

Working from the same page

consistent messages for CDEM

PART B: Hazard-specific information



Kelson, Lower Hutt, 2006

Landslides

- ▶ Learn if landslides, including debris flows, could occur in your area by contacting your local council.
- ▶ Get information on specific locations that are vulnerable to landslides.
- ▶ Request a professional referral for a detailed landslide-vulnerability analysis of your property, and take corrective measures if necessary.

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CORE ACTION MESSAGES IN THIS CHAPTER (pp7–10)

- ▶ **Determine your risk.**
- ▶ **Prepare members of your household.**
- ▶ **Consult an expert and mitigate and/or reduce potential problems.**
- ▶ **Be alert to changes and patterns in the land.**

For general preparedness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household at risk from landslides should take specific precautions and plan for and practice what to do if a landslide occurs.

- ▶ **Monitor local news.**
- ▶ **Consider evacuating.**
- ▶ **Look and listen for signs of landslides.**
- ▶ **Get out.**
- ▶ **Inform your neighbours.**
- ▶ **Contact local officials.**
- ▶ **Get out of the landslide's path.**
- ▶ **Stay away from the slide area.**
- ▶ **Help others.**
- ▶ **Report hazards.**

Please note: Core Action Messages should be read in conjunction with the rest of the text in this chapter.

Awareness messages

Why talk about landslides?

Landslides are a serious geological hazard throughout much of New Zealand. Few areas are immune to landslide hazards. Landslides are a normal and natural erosion process, but they can be dangerous. Landslides which have caused fatalities in New Zealand in the past include the 1846 Waihi landslide, which claimed 60 lives. In 1923, a rail crash occurred in the King Country when the Auckland to Wellington express train ran into a huge slip covering the rails at Ōngarue, near Taumarunui. Seventeen people were killed and 30 seriously injured. While not resulting in deaths, landslides such as the 1979 Abbotsford event and the 2005 Matata debris flow highlight the destructiveness of landslides.

What are landslides?

The term “landslide” describes many types of downhill movements of rock, soil, and vegetation under the influence of gravity. Some landslides move so rapidly that they destroy property and take lives suddenly and unexpectedly, whereas others move slowly and gradually, causing damage to property and infrastructure, but rarely killing people. However, potential can exist for slow landslides to become fast ones, e.g. the 1979 Abbotsford landslide. Landslides come in many sizes, from one or two small falling rocks to immense landslides many cubic kilometres in volume. Most deaths and damage come from landslides with displacements (run-out) over a considerable distance, such as rapid debris flows (landslides that are flow-like in character). Debris flows are among the most dangerous and damaging of all landslide phenomena and their potential for destruction often cannot practically be reduced.

Why do landslides occur?

Gravity is the driving force of landslides, but they can be triggered by any of several factors alone or in combination. Triggering factors include heavy rain, periods of prolonged rainfall (typically associated with wet seasons), freezing and thawing, snowmelt, erosion, poor construction and excavation practices, earthquake shaking, and volcanic eruptions. However, some landslides have no triggers. When the triggering factors are regional in extent, many landslides can be triggered at once, e.g. the Northland 2007 rainstorms which affected an area of approximately 10km² triggering over 10,000 landslides.

Where do landslides occur?

Few areas of New Zealand are completely free of landslide hazards. In general, landslides are most likely to occur on slopes in weak materials. An indicator of unstable slopes is the presence of existing landslide scars. As landslides typically form in similar topographic settings to older ones there may be new landslides occurring in past landslide locations, or adjacent to where landslides have previously fallen, or they can be reactivations of past landslides. There may be historical records of past landslides or landslide damage, or the past landslides may have been prehistoric. The evidence of past landslides sometimes can be very subtle, but generally even subtle evidence can be recognised by appropriately trained specialists (engineering geologists, engineering geomorphologists and geotechnical engineers). Where there is evidence that dangerous landslides can reoccur in the future, sites of past landslides are best avoided.

When do landslides occur?

