

# **GVH CONSULTING LTD.**

#102 - 6388 Bay Street, West Vancouver, BC, V7W 2G9  
Phone/ Fax (604) 925-9102 gv h9@shaw.ca

David Leslie  
8593 Bedora Place  
West Vancouver, BC  
V7W 2W4

October 30, 2014  
File 14-124

**Re: Proposed Subdivision and Residence  
5616 Westport Place  
LOT 4 BLOCK E DISTRICT LOT 1374 PLAN 10565  
West Vancouver, BC  
Preliminary Geotechnical Report for Subdivision Approval**

## **1.0 INTRODUCTION**

As requested, GVH Consulting Ltd. has completed a geotechnical report for the above noted property. The purpose of this report is to assess natural hazards on the site, to provide preliminary recommendations pertaining to construction of a new residence on the proposed southern lot to be subdivided from the existing lot and residence. We have based the following report on review of available documents pertaining to the site including preliminary proposed subdivision and house location routing of the proposed driveway and on a field review of the site conducted on October 15<sup>th</sup>, 2014.

Reference documents for this review include:

1. Images from David Leslie of Synthesis Design Architectural Drawings showing the proposed house siting, October 10, 2014
2. Survey Drawing, Hobbs, Winter & MacDonald, November 19<sup>th</sup> 2009
3. Community Charter, Ministry of Community, Sport & Cultural Development- Government of British Columbia, May 2003
4. British Columbia Building Code, 2012
5. National Building Code of Canada, 2010
6. Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC, APEG revised May 2010
7. DWV GIS Site
8. DWV Building Bylaws

This report presents our interpretation of geotechnical characteristics and natural hazards that may affect the proposed development and contains general recommendations for construction of the new residence. Post development landslide risk (rock fall) is based on procedures outlined in reference #6 above and on the assumption that mitigation of the risk will be accomplished in accordance to general recommendations contained in this report. It is concluded that the site is safe for the intended usage regarding natural hazards provided the recommendations contained herein are followed. Find attached “Appendix D: Landslide Assessment Assurance Statement”

## **2.0 SITE AND SUBSURFACE DESCRIPTION**

The property adjoins Westport Place to the north, Westport Road to the south and private property to the east and west. Competent granitic bedrock outcrops over most of the site with some ground cover consisting of loose talus or jointed rock and debris at the south side of the property and proposed new building site. Shear cliffs bound the north side of the southern proposed lot just north of the new building site with an elevation difference of about 25 feet. The cliffs are close to the proposed new property of the subdivision for the lot. The south side of the new lot slopes at roughly 5 H : 3V down to Westport Road and is comprised of granitic talus over bedrock. The thickness of the talus is estimated at 3 to 5 feet. The proposed access for the lot is from Westport Road to south.

## **3.0 NATURAL HAZARD (ROCKFALL) ASSESSMENT**

The natural hazards listed as per references #3 and #6 pertaining to this property with a probability of occurrence greater than 1 : 2475 years (ie 2% over 50 years) includes rock falls that fall under the APEG Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in BC Revised May 2010 and adopted into the BCBC in 2010.

Rock fall considerations affect the area north of the proposed residence where shear cliffs up to about 25 feet high are found. Future rock cuts for the building foundation wall would be retained by the structure of the house. The rock cliffs were reviewed on site and it is concluded that any rock fall hazard can be mitigated by scaling or rock bolting in discrete areas thus removing the potential hazard to the proposed building site rendering the site safe for the intended usage as pertaining to natural hazards as described in reference #3.

## **4.0 RECOMMENDATIONS For DEVELOPMENT**

It is recommended that foundations for the residence comprise conventional strip and pad foundations with structural fill supporting slab-on-grade. Structural fill can be used to raise the grades to the design grade using compacted shotrock fill (150 mm minus angular broken rock) or the foundation walls can bear directly onto bedrock.

Subgrade preparation should include removal of all vegetation, organic soils and soft disturbed soils down to the underlying bedrock. Footings placed on bedrock sloping steeper than 1V : 2H should

be dowelled into the bedrock with 15M dowels placed every 400 mm imbedded into the rock a minimum of 300 mm. The prepared footing areas should be reviewed and approved by the engineer prior to pouring or placing dowels.

The following values can be used for design of footings:

Foundation Soil	Factored Ultimate Bearing Capacity	Allowable Bearing Pressure
Bedrock	2000 kPa	1000 kPa
compacted structural fill	400 kPa	200 kPa

The above design bearing pressures assume the following:

- Footings have a minimum dimension of 400mm- foundation walls can be pinned directly to bedrock without a footing.
- Footings are founded at least 450 mm below the final finished exterior grades except where foundation walls are pinned or placed directly on bedrock (non frost susceptible)
- Site preparation is completed as indicated above and load-bearing surfaces are inspected and approved by the Geotechnical Engineer.
- For seismic design the site can be considered as Site Class B as defined in the current BCBC
- Foundations should be pinned onto sloping bedrock using minimum 15M dowels at 400 mm o/c grouted 300 mm into the underlying bedrock for strip footings or foundation walls and a minimum of 4 15M dowels for square pad footings.

Slab-on-grade can be supported on suitable prepared subgrades. The subgrade should be prepared by stripping all loosened, softened or otherwise unsuitable material. We recommend that a minimum 100 mm layer of clear crushed gravel or compacted shotrock fill should be placed beneath the crawl space skim coat or slab-on-grade in order to provide a drainage layer for potential seepage zones. The gravel drainage layer should have outlets via weep holes at the low sides of the foundation walls. A layer of 6mil poly vapour barrier should be placed over the clear crushed gravel to protect it from concrete contamination and to limit dampness of the skim coat.

Foundation walls and retaining walls can be designed assuming a minimum lateral load of an equivalent fluid pressure of  $5 \text{ kPa} \times H$  where H is the depth below grade in metres for static load. For seismic load a reversed triangular loading of  $4 \text{ kPa} \times H$  where H is the height above the bottom of the wall can be used. A uniform load 2 kPa should be additional to the above to account for surcharge loading. In giving the above loading it is assumed that the perimeter fill is comprised of freely draining backfill. Perimeter drains are required for foundation walls that retain fill with finished grades above that of the adjacent floor slab. The drain should consist of 100 mm diameter perforated PVC pipe surrounded with clear gravel with a suitable gravity outlet. Perimeter drains are not required in areas where the slab-on-grade is above the adjacent grades.

Backfill for support of exterior sidewalks, driveway, patios, etc. should consist of well-graded granular material (75 mm minus) with less than 5% passing the US Standard No. 200 (0.075mm) sieve by dry weight. The backfill should be placed in thin lifts (200 mm) and compacted to a minimum 90% Modified Proctor Maximum Dry Density. The placement of structural fill should be monitored by a representative from GVH Consulting Ltd. to confirm that the placed fill is suitable for the intended purpose.

All backfill should be placed in a manner that avoids damaging the foundation wall, drainage tile, and damp-proofing or waterproofing on the wall. Finished grades should slope away from the building to promote flow of surface water runoff away from the building. A 200 mm layer of 20 mm minus crushed sand and gravel (road base) should be placed immediately beneath pavements and sidewalks.

## **5.0 CLOSURE**

GVH Consulting Ltd. has completed this preliminary report for the exclusive use of our client and designated consultant or agents specifically for the proposed residence and subdivision planned. Any other usage of the report is not authorized by GVH. We trust that this report meets your present requirements. Please call if you have any questions or require further assistance.

For:  
GVH Consulting Ltd.

Greg Ven Huizen, M.Eng., P.Eng.  
Geotechnical Engineer



