



**A Fact Sheet prepared by the National Telecommunications Safety Panel**

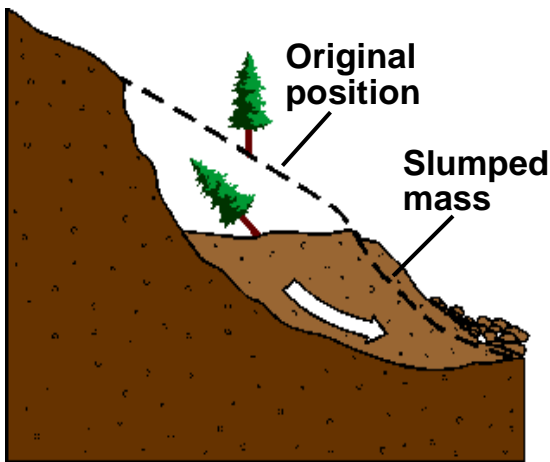
## Introduction

Landslides are a serious geologic hazard common to almost every state in the United States. They include fast-moving debris flows, slow-moving landslides, and a variety of flows and slides initiating from volcanoes. Each year, these hazards cost billions of dollars and cause numerous fatalities and injuries. Awareness and education about these hazards is a first step toward reducing damaging effects.

## Fast-moving debris flows

Debris flows start on steep slopes—slopes steep enough to make walking difficult. Once started, however, debris flows can even travel over gently sloping ground. The most hazardous areas are canyon bottoms, stream channels, areas near the outlets of canyons, and slopes excavated for buildings and roads.

- A.** Debris flows (also referred to as mudslides, mudflows, or debris avalanches) generally occur during intense rainfall on water-saturated soil. They usually start on steep hillsides as soil slumps or slides that liquefy and accelerate to speeds as great as 35 miles (56 km) per hour. Multiple debris flows that start high in canyons commonly funnel into channels. There, they merge, gain volume, and travel long distances from their source.



- B.** Debris flows commonly begin in swales (depressions at the top of small gullies) on steep slopes, making areas downslope from swales particularly hazardous.
- C.** Roadcuts and other altered or excavated areas of slopes are particularly susceptible to debris flows. Debris flows and other landslides onto roadways are common during rainstorms, and often occur during milder rainfall conditions than those needed for debris flows on natural slopes.
- D.** Areas where surface runoff is channeled, such as along roadways and below culverts, are common sites of debris flows and other landslides.

## What can you do if you work in Potential Debris Flow Areas?

1. Stay alert! Many debris-flow fatalities occur at night when people are sleeping. If you are working at night in an area with a potential for a debris flow, listen to a radio or warnings of intense rainfall. Be aware that intense short bursts of rain may be particularly dangerous, especially after longer periods of heavy rainfall and damp weather.
2. If you are in areas susceptible to landslides and debris flows, consider leaving the area if it is safe to do so. Remember that driving during an intense storm is hazardous.
3. 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 larger flows. 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 debris flow activity upstream, so be prepared to move quickly. Don't delay! Save yourself, not your belongings.
4. 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 possible debris flows.

## **What to do and look for during and immediately after heavy rains.**

### **Areas generally prone to landslides are:**

- On existing old landslides
- On or at the base of slopes
- In or at the base of minor drainage hollows
- At the base or top of an old fill slope
- At the base or top of a steep cut slope
- Developed hillsides where leach field septic systems are used
- Roadcuts and other altered or excavated areas of slopes
- Embankments along roadsides

### **Areas that are typically considered safe from landslides:**

- On hard, non-jointed bedrock that has not moved in the past
- On relatively flat lying areas away from sudden changes in slope angle
- At the top or along the nose of ridges, set back from the tops of slopes

### **Features that might be noticed prior to major land sliding:**

- Springs, seeps, or saturated ground in areas that have not typically been wet
- New cracks or unusual bulges in the ground, street pavements, or sidewalks
- Soil moving away from foundations
- Ancillary structures such as platforms, concrete pads, etc. moving relative to other structures
- Tilting or cracking of concrete floors and foundations
- Leaning telephone poles, trees, retaining walls, or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Change from clear to muddy water in a stream or channel

### **What to do if you suspect imminent landslide danger:**

1. If a landslide threatens, move very quickly in your vehicle a great distance from its likely path and keep clear of banks, trees, power lines and poles
2. Contact your local fire, police, or public works department of your observations
3. Inform your management

## **Additional Information:**

National Landslide Information Center, U.S. Geological Survey.

[http://landslides.usgs.gov/html\\_files/nlicsun.html](http://landslides.usgs.gov/html_files/nlicsun.html)

Landslide Hazards – FEMA

<http://www.fema.gov/hazards/landslides/>