Landslides are most commonly associated with periods of heavy rain, and greatly worsen the effects of flooding. They also are associated with large earthquakes, and can greatly worsen the effects of them too. For instance, the Murchison earthquake of 1929 killed 17 people – 16 as a result of landslides it generated. Current, or recently completed excavations also can cause dangerous landslides, and especially so during rain or earthquakes.

Although most landslides are associated with heavy rain, earthquakes, or excavations, some can be delayed from their triggering event, falling minutes, hours, days, or weeks after the initial trigger. This is because some landslides go through an interval of slowly accelerating creep that at first may be imperceptible.

Will there be a warning and what are the danger signs?

Most landslides occur without public warning. Public warning generally can be given only after landslides have started to occur. Anybody seeing a landslide, or suspecting that a landslide might occur, must decide their own course of action. For their own safety, they must decide whether to remain in their current position or to evacuate. The most recognisable sign of danger is very heavy rain. There is prospect for regional forecast warning of rainfall-triggered landslides that might be issued along with heavy-rain warnings, but this is not yet in place.

Landslides have features that clearly identify them. Recognition of these features makes it possible to identify landslides from aerial and ground inspections. Important landslide features, their significance, and some simple ways to recognise both active and inactive landslides, and erosion features are summarised in Figure 1 and Table 1.

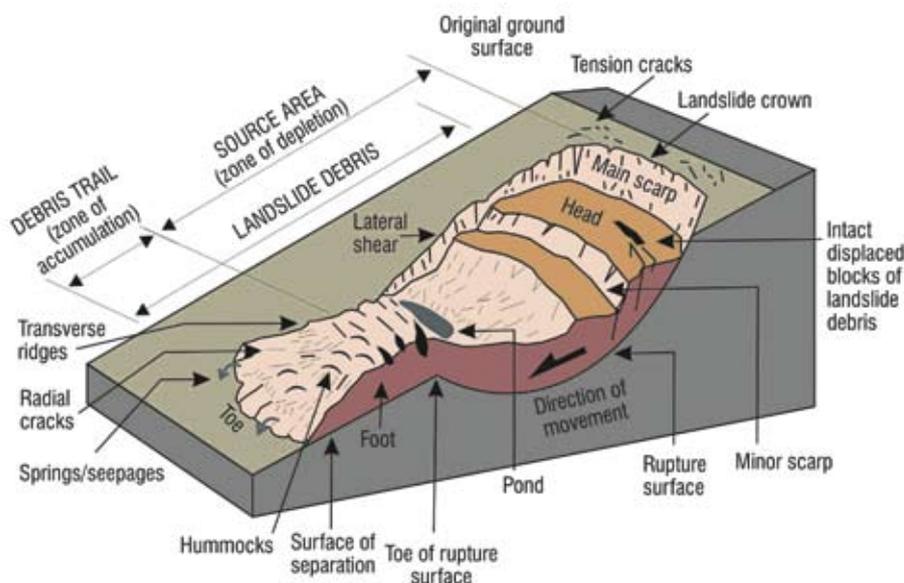


Fig. 1 Landslide features (GNS Science)

Table 1 Landslide terms and definitions

Landslide terms	Definition
Active landslides (and recently active or dormant landslides)	
Landslide scar	Includes the source area and debris trail.
Source area	The area at the head of the landslide (zone of depletion) where the landslide mass (debris) is derived from.
Landslide debris	Material (rock, soil, vegetation) displaced from the source area and transported down-slope by gravity.
Main scarp	The main scarp is the steep slope in undisturbed ground at the head of the slide (head scarp) – the visible part of the failure surface. Minor (secondary) scarps may be present within the displaced material of the landslide mass
Tension cracks	Often located upslope of the landslide main scarp and tend to be aligned in an arc, and can be continuous or discontinuous, but are essentially linear. These indicate horizontal (pull-apart) movement, but may also show vertical and shear movement.
Hummocky ground	Ground surface irregular, often formed of low hummocks, resulting from uneven deformations within the displaced material – a feature of many landslides (active and inactive).
Ponds (un-drained)	Ponds formed in depressions, which are often un-drained, are present within the displaced material of many landslides, especially at the slide head; they may be filled by seepage from springs, or by rainfall.
Springs, seepages	Give rise to areas of swampy or boggy ground; seepage water may accumulate in ponds.
Trees with curved trunks or leaning backwards	Wind, steep topography and ground movement can all give rise to non-vertical tree trunks. Care is required in their interpretation as additional supporting evidence of landslide movement is required.
Disruption of natural drainage	May be seen directly or inferred from seepages. Also, where landslide debris may have totally/partially blocked a drainage line, or where the drainage line has been forced to alter its course.
Cracking to structures and paved surfaces and dislocation of drainage structures	These can also be related to local settlement of fill and foundations, so additional supporting evidence is required, e.g. presence of a source areas/landslide debris, tension cracks, trees leaning backwards.
Relict landslides (inactive old landslides with little potential for reactivation)	
Relict landslides typically have eroded, rounded and subdued features, with no sharp features or bare scarps visible. The main scarp is generally eroded and well vegetated. The displaced landslide mass often has ponds and hummocky and irregular ground. Generally, no cracks or indications of movement are visible. Trees and established vegetation show no evidence of tilting, non-vertical trunks, or disturbance.	

