

LANDSLIDE & EROSION

We have a plan to adapt.

Together, we can shift the course of climate change impacts. Read this brochure to learn about erosion and landslide risk in our region, how it could affect you, and information to help you be prepared. Stay up to date:

CVRDNEWNORMALCOWICHAN.CA



Landslide risk in the Cowichan region is a reality.

The Cowichan region's hilly terrain, deep ravines, flowing rivers, and coastal cliffs form some of the most striking scenery of this region — yet many of these areas are also vulnerable to natural hazards like erosion and landslides. Climate change is increasing these risks. Wetter winters, drier summers, and extreme weather can affect stability of slopes, increasing potential for erosion and landslide. Impacts can be catastrophic to people, property, and critical infrastructure like roads and power lines.

How can we prepare for the new normal?

Be prepared and understand your risks.

Cowichan Region Climate Adaptation Partners have been working together to study and prepare for the impacts of climate change. Together, we are taking steps to implement risk management at the community level through a Board-approved Climate Adaptation Strategy.

Residents, businesses, and property owners also have responsibility to prepare. Knowing the risks helps people mitigate potential impacts on private lands, increases personal safety, and prepares us to respond quickly in the event of an emergency.



COWICHAN
ADAPTS



ABOUT LANDSLIDES

A landslide is a downslope movement of a mass of rock, earth, or debris and can happen without warning.

Landslides occur in steep or mountainous areas when disturbances affect the natural stability of a slope. The type of sub-surface materials that make up a slope can affect landslide risk. For example, areas with weak or fractured rock or varied soil layers can be more vulnerable. Risk of landslide has increased in the Cowichan region in recent years. Here's why:



Heavier precipitation, intense storms, and flooding can increase erosion and saturate the ground, reducing slope stability. During major weather events the risk of landslides or wash-outs increases.



Development above, on, or below slopes increases risks to human safety and property impacts in landslide prone areas. While current development regulations require careful slope stability analysis when siting new development, some historical development areas may have higher risks.



Vegetation loss and deforestation related to development, industry, drought, wildfire, disease, or other activities can leave land more vulnerable to landslides. Tree roots and vegetation hold soils, helping to stabilize slopes.

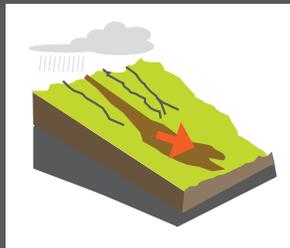


Activities such as agriculture, improper excavation or soil removal, tree and vegetation removal, and building and construction can impact downslope areas. Proper assessment of slope stability prior to undertaking work protects your property and downslope properties from risk.

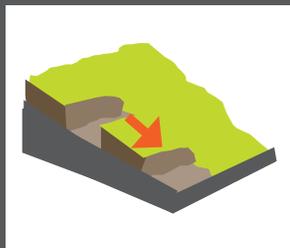
ABOUT LANDSLIDES

Landslides types vary depending on the ratio of water mixed with slide material. Types of landslides that could occur in the Cowichan region include:

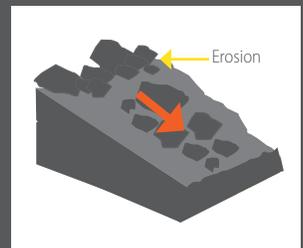
- ▶ **Debris Flows:** Rapid mass movements of saturated surface material and organic debris. High water content makes a slurry flow, like wet concrete.



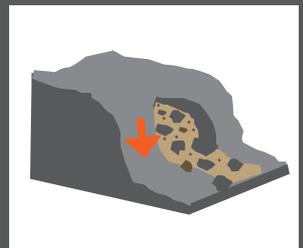
- ▶ **Debris Slides:** Rapid sliding masses of surface material that move as a solid rather than a slurry or a liquid.



- ▶ **Rock Slides:** Large disintegrating masses of bedrock that move downslope by sliding.



- ▶ **Rock Falls:** Detached masses of bedrock that fall, bounce, or roll. Rock falls typically have small volumes, but may occur frequently.



Three factors characterize landslides: velocity; sediment concentration by weight; and sediment concentration by volume.



