

Tunnel gully erosion

Tunnel gully erosion not only creates hazards for people and stock but it also causes the loss of productive land and siltation downstream. Pole planting is a key management technique available to stabilise susceptible land.

What is tunnel gully erosion

Tunnel gully erosion is an insidious process involving the removal of subsurface soil layers by water. The water moves down through the soil profiles until it reaches a less permeable layer where it concentrates to form a downslope channel (tunnels or under runners). As the tunnel widens the risk of collapse increases, which can then often continue as gully erosion.



Holes created by partial collapses of a tunnel gully in the Tararua District.

Where does it occur?

Tunnel gully erosion is likely to be found on landscapes ranging from rolling to steep where there is a variation in the permeability within the soil profile such as a freer draining soil or subsoil overlying an impermeable layer. It often occurs on colluvial foot slopes, which are lower slopes formed by previous mass movement.

How to identify tunnel gully erosion

You may notice either small 'holes' appear or longer sections of the tunnel collapse to form an open channel. Water and silt will often come out at tunnel outlets if it hasn't yet collapsed, and lines of rushes often grow along the tunnel's course.



The line of rushes on the lower section and the partial collapse of the tunnel reveal the course of a tunnel gully on this slope in the Tararua District.

Tunnel size varies depending on the stage of erosion, the rock and soil type, and the amount of water runoff. Where some collapsing has occurred it is relatively easy to follow its course on the hill slope.

Why control tunnel gully erosion?

Tunnel gully erosion is a farm management problem. Not only does it create hazards for both farm staff and stock, the most common being young stock falling into holes, there is also the constant loss of soil which causes siltation of downstream watercourses. As the tunnels continue to enlarge, the risk of losing larger areas of pasture and productive land through their collapse increases.



Established poplars in a stabilised tunnel gully in the Rangitikei District

Prevention and treatment

In areas where soils are known to be susceptible to tunnel gully erosion, normal sustainable farming practices, such as keeping a dense pasture sward and minimising bare ground, should be used to reduce the risk of tunnel gully erosion occurring. Control rabbits as their burrows can channel water into the subsoil. Tunnel gullies or holes can indicate unstable subsoil and can be made worse by deep ripping or subsoiling. Consider diverting water away from the entrances to gullies or holes.

Mechanical stabilisation

If mechanical stabilisation is unavoidable then using an excavator rather than a bulldozer enables the surface holes to be dug out and the fill to be compacted, prior to topsoiling, resowing and planting with poplar or willow poles.

Planting

In most cases tunnel gully erosion occurs on strongly rolling to steep hill country running sheep and cattle. Here the best option is to plant poplar or willow poles following the lines of the tunnels up the slope. Poles can be planted either directly into the collapsed holes or beside the holes. The spacing of the poles will depend on the severity of the erosion and the steepness of the hill slope.

When planting into tunnels and holes longer poles may be required so that new growth is out of reach of stock. The poles also help identify the location of the tunnel hazard.

On areas with severe erosion and/or marginal grazing value, a better option might be to change the land use to protection forestry.



Willows and poplars beside a tunnel gully in the tararua District. Silty water can be seen discharging from an outlet between the environmental management officer soils and the willow pole.

More information

More information about erosion control and pole planting plus demonstrations of specific techniques are available free from your local Horizons Regional Council environmental management officer soils by calling 0508 800 800.

The publication "Growing Poplar and Willow Trees on Farms" is available online by going to <http://www.maf.govt.nz> and typing "growing poplar and willow trees" into the "search MAF" box.