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## Protecting soil productivity and value

Many properties in the Tauranga Harbour catchment are steep and hilly. Our volcanic soils are versatile and provide a good basis for farm production, but they are vulnerable to erosion. Erosion contributes large amounts of sediment to waterways and estuaries and affects natural habitats and communities by lowering water quality and soil quality.

### Help is at hand

This toolkit is for anyone who owns a farm, orchard or land surrounding Tauranga Harbour. We hope you will find the information useful for controlling erosion on your land. Please contact a Tauranga Land Management Officer for free advice.

# Land retirement areas

## What is a land retirement area?

For the purpose of this toolkit, a retirement area is any land that has been taken out of pastoral production for the purpose of maintaining or protecting the existing values of water and land. Examples of land retirement areas include steep land, stream margins, wetlands and seeps, estuary margins, cultural or archaeological sites or other areas that have a personal value to landowners.

## Why is retiring land an advantage?

- Pasture on steep hill country is vulnerable to sheet, rill, and slip erosion. Large amounts of soil can be lost by erosion processes and often cause financial loss through farm damage, rehabilitation costs and loss of production.
- Excluding your livestock from waterways prevents direct contamination from effluent and reduces stream bank erosion. It also keeps stock secure and safe.
- Improves stock movement and mustering around the farm.
- Establishing woody vegetation (native or exotic) will bind the soil and help with stability.
- Establishing woodlots for timber production can provide alternative income.
- Retired land has no fertiliser requirements and therefore allows you to concentrate your fertiliser budget on the most productive areas.
- Woody vegetation can reduce peak flood flows by slowing down overland flow.
- You may qualify for a grant fund towards the cost of fencing, planting or establishing timber crops.
- We can provide free advice to help you assess your property.



Photo: A newly retired riparian margin with new native plants establishing.

## Key things to think about when establishing retirement areas

### PLAN FOR THESE

- Timber harvesting requires good access for machinery and trucks. Steep land can be difficult to access so make sure access is available early in the planning phase.
- Stock exclusion from waterways often requires alternative water supply.
- A farm plan will help identify a farm's resources and how to make best use of them.
- To get the best results choose the right types of native vegetation for riparian planting and buy good quality, healthy plants to ensure a good strike rate.
- Choosing an appropriate fence type for permanent stock exclusion.
- Weed management on an annual basis to prevent undesirable species establishing.

### MAKE USE OF THESE

- Sustainable land management advisory services and council grant funds.
- Bay of Plenty Regional Council land management fact sheets.
- Discuss the economics of land retirement with a farm consultant.
- Get some good advice on what other options are available for your less productive land.
- Discuss Council grant funding options for your site with one of our Land Management Officers.



## AVOID THESE

- Poor fencing standards equates to higher maintenance costs.
- Planting large trees close to the water's edge because they may topple in as they mature.
- Planting flax on steep stream banks as they will block the stream if they are undercut and fall in.
- Placing water troughs in water logged or floodable areas where increased stock traffic may damage soil structure or water supply is washed away.

## IF I RETIRE LAND HOW DOES THAT HELP MY COMMUNITY?

- You become part of the bigger picture to improve the quality of your local and regional soil and water resources.
- You reduce the volume of sediment entering waterways and Tauranga Harbour that extends recreational opportunities for you, your family, friends and neighbours.
- You add diversity to your communities overall landscape.
- It supports future generations.
- By establishing native plants you enhance the natural habitat in your "patch of the woods" meaning more native birds, and fish to be enjoyed by everyone.

**PROTECT  
YOUR LAND**

Contact us to see if you qualify for council grant funding towards fencing, planting and erosion control.



Photo: Riparian work retirement before and recently completed.

**AFTER**

## RESOURCES

**Management of retirement areas:** [www.boprc.govt.nz/media/29143/landmanagement-090526-factsheet08.pdf](http://www.boprc.govt.nz/media/29143/landmanagement-090526-factsheet08.pdf)

**Plant selection for retirement areas:** [www.boprc.govt.nz/media/29140/landmanagement-090526-factsheet07.pdf](http://www.boprc.govt.nz/media/29140/landmanagement-090526-factsheet07.pdf)

**A helping hand:** [www.boprc.govt.nz/sustainable-communities/funding-and-awards/](http://www.boprc.govt.nz/sustainable-communities/funding-and-awards/)

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# Soil erosion types

There are three main categories of soil erosion types in Tauranga Harbour catchment: surface, mass movement and fluvial. These are classified into 13 erosion types, and each has a range of management options. The best management option will need to be tailored to meet specific site needs. Recognising the potential for erosion to occur will enable you to manage the land according to your level of acceptable operational risk. Below are the common ones for Tauranga Harbour catchment.

