

## Managing and preventing Landslips & Erosion

There are common management and preventative actions for dealing with landslips and erosion. These actions involve works which improve drainage and restoring vegetative cover, and can be used to deal with sites which have already slipped or eroded and sites which show potential to slip or erode. Preventative measures should initially involve learning to recognize the potential for a landslip or erosion to occur by identifying slip-prone and erosion-prone areas in and adjacent your farm. The factors which cause landslips and erosion are not constrained by property boundaries, so a collective approach from neighbouring landowners is encouraged.

- Drainage should be aimed at reducing the excess water content in the landslip or gully/tunnel erosion site and at preventing further build-up of water by diverting water away from the site to more stable ground (eg. via diversion banks above the site).
- Locally-native vegetation including deep-rooted perennial grasses, shrubs and trees should be re-established on and above the site to use up excess water. Stock should be permanently excluded from the planted area. Keeping stock out will preserve your new plantings and will prevent further damage to the unstable ground. See this as an opportunity to establish a shelterbelt for improved farm productivity or a woodlot for a source of firewood for your use. Local wildlife will see this site as a place of habitat and refuge, and a source of food.
- Avoid (further) soil disturbance and removal of vegetation. Constructing tracks, roads, dams, cattle yards and so on will inevitably require removal of vegetation. Locate such infrastructure on more stable ground. Tracks should be located along ridges or at the base of slopes, not across the face of slopes.
- Avoid the temptation to create a dam in a slip prone area as collecting and holding water will only compound problems in the immediate area.

If you assess the site as having only low potential for slipping or erosion (tunnel or gully), and is therefore still suitable for grazing, then maintain good pasture coverage and don't over-stock.

In the case of stream-bank erosion, replace willows and other exotic species with suitable locally-native riparian species. Fence off the riparian zone to exclude stock access to the stream. Consult with your local Catchment Management Authority regarding financial and technical support for such works. Similarly, if you have invasive waterways weeds such as Sweet Reed Grass, seek advice from your CMA for the best way to control them.

Apart from managing the problem area, re-establishing locally-native vegetation at the site of your landslip or erosion will yield other benefits:-

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**Improved Farm Productivity** – the planting of shrubs and trees will create a shelterbelt for stock grazing in adjacent paddocks (crops will also benefit from the shelterbelt); and

**Improved Bio-diversity** – vital habitat is created for local wildlife, particularly if the plant species chosen include a rich mix of locally-native species.

If the site shows signs of developing tunnel erosion (that is you have detected it early in the form of small holes and cracks appearing in the ground) then you may be able to repair and rehabilitate the site by:-

- Improving drainage at the site and by diverting water away from the site before it enters the new tunnel
- Deep ripping the forming tunnel in Autumn to break it up
- Cultivating the area and including deep-rooted pasture species in your seed mix

### What Next ?

To discuss in more detail any topic raised in this guide please contact the Natural Environment Team at Baw Baw Shire Council on 5624 2411. They can also assist with information on Rural Tree Grants and Fencing Grants, weed control, species suitable for revegetating erosion areas and revegetation techniques.

### References & Further Reading:

- Practical Landcare guide series published by Latrobe Catchment Landcare Network – free from the network and from Baw Baw Shire Council
- [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) – search this website on keywords “landslips” and “erosion”
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For severe landslip problems, contact a geotechnical expert who specialises in land and subsoil characteristics and rehabilitation. The authors advise that the information presented in this brochure, including any management advice, has been prepared with all due diligence and care, and based on the best available knowledge and research.

### Acknowledgements:

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Photos: Mike Houghton, Nicole Driessen



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For advice on what funding may be available to help you implement your project or to discuss in more detail any topic raised in this booklet please contact the Westernport Catchment Landcare Network on (03) 5941 8446 or 0429 613 974. If required a visit to your property can often be arranged. You can also visit [www.wpcln.org.au](http://www.wpcln.org.au) for further information.

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## What are Landslips & Erosion ?

**Landslips** are a mass movement of soil down a slope, and they may appear as a rather dramatic slump or as a gradual soil creep. Soil creep is less obvious and appears as terracing across the face of a slope (often mistaken for animal tracks).

**Erosion** is the movement of soil by water or wind. In hilly areas of high rainfall, such as here in Gippsland, it can take a number of forms and this guide focuses on:-

**Stream-bank erosion**, whilst a natural process which involves movement of sediments in a stream system, occurs where streams begin cutting deeper and wider channels as a consequence of increased peak flows or the removal of bank-side vegetation.