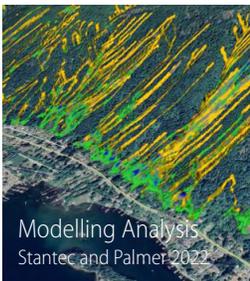
MANAGING RISK: SLOPE STABILITY ASSESSMENTS

Slope stability assessments provide a general understanding of slope hazards. The assessment identifies where more detailed slope stability investigations are required if building or planning to build in a steep slope area.



Ravine Bluffs in Saltair
Stantec and Palmer 2022

Saltair Coastal Slope Stability Assessment (2022): The CVRD has undertaken rockfall assessments and slope stability assessments across the region to identify potential landslide risks. Adaptation measures include appropriate setbacks for new developments and geotechnical (ground) engineering evaluation to confirm what can be built.



Modelling Analysis
Stantec and Palmer 2022

Youbou Area Geohazard Risk Assessment - Landslide Run-out Analysis (2020): The CVRD carried out debris flow hazard mapping and modelling around Youbou's steep slopes above Lake Cowichan. Further studies have clarified which properties are located in hazardous zones and the extent of potential damage. Information helps support planning and development decisions and the measures that owners can take to mitigate risks.

Did You Know?

The CVRD has established a **Natural Hazard Risk Tolerance Policy** to inform land use planning and development decisions in areas prone to natural hazards. It allows development in hazardous areas to be done in ways to mitigate the risks to acceptable levels. The CVRD also has a **risk assessment review and assurance process** that determines levels of acceptable risk in development proposals.

ADAPTATION TO MANAGE RISK

We can adapt to the risk of erosion and landslide in our region by taking a proactive approach to prepare our social, economic, and environmental systems for the impacts of a changing climate. Here's how.



Continue to **identify and share information** about high risk areas for erosion and landslides



Continue to **complete regional mapping and modelling** to identify unstable areas



Manage new development in hazardous zones and consider mitigations in established communities (e.g., drainage improvement, slope stabilization, engineering solutions)



Develop and implement risk management strategies at the community level, such as research and assessment, awareness programs, policy, and capacity building



Encourage the public to learn more about landslide risks and being prepared



Educate the development community about erosion risks and appropriate building permit processes



TOOLKIT

Use these tools to help understand landslide risks in your community, how you can prepare, and what to do if a landslide occurs.

Be Ready for Erosion and Landslides.

BEFORE AN EVENT

- ▶ Learn about landslide risks in your area, especially if you live near a ravine or steep slope
- ▶ If you are planning improvements or new development on your property, follow permitting requirements and involve technical experts like geotechnical (ground) engineers
- ▶ Avoid actions that increase instability such as undercutting steep slopes, draining your pool onto a slope, or placing fill on a steep slope
- ▶ Recognize warning signs that can precede a landslide such as slope cracks or bulges, sudden changes in stream flow, increases in murky water, debris accumulation, or falling rocks
- ▶ Make an emergency kit in case you are trapped due to damaged roads or power lines

DURING AN EVENT

- ▶ Stay safe! Leave the area immediately if you hear sounds such as trees breaking or rocks moving
- ▶ If indoors, go to an area of the building furthest away from an approaching landslide and take cover
- ▶ Watch for secondary risks that can follow a landslide such as flooding, downed power lines, and damage to structures

AFTER AN EVENT

- ▶ Report a landslide to your local authority or First Nation
- ▶ Stay away from the slide area as the ground is still unstable
- ▶ Listen to local media for updates

RESOURCES

- ▶ Use the [Province's landslide hazard resource website](#)
- ▶ Know your risk by viewing the [Province's landslide risk hazard map](#)
- ▶ Read BC's Emergency Preparedness Guide for [households](#), [small businesses](#), and [tourism operators](#)
- ▶ Read [BC's Landslide Information for Homeowners and Home Buyers Guide](#)
- ▶ Read CVRD's [Hazard Acceptability Thresholds](#) and [Assurance Guide](#)
- ▶ Learn more about landslides and how to prepare on the [Red Cross web page](#)
- ▶ View the Canadian Government webpage: [how to minimize landslide risks](#)



Stay connected, monitor progress, and find tools about how you can adapt
CVRDNEWNORMALCOWICHAN.CA