

Appendix E



GeoWest Engineering Ltd.

200 · 34425 McConnell Road, Abbotsford, BC V2S 7P1

www.geowestengineering.com

info@geowestengineering.com | 604-852-9088

MEMORANDUM

Attention:	Jim Gordon, P.Eng., City of White Rock	Date:	April 20,2022
cc:		From:	Calum Buchan, P.Eng.
Project:	Marine Drive Hump Vegetation Management	File:	GA22-1085-00
		Sent Via:	email
Subject:	Geotechnical Review of Vegetation Management Strategy		

At the request of the City of White Rock (the City), GeoWest Engineering Ltd. provides herein our preliminary geotechnical comments with regard to vegetation management along the steep hillside that supports Marine Drive between Cypress Street and the White Rock Pier. This hillside is commonly referred to as the “Hump” and is predominantly located on BNSF Railway property. Aerial images taken of the Hump in late 2019 are provided below for reference.



Photo 1: Looking west across Hump to the White Rock Pier



Photo 2: Looking eastward from above top of Hump

It is understood that the City has an agreement with BNSF allowing them to enter the BNSF property to maintain the slope stability. The Hump has three metal bin wall structures constructed by the City on BNSF property that support Marine Drive, the largest of which was recently stabilized to provide enhanced resiliency against earthquake and natural hazards. GeoWest conducted the slope stability assessment, designed the repairs, and completed the engineering review of the slope remedial works. The author of this memorandum has also conducted previous geotechnical assessments of the Hump slope dating back to Circa 2009.

It is understood that the City is considering actively managing the vegetation growth on the Hump and have provided GeoWest with the attached *Character Analysis of Plant Community on Hump* document for our review from a geotechnical perspective. It is understood that cutting and mowing of vegetation is planned to maintain views from Marine Drive. The arborist that prepared the document opined that the cutting back of vegetation will not have a negative effect on the health of the vegetation.

The majority of the Hump is inclined at or near its angle of repose. The vegetative cover provides a vital role in maintaining its stability by way of root reinforcement and by controlling surface water and groundwater pore pressures. Deeper rooting tree species provide the greatest mechanical root reinforcement benefit, but taller growing trees can become a destabilizing windthrow hazard and would also block views from Marine Drive.

It is our considered opinion that vegetation management on the Hump by way of tree cutting will be beneficial for the slope stability, provided that appropriate native woody species well suited for the exposure and climate are established and maintained throughout the steep hillside area.

We trust that the information provided herein meets your immediate needs. Should you require further assistance, please contact the undersigned.

GeoWest Engineering Ltd.

Per: Calum Buchan, P.Eng., FEC
Principal Geotechnical Engineer

REVIEWED BY:
Michael Gutwein, P.Eng.
Senior Geotechnical Engineer

Attachment: *Character Analysis of Plant Community on Hump*

Character Analysis of Plant Community on Hump

The composition of the plant community on the hump includes an emergent canopy of mostly woody native pioneer species with an understory of invasive Himalayan blackberry. There are small fragmented occurrences of other native and invasive species that account for < 5% of the total plant community.

Individual species tend to be occurring in large monospecific groups that indicate site-specific soil moisture conditions. E.g. Bitter cherry growing high on the slope where it is drier and bigleaf maple growing lower on the slope where more moisture accumulates.

This plant community represents an early stage of ecological succession which is ultimately superseded by multiple stages of coniferous forest.

Primary Plant Species of Vegetation on Hump					
Species	Mature height	Growth rate from stump sprouts	Root system	Regenerates after basal pruning	Notes
<i>Prunus emarginata</i> , bitter cherry	<15m	<2m/season	Shallow with many lateral branches	Yes – at any stage of maturity	Indicator of moderately dry soil moisture
<i>Alnus rubra</i> , red alder	<40 m	<1m/season	Extensive fibrous root system	Yes – only on young trees	Indicator of high soil moisture
<i>Acer macrophyllum</i> , bigleaf maple	<30 m	<5m/season	Shallow but wide root system	Yes – at any stage of maturity	indicator of moderate soil moisture
<i>Abies grandis</i> , grand fir	<70 m	n/a	Relatively deep taproot with surface laterals	No	top dieback on single specimen – likely due to dry soil conditions
<i>Rubus armeniacus</i> , Himalayan blackberry	<3 m	<5m/season	Low branching density, roots up to 10 m long and 1 m deep	Yes – at any stage of maturity	Will out-compete most newly introduced plants.

Mowing Vegetation on the Hump

All of the species in this plant community are adapted to regenerate after fire or grazing events and will regenerate vigorously if cut back to < 1m in height. A program of cutting back vegetation every three years will not have a negative effect on the health and vigor of this plant community. Woody plants will produce 1 m – 5 m of regrowth each year after having been cut back. Allowing 2-3 years of regrowth will allow plants to continually support a healthy root system.

Sources:

[silvics_mb.pdf \(gov.bc.ca\)](#)

[silvics_vb.pdf \(gov.bc.ca\)](#)

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/tree-species-selection/silvics_dr.pdf

[Grand fir - Province of British Columbia \(gov.bc.ca\)](#)

[Himalayan Blackberry Factsheet 20190220.pdf \(bcinvasives.ca\)](#)

General Composition of Plant Community – West Side of Hump

*Areas not indicated with a colour code are Himalayan blackberry.



General Composition of Plant Community – Top of Hump



Sources:

[silvics_mb.pdf \(gov.bc.ca\)](#)

[silvics_vb.pdf \(gov.bc.ca\)](#)

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