## Surface erosion

### SHEET

Otherwise known as sheet wash, this type removes surface soil over larger areas such as cultivated paddocks, tracks, areas of heavy stock concentrations and bare ground. It is caused by raindrops dislodging soil particles that are then transported away by overland flow. Factors that increase the risk of sheet erosion include soil parent material, slope angle, slope aspect, drought conditions and overgrazing. It commonly occurs on dry hill country, cultivated slopes, and steep land in pasture.

## Mass movement

### SOIL SLIP

Soil slips are shallow, rapid slides or flows of soil and softer weathered rock. The failure surface is parallel to the ground surface and less than one metre deep. The failure occurs when the surface material becomes saturated with water and 'slides' off the relatively impermeable layer it sits on. It can be triggered by prolonged rainfall, earthquakes, and undercutting of slopes by streams or wave action. Slips may also be induced by human activities such as slope modification or roads, tracks and buildings. Slips generally occur on slopes of greater than 20 degrees and are more common under a pasture land cover.

### EARTH FLOW

Earth flow erosion is a slow mass movement of soil and weathered rock (up to 25mm per year). Earthflows may be shallow (<1-2m) to deep-seated (tens of metres but normally 3-5m). Deep earthflows occur on slopes between 10 and 20 degrees and shallow on slopes >20 degrees.



*Photo: Forest to farm conversion requires careful consideration to keep soil in place for production and environmental protection.*

The original vegetation often remains in place and looks humped with tension cracks. Earth flows are most active in wetter months and on sites where the toe is undercut by streams or roads or where gullies have developed.

### SLUMPS

Slumps are deep-seated failures of rock and subsoil. They involve rotational slide movements along failure planes resulting in a raised lower toe relative to the upper slope. Sometimes this results in formation of a pond at the head of the slump. Slumps often occur in those areas prone to earth flow erosion.

## Fluvial erosion

### STREAMBANK

Streambank erosion is the removal of material from the bank usually during high flows. Bed and bank scouring removes support and leads to the toppling in of the bank. This normally occurs when flood waters are receding and the bank material is saturated, heavy, and loses the support of the river. Water velocity along the streambank can also shear off large blocks.

### RILL

Rills are closely spaced channels resulting from the uneven removal of surface soil by running water. Rills are <60cm deep and <30cm wide and commonly occur on cultivated slopes where they normally erode down to the base of the cultivated layer. They are occasionally observed on slopes with established pasture cover. In general the potential for rill erosion increases with slope angle.

## GULLY

Gullies are formed by the removal of soil, subsoil or rock by water. They are large, permanent features >60cm deep and >30cm wide that initially form when water is channelled and the sides and head of the channel begin to erode. The channel normally only carries water during rainstorms.

## TUNNEL GULLY

Tunnel gully erosion is initiated by the subsurface concentration and flow of water resulting in scouring and the formation of narrow conduits, tunnels or pipes underground. As softer material is eroded away the tunnel collapses and can be visible as either holes in the ground or continuous open channel.

# Soil erosion control

## PLAN FOR THESE

- Remove stock access from waterways and maintain a mix of grasses with occasional deep rooted woody vegetation to help reinforce the riparian margin.
- Maintain healthy pasture swards on steep hill country to reduce bare ground.
- Plant suitable tree species on those landscapes that may be prone to slipping.
- Avoid cultivating slopes steeper than 12 degrees. For lesser slopes cultivate along the contour or at a slight angle to it. Divert runoff from drains, roads, and tracks away from arable paddocks.

## MAKE USE OF THESE

- Soil conservation trees such as willow or poplar hybrid species. Pruned, mature trees supply fodder and shade for stock and stabilise streams and hills.
- Minimum or no tillage techniques that protect soil structure as fine soil particles erode more readily.
- Regular checks on streams, dry waterways and steep hill country to identify and act on potential erosion issues before they get out of control.
- Aerial photos to help farm planning.
- Retirement areas to protect against erosion using a more suitable ground cover.
- A Land Management Officer can help you to identify remedial options for erosion features.
- Council grant funds for erosion control structures and repairs.

## AVOID THESE

- Locating farm infrastructure in high risk areas such as riparian margins, ephemeral waterways, and steep slopes.
- Overgrazing steep hill country.
- Using sacrificial paddocks near waterways.
- Poor maintenance of stormwater drainage on farm tracks.
- Cultivating soils that are too wet or too dry as this destroys soil structure and increases the erosion risk.

*Photo: Erosion potential on hard grazed very steep gully sliding.*



# Managing steep land

## Keeping it productive

Maintaining the productivity of steep land is a challenge. The soil surrounding Tauranga Harbour is mostly volcanic ash, which is more vulnerable to erosion. The loss of land through erosion can mean loss of productivity and take many years to recover. The good news is that there are reliable techniques to help stabilise steep land. A good vegetation cover of pasture and trees is the first line of defence against soil erosion.

## Management considerