



## Planting guide



# Landslide remediation through revegetation

This document provides generic advice for specifying planting to be used for sites where a landslide has occurred. These species are generally well suited to sites in the Auckland region with limited remaining topsoil and should help provide some additional stability by binding the soil with their roots and by reducing pore water pressures in a short timeframe of 2-5 years.

Before considering planting on a landslide, **it's important to ensure it can be done safely**. In more extreme circumstances, planting may not be possible and an experienced professional should be engaged to assess the site. On all landslides, there are many hazards that can be hard to spot.

Some of the more common are:

- unexpected voids
- contamination (for example, with asbestos or human waste)
- sudden changes in moisture content that mean you can quickly move from what feels like stable ground to very unstable areas
- sudden movement of the ground which can be fatal
- loose material above.

This is particularly challenging near cliffs where the risk of falling is more severe.

To assess the stability of a landslide, landowners should seek advice from an engineering geologist or geotechnical engineer. You can check if the person you are getting advice from is suitably qualified by checking the list on the [Engineering NZ website](#) – you can search for them by name.

- Geotechnical engineers should have “Geotechnical engineering” in their Practice Field and check they have “CPEng” as their Post nominal.
- Engineering geologists should have “PEngGeol” as their Membership.

Unless a landslide is posing an immediate risk, it is usually best to leave landslide debris in place. It will usually have come to rest in a more stable location, and moving it risks destabilising slopes above as well as causing more silt to be mobilised into waterways.

## Heritage

Sometimes landslide debris has soil in a different colour or even has objects in it. This might be modern household material, but it can be black soil with shell, fire-cracked rocks or even wood or machinery. This material could have heritage protection under the [Auckland Unitary Plan](#) (E11.6 or E12.6) or under the [Heritage NZ Pouhere Taonga Act 2014](#). The council's Heritage Unit can assist in identifying the material and any legal requirements that need to be met before it can be moved, or replanting can commence. Contact [heritageconsents@aucklandcouncil.govt.nz](mailto:heritageconsents@aucklandcouncil.govt.nz) for further assistance in identifying this material.

## Vegetation management

Landslides create areas of freshly disturbed soil and high light, providing ideal environments for the establishment of weed species that pose a threat to valuable native ecosystems and gardens. To manage this, it is critical to maintain control of pest plants. This is important to protect surrounding ecosystems from weed invasion and to allow any natural reestablishment of native species from existing native forest. If you want to establish vegetation from planting, it is necessary to prevent competition and smothering by invasive species.

## Replanting

There are two ways that revegetation of landslides can occur – natural regeneration and planting. These often occur in tandem. In all circumstances, the management of weeds that can smother vegetation is recommended.

The cliff-top planting guide in the link below gives some good ideas for species that are normally well suited to landslide remediation. In general, the environmental conditions for landslides are quite similar to cliff tops, so species that work well on cliffs tend to work well on landslides. The ecosystem and environmental conditions vary across the region, and these should be taken into consideration when selecting species for planting while prioritising stabilisation. Ecosourced plants are important to ensure they are locally adapted.

## Plant suggestions for landslide stabilisation

Māori name	Botanical name	Spacing	Notes
karamū	<i>Coprosma robusta</i>	1m	Disperse across the site to promote good canopy coverage
koromiko	<i>Hebe</i> sp.	1m	Disperse across the site to promote good canopy coverage. Make sure you have the right species for your ecological district ( <a href="#">check Tiaki Tāmaki Makaurau website</a> ).
māhoe	<i>Melicytus ramiflorus</i>	1m	Disperse across the site to promote good canopy coverage
mānuka	<i>Leptospermum scoparium</i>	1m	Disperse across the site to promote good canopy coverage
pōhuehue	<i>Muehlenbeckia complexa</i>	0.5m	Plant up to cliff edge where it is safe. Provides ground cover, reduces weed species and protects from rainfall erosion.
tī kōuka	<i>Cordyline australis</i>	1m	Requires some protection when young.

## Sediment control

The disturbed soil in a landslide is very susceptible to being eroded by rainfall and overland flow. To minimise environmental harm, and to retain enough soil so that plants have the best chance of survival, it is important to minimise the amount of soil that is eroded from the landslide. Four ways to manage this are:

1. Divert overland flow away from the landslide so there is less water to erode it
2. Minimise disturbance of the soils while planting
3. Provide protection to the base soil (e.g. coir or jute mesh, mulch, or hydroseeded grasses)
4. Capture transported sediment downhill.

Water can be diverted away from a landslide by ensuring any stormwater pipes are not discharging onto the slope. Extend the pipes (consider using flexible 'lay-flat' tubes to accommodate future movement) to beyond the toe of the landslide.

Coir (coconut fibre) mats are an effective and biodegradable way of protecting the surface of smaller landslides from rainfall erosion while plants establish and can help reduce the growth of weeds. They are effective on slopes up to 45 degrees where there isn't likely to be large flows of water. In general, it is not safe to access slopes this steep, so it is recommended to get professional help for any slopes steeper than 28 degrees. To install them, lay the mats over the slope, ideally with the long edge running down the slope. Where possible bury the top of each run of matting into a small trench (about 150mm deep) and fill with soil to hold the top in place. Pin the mat to the slope with about three pins per metre squared. Use biodegradable pins if possible. Cut small holes after installation to make gaps for your plants.

Capturing sediment downstream of a landslide is rarely successful. Most landslides will result in large volumes of sediment which would quickly overwhelm most capture systems. The most appropriate for small landslides are likely to be commercially available 'silt socks' or hay bales. However, both are likely to quickly get silted up and overtopped. Regular maintenance will be required. These should be installed downhill of the landslide on the flattest available ground.

For larger landslides above watercourses containing important ecosystems, a sediment retention pond could be considered. This is a major construction activity and should not be undertaken without professional advice. See section F of [Auckland Council Guideline Document 2016/005 Erosion and Sediment Control](#) for more information.

## Further information

Auckland Council coastal planting guide:

<https://www.aucklandcouncil.govt.nz/environment/plants-animals/plant-for-your-ecosystem/Pages/coastal-ecosystems.aspx>

Auckland Council Geomaps Heritage layer (see under Unitary Plan Management layer):

<https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>

Auckland Council Guideline Document 2016/005 Erosion and Sediment Control:

<https://content.aucklanddesignmanual.co.nz/regulations/technical-guidance/Documents/GD05%20Erosion%20and%20Sediment%20Control.pdf>

Bay of Plenty guide for disturbed sites with poor soil quality:

<https://www.boprc.govt.nz/media/29155/LandManagement-090526-Factsheet13.pdf>

Landcare Research information about root stabilisation properties:

[https://icm.landcareresearch.co.nz/research/research.asp?theme\\_id=1&research\\_id=15](https://icm.landcareresearch.co.nz/research/research.asp?theme_id=1&research_id=15)

Learn how to reduce the risk from a landslide: <https://landslides.nz/reducing-risk/>

Matting installation guide (other suppliers are available):

[https://www.geofabrics.co/sites/default/files/installationguides/Matting\\_Installation\\_Guide\\_05-19\\_NZ.pdf](https://www.geofabrics.co/sites/default/files/installationguides/Matting_Installation_Guide_05-19_NZ.pdf)

Pest plant control guides:

<https://www.tiakitamakimakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/>

If you have further questions, email [biodiversity@aucklandcouncil.govt.nz](mailto:biodiversity@aucklandcouncil.govt.nz).