



# STAFF REPORT TO COMMITTEE

**DATE OF REPORT** February 9, 2022  
**MEETING TYPE & DATE** Committee of the Whole of March 23, 2022  
**FROM:** Environmental Services Division  
Engineering Services Department  
**SUBJECT:** Regional Landslide Hazard Assessment  
**FILE:** 5280-30

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## PURPOSE/INTRODUCTION

The purpose of this report is to present the results of the Regional Landslide Hazard Analysis.

## RECOMMENDED RESOLUTION

That it be recommended to the Board:

1. That the Landslide Hazard Assessment prepared by Stantec Consulting Ltd. in association with Palmer in December 2021, be received.
2. That staff report back to the Electoral Area Services Committee on the process for updating the OCP for the Electoral Areas to incorporate the mapping and recommendations of the Regional Landslide Hazard Assessment.
3. That the Landslide Hazard Assessment be referred to the Emergency Management Division to inform the regional disaster risk reduction program and emergency preparedness.

## BACKGROUND

The Environmental Services Division has been leading a number of natural hazard risk assessments as part of the Climate Adaptation Program and to inform the identification of hazard lands required in Official Community Plans.

Climate change projections for the region identify increasing annual winter precipitation and more frequent intense storm events. The intense rainfall from these storms increases the likelihood of landslides on unstable slopes within the region.

In 2020, a pilot project applied a debris flow runout analysis to better understand the landslide hazards on the north shore of Cowichan Lake and mapped how these landslides would spread across the landscape. A line was then established beyond which no landslides are expected to cause damage. Upslope of the line, geotechnical assessments are required to ensure developments fall within the guidelines of the Natural Hazard Risk Tolerance Policy.

In 2021, Stantec Consulting Ltd. in association with Palmer expanded on the pilot project to carry out a Landslide Hazard Assessment for the remainder of the developed portions of the region including the watersheds above developed areas.

## ANALYSIS

The Stantec / Palmer analysis includes an inventory of 297 historic landslides which are used to develop a landslide hazard model for the region based on factors including slope, geology, and precipitation. The model shows that over 91% of the study area is at low or very low risk of experiencing a landslide. Areas where the landslide hazard is moderate or greater are concentrated on the steep hillsides around Cowichan Lake (the original area of assessment). With

the exception of the Youbou area (previously analyzed in the pilot project), the areas at highest risk of a landslide (high or very high hazard) are located away from residential developments.

The debris flow predictor model was applied to five areas with the highest landslide hazards:

- A. Caycuse
- B. Cottonwood Creek – Youbou Lands, Pine Point
- C. Honeymoon Bay & Mesachie Lake – Ashburnham Creek, Sutton Creek, Robertson River
- D. Bald Mountain – Woodland Shores
- E. Highway 18 – Above Skutz Falls Road and Mayo Road

For each location, landslides were simulated originating in areas with high or very high landslide hazards and the runout of these landslides was mapped to determine the furthest downslope any debris would be expected to travel. These hazard zones are conservative as they are based on a scenario of 90% of the simulated landslides occurring simultaneously. For Model Areas D and E, the consultants applied adjustments to the model parameters to simulate a more probable scenario of the impacts to downslope development. For all modeled areas, the No Debris Flow Zone identifies areas where the likelihood of a debris flow is below the 1:10,000 risk threshold identified in the Natural Hazard Risk Tolerance Policy.

Two potential areas of concern are identified from the debris flow runout model. The Woodland Shores area is located below slopes from which there is a Moderate (1:2,000) chance of a landslide occurring. While this risk is lower than in High or Very High hazard areas, a landslide originating on the south slopes of Bald Mountain could extend right to the shore of Cowichan Lake. In the Cottonwood Creek drainage, debris flows from High Hazard areas could extend to the shore of Cowichan Lake in two locations: the eastern extent of the old Youbou Mill property (the Youbou Lands) and in the area adjacent to Pine Point. Current development in this latter area is limited to seasonal dwellings.

In addition to the debris flow analysis, Stantec / Palmer examined the hazards for Rockfall from exposed rock bluffs within the study area. Three main areas were identified where there is the potential for rockfall to impact downslope development: North shore of Cowichan Lake (Cottonwood Creek to Meade Creek); Mt. Tzouhalem (east and west flanks); and, Mt. Prevost. In these locations, Stantec / Palmer used an energy angle approach to determine the maximum extent of observed rockfall and used that to identify the rockfall shadow or area likely to be exposed to future rockfall. While there is no development below the outcrops on the Mt. Prevost buttress, in the other rockfall areas there is the potential for rockfall to reach residential developments as well as impacting roads and other linear infrastructure. The mapping identifies locations at risk in the Youbou Area as well as in the Khenipsen Road and Genoa Bay Road areas of North Cowichan. It should be noted that this analysis does not consider land-cover. In many instances, existing forested slopes may block much of the potential rockfall before it reaches developments below.

The regional landslide assessment identifies areas within the region where there is a potential hazard due to debris flows or rock avalanches. This analysis can be used as the basis for a development permit area to ensure future development identifies and mitigates the potential hazards due to upslope landslides.

The Regional Landslide Hazard Assessment is available here:

<https://cvrd.ca/DocumentCenter/View/103121/Regional-Landslide-Hazard-Analysis>

#### **FINANCIAL CONSIDERATIONS**

There are no financial considerations at this time.

### COMMUNICATION CONSIDERATIONS

The hazards identified in the Stantec / Palmer report have been shared with staff at the Municipality of North Cowichan and the Ministry of Transportation and Infrastructure. The technical study and outputs will be posted to the CVRD Natural Hazards web page.

Communication will take place with residents living within or adjacent to lands subject to landslide hazards to inform residents about the analysis and of steps they can take to learn more about the hazards and how to mitigate any risks as part of the Modernized Official Community Plan process.

### STRATEGIC/BUSINESS PLAN CONSIDERATIONS

The regional landslide analysis supports Corporate Strategic Objective #3, protecting our communities from the adverse impacts of climate change.

### GENERAL MANAGER COMMENTS

☐ Not Applicable


Referred to (upon completion):

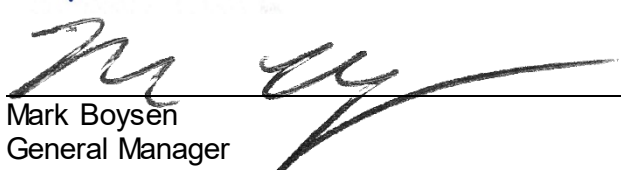
- ☒ Communications & Engagement
- ☒ Community Services *(Cowichan Community Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Emergency Management, Facilities & Transit)*
- ☐ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology, Procurement)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☒ Land Use Services *(Community Planning, Planning – Strategic Initiatives, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*

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Reviewed for form and content and approved for submission to the Committee:

Resolution:

Financial Considerations:

☒ Corporate Officer

☒ Chief Financial Officer

**ATTACHMENTS:**

Attachment A –

Attachment B -