Will there be a warning and what are the danger signs? (continued)

The most obvious sign of landslide danger is the occurrence of a landslide, no matter how small. When small, steep streams start to run dirty there is a landslide danger. Bulging, cracked slopes, tilting trees, cracks in pavements and buildings can all be warning signs that a landslide is moving. After landslides have started to occur, the danger remains very high as long as the situation that led to the landslides continues. For example, if a landslide occurs during rain, the danger of further landslides remains high as long as the rain continues. The danger diminishes, but does not vanish when the rain ceases. At the site of a landslide, only a technical expert is likely to have the expertise to evaluate whether the danger has passed.

When earthquakes are large enough to trigger landslides, there remains a danger that further landslides may be triggered by strong earthquake aftershocks, which may occur up to months after the initial earthquake. Slopes can be weakened by earthquake ground shaking and become more susceptible to landslides in further shaking, and in rain.

How can I protect myself from landslides?

Landslides generally happen where they have occurred in the past, and in identifiable hazard locations. Areas that are prone to landslides include existing old landslides, steep slopes, drainage channels on steep slopes, stream/river banks and coastal cliffs.

Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat areas away from sudden changes in slope, and areas at the top of or along ridges, but set back from the edge of slopes.

People can reduce their personal risk by learning about potential local landslide hazards and taking steps to reduce those hazards.

Landslides are usually isolated events occurring without public warning. If you live in a landslide-prone area, be alert, particularly during periods of heavy rainfall or snowmelt. If you see signs of a landslide or suspect a landslide may occur, you must make the decision to evacuate yourself.

Action messages

Be prepared for a landslide: protect yourself

CORE ACTION MESSAGES

- ▶ **Determine your risk.**
- ▶ **Prepare members of your household.**
- ▶ **Consult an expert and mitigate and/or reduce potential problems.**
- ▶ **Be alert to changes and patterns in the land.**

For general preparedness, every household should create and practice a Household Emergency Plan and assemble and maintain Emergency Survival Items and a Getaway Kit. In addition, every household at risk from landslides should take specific precautions and plan for and practice what to do if a landslide occurs.

If you are at risk from landslides, you should:

1. Develop an evacuation plan. If your home could be damaged in a landslide, you should know where to go if you have to leave. Making plans at the last minute can be upsetting, create confusion, and waste precious time. Contact local authorities to learn about the emergency response and evacuation plans for your area and develop your own emergency plans for your family and business.
2. Familiarise yourself with the land around you. Knowing the land can help you assess your risk.
3. Regularly inspect your property – watch the patterns of storm water drainage on slopes near your home and especially the places where runoff water converges, increasing flow over soil-covered slopes. Watch the hillsides around your home for any signs of land movement, such as small landslides or debris flows, or progressively tilting trees. Noticing small changes could alert you to an increased threat of a landslide.
4. Discuss landslides and debris flows with members of your household – everyone should know what to do to stay safe if one occurs.
5. Keep the storm water system working effectively by keeping gutters, down-pipes and drains free of dirt, leaves and other blockages. Trim back or remove vegetation blocking drains and gutters.
6. Check retaining wall drainage for blockages and water build-up behind the wall.
7. If you are planning on building and believe the site may be affected by landslide, seek expert advice.

What to do during severe storms which can trigger landslides

CORE ACTION MESSAGES

- ▶ Monitor local news.
- ▶ Consider evacuating.
- ▶ Look and listen for signs of landslides.

During a severe storm, if you are in an area susceptible to landslides, you should:

8. Stay alert and awake. Many landslide fatalities occur when people are asleep.
9. Listen to radio stations for heavy rainfall warnings or check the MetService website (www.metservice.co.nz). Short bursts of heavy rain may be particularly dangerous, especially after longer periods of wet weather.
10. Watch for signs of slope movement, such as small slips, rock falls, subsidence or bulges at the bottom of slopes; cracks in the ground, plaster, brick work, tiles, foundations, retaining walls, driveways and other hard surfaces; tilting trees, walls or fences; building movement, such as doors or windows that stick or jam, and outside fixtures such as steps that are pulling away from buildings.
11. Consider leaving if it is safe to do so. Remember that driving during a severe storm can be hazardous. If you remain at home, move to a second storey if possible. Staying out of the path of a landslide or debris flow can save your life.
12. Listen for any unusual sounds that might indicate moving debris, such as trees cracking or boulders knocking together. A trickle of flowing or falling mud or debris may precede a large landslide. Moving debris can flow quickly and sometimes without warning.
13. If you are near a stream or channel, be alert for any sudden increase or decrease in water flow and for a change from clear to muddy water. Such changes may indicate landslide activity upstream, so be prepared to move quickly. Act quickly. Save yourself, not your belongings.
14. Be especially alert when driving. Embankments along roadsides are particularly susceptible to landslides. Watch the road for collapsed pavement, mud, fallen rocks, and other indications of a possible debris flow.
15. Bring your pets indoors and maintain direct control of them. Should you need to evacuate take your pets with you – if it is not safe for you, it is not safe for them.
16. Ensure livestock are in safe paddocks if there is heavy rain. Consider precautionary evacuation of livestock if you believe there is a risk of landslide.

What to do if you suspect imminent landslide danger

CORE ACTION MESSAGES

- ▶ **Get out.**
- ▶ **Inform your neighbours.**
- ▶ **Contact local officials.**

If you learn or suspect that a landslide is occurring or is about to occur in your area:

17. Evacuate immediately. Getting out of the path of a landslide or debris flow path is your best protection. Take your pets with you and/or move livestock to safe paddocks if you can do so without endangering yourself.
18. Inform neighbours. Your neighbours may not be aware of the potential hazard. Advising them of a threat may save their lives. Help neighbours who need assistance to evacuate.
19. Contact your local council. Local officials are the people best able to assess the potential danger.

What to do during a landslide

CORE ACTION MESSAGES

- ▶ **Get out of the landslide's path.**

If a landslide occurs, you should:

20. Get out of the way as quickly as you can. Moving away from the path of the landslide or debris flow to a safe area will reduce your risk.

What to do after a landslide

CORE ACTION MESSAGES

- ▶ **Stay away from the slide area.**
- ▶ **Help others.**
- ▶ **Report hazards.**

If a landslide occurs, you should:

21. Stay away from the slide area. Further landslides may occur.
22. Check for injured and trapped persons and animals near the slide, without entering the slide area. Direct rescuers to their locations.
23. Help people who require special assistance – infants, elderly people, those without transportation, families who may need additional help, people with disabilities and the people who care for them.

What to do after a landslide (continued)

24. Listen to local radio stations for the latest emergency information.
25. Landslides can occur progressively, often some time (hours/days) after a triggering event (e.g. rainstorm or earthquake). Be aware of any changes to your property/ground following a landslide or major rainstorm/earthquake, noting any cracks or ground bulging.
26. Watch for flooding, which may occur after a landslide or debris flow. Floods sometimes follow landslides and debris flows.
27. Look for and report broken utility lines (power, telephone) to appropriate authorities. Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury.
28. Check your home's foundation, chimney, and surrounding land for damage.
29. Re-plant damaged ground as soon as possible because erosion caused by the loss of ground cover can lead to flash flooding.
30. If your property has been damaged contact EQC and your insurance company.

Insurance

If your property sustains any damage:

31. Be aware that in general, landslide insurance is not available. However, the Earthquake Commission may pay out on claims lodged by residential property owners for damage caused by landslides to residential properties and their contents, outbuildings, land within eight metres of buildings and outbuildings, accessway land and a range of other structures and utilities. Full details and restrictions are available at www.eqc.govt.nz.
32. Residential property damage caused by landslide is covered by Earthquake Commission (EQC) insurance **providing** you already have house and/or contents insurance. If your property has been damaged, lodge a claim by calling 0800 326 243 or visit www.eqc.govt.nz.
33. If the value of damage to your property exceeds the limit of EQC cover, ring your insurer as soon as possible. In almost all cases the insurance company will send an insurance assessor to look at your property. They will confirm what repairs and replacements are needed and covered by your policy.
34. Photograph or video record your damaged property.
35. List the damage to your property and belongings.
36. If your insurance policy covers you for loss of perishable goods, make a list of all the foods you throw away. Include anything in your fridge or freezer ruined by loss of power.

Ask the insurance company:

37. How long it will be before the assessor visits.
38. If they will provide you with temporary accommodation. This could be a nearby motel, bed and breakfast, a static caravan or a rented house.

Insurance (continued)

Things to help with your insurance claim:

39. Confirm the insurance company will pay for any service or equipment you need.
40. Make a note of all telephone calls. Record the date, name and what was agreed.
41. Keep copies of all letters, emails and faxes you send and receive.
42. Keep receipts.
43. Don't throw anything away until told (except ruined food).
44. Depending on your policy, the insurance company may only offer to clean and repair something, not replace it.
45. If you rent your property, contact your landlord and your contents insurance company as soon as possible.
46. If you do not have insurance, your local council should be able to provide information on hardship grants or charities that may be able to help you.

Landslides general information

Media and community education ideas

If your area is prone to landslides, ask your local newspaper or radio or television station to:

47. Do a series on the dangers of landslides and debris flows.
48. Do a story featuring interviews with local officials about land use management, zoning regulations, and building codes for landslide safety.
49. Highlight the importance of staying alert to land and rainfall conditions.
50. Run public service ads about how to protect lives and property in a landslide.
51. Report on what local councils are doing to reduce the possibility of landslides.

Support your local council in efforts to develop and enforce land use and building ordinances that regulate construction in areas susceptible to landslides and debris flows. Buildings should be located away from steep slopes, streams and rivers, intermittent-stream channels, and the mouths of mountain stream channels.

Fiction and facts

Fiction: Landslides are caused by the earth collapsing into a hole or a void.

Fact: Landslides exhibit vertical and horizontal movement down a slope, and most are triggered by heavy rain and snowmelt, earthquake shaking, volcanic eruptions, and gravity.

Fiction: Landslides are caused by human activities such as logging, road construction, and farming on steep slopes.

Fact: Although human activities may cause landslides on unstable slopes, most landslides are caused by natural forces or events, such as heavy rain and snowmelt, earthquake shaking, volcanic eruptions, and gravity.

Useful links

- www.gns.cri.nz
- www.eqc.govt.nz
- www.metservice.co.nz
- www.teara.govt.nz/EarthSeaAndSky/NaturalHazardsAndDisasters/Landslides/en
- www.maf.govt.nz/mafnet/rural-nz/adverse-events/
- www.rural-support.org.nz/

Landslides general information

Useful numbers

Your important emergency household plan telephone numbers. Fill this out and keep this leaflet with your emergency items.

Contact	Details
Local authority emergency helpline	
Insurance company 24-hour	
Insurance number and policy number	
Local radio station (Frequency)	
School	
Family and neighbours	
Bank phone number and details	
Work phone numbers	
Medical Center/GP	
Local police station	
Vet/kennel/cattery/animal transporter	
Local hotel or B&B	
Gas supplier and meter number	
Electricity supplier and meter number	
Water supplier and meter number	
Electrician	
Plumber	
Builder	

