood hazard (e.g. engineered fill or foundations or coastal bank protection or building envelope design).
4. Where a lot does not have sufficient area to accommodate a dwelling under these siting conditions, a variance may be needed to relax setback requirements. This will be determined on a site by site basis, and a report by a QP would be required to support any variance.