

Seismic landslide hazard mapping for Greater Vancouver, British Columbia

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The lower Mainland of southwest British Columbia (BC) hosts about 3.5 million people and significant infrastructures of national importance. Southwestern BC has the highest seismic risk in Canada with significant potential to cause earthquake-induced hazards including tsunamis, liquefaction and landslides. A Cascadia mega-thrust (M_w 9) earthquake is predicted to generate \$75 billion Canadian dollars in losses. This damage can be resulted from ground shaking or its secondary phenomena like landslides; ground shaking during earthquakes may trigger landslides that can damage or destroy buildings, bury roads and highways and kill and injure people. In Canada, during the past century and a half, landslides have caused more fatality than all other natural hazards combined.

Seismic hazard mapping for landslides integrates topographic, geotechnical and seismological information to develop the earthquake-induced slope displacements map which is indicator of seismic landslide potential. In this study we use a pseudo-probabilistic Newmark displacement analyses for regional landslide susceptibility mapping and its application will be illustrated with developing earthquake induced landslide hazard map for the quadrangle in Greater Vancouver area. The predicted displacements are assigned to the defined grids to come up with the final seismic landslide hazard map. The seismic landslide hazard map predicts very low hazard level (displacement < 5 cm) for the selected region which is in agreement with the observations in our field survey in July 2018 where no signs of deformation were recorded (e.g. cracks, settlements, previous landslides, scarps).