**Gully erosion** is the removal of soil along drainage lines by surface water runoff. Over time, and unless managed by the landowner, gullies will grow and their sides collapse.

**Tunnel erosion** is the removal of sub-surface soil by the action of water, and its presence is often noted long after the process has commenced.

**Land-slipping** and these 3 forms of erosion are all processes which involve the unwanted movement of soil by water. There are common causal factors, and therefore common management actions, for dealing with them after the event, as well as preventative measures to take before the event.

## Why Landslips & Erosion are a problem

Landslips and erosion impact *farm production* due to:-

- Loss of accessibility to farm vehicles
- Loss of topsoil exposing infertile subsoil such as clay
- Germination of weeds on disturbed soil
- Loss of stock and crops
- Loss of farm infrastructure such as fences and tracks
- Sedimentation of dams
- Loss of valuable nutrients

Furthermore, there are adverse impacts on the *natural environment*. Erosion on the farm results in sedimentation in waterways downstream of the farm, adversely affecting water quality in streams and rivers which all eventually drain into our estuaries, bays and ocean. Excessive sedimentation de-stabilises streams and can cause them to change course over time. Loss of aquatic habitat may occur. Infrastructure such as bridges and pump stations may be damaged. Floods in urban and farmed areas may result. Some nutrients are also carried by soil particles, and excessive levels of phosphorus create algal blooms in waterways such as the Gippsland Lakes.

## Recognising Landslips & Erosion



### Slumped landslip

Slumped landslips can be easily observed as dramatic collapses of ground, with exposed subsoil faces (scarps) and cracked surfaces.



### Creeping landslip

Look for terracing and/or bulging ground. Bulging ground is dynamic and over time you may notice the bulges moving and growing.



### Eroding stream-bank

Signs to look for are slumping banks, cattle hoof prints, weeds such as blackberries (which out-compete stabilising native vegetation) and exotic trees such as Willows.



### Gully erosion

Gullies may start off very small and over time, without management, grow in length, width and depth.



### Tunnel erosion

Look for early signs such as small holes, cracks and gullies appearing in your paddocks. Here the tunnel is transforming into a gully, growing upwards to the head of the tunnel.

## The causes of Landslips & Erosion

Loss of native vegetation with its soil-binding roots de-stabilises soil. Foliage and leaf litter softens the impact of rainfall on soil. Deep-rooted species remove excess water. Healthy soil with a high level of organic matter has better soil particle aggregation with which to withstand erosion. Specific causes include:-

### Landslips

The contributing factors are rainfall, geology, soil type and topography. Poor drainage, excess water and loss of deep-rooted perennial vegetation create the conditions for a landslip to occur. Inappropriate human activity in slip-prone areas (such as the poor location of farm tracks and the clearing of vegetation) further increases the potential for a landslip to form.

### Stream-bank erosion

A number of factors have created the conditions for increased stream-bank erosion:-

- Land clearing in catchments has increased the volume of water which enters streams.
- De-snagging and straightening streams has increased the velocity of water in streams.
- Clearing of streamside vegetation and allowing direct stock access to the stream has de-stabilised stream banks.
- Cultivating ground for crop production close to the banks of the stream de-stabilises the banks and removes the nutrient filtering effect offered by good coverage of streamside vegetation.
- Planting of exotic trees such as willows has altered the structure of streams: Eg. fallen willows continue to grow in streams and can create islands which then funnel flowing water hard against stream banks. Willows can colonise rapidly from broken twigs and can infest waterways.
- Waterway weeds, such as the introduced *Glyceria maxima* (Sweet Reed Grass) can also force streams to alter their course resulting in loss of valuable farm land.

### Gully erosion

Excessive un-moderated surface runoff can lead to gullies forming along cleared drainage lines, particularly when soil compaction by stock or vehicles, or other disturbance of the topsoil leads to its poor absorption of excess water.

### Tunnel erosion

Tunnel erosion is particularly prone in areas where a shallow hard-setting topsoil sits over a subsoil which, whilst stable when dry, readily disperses when saturated. Native vegetation on such sites maintains ground stability. After land clearing, the amount of seepage and runoff increases. Tunnels then form when water flows along lines of least resistance such as in old tree stump holes, old tree root lines and rabbit warrens. Over time tunnels may become a series of open gullies, with all the problems associated with gully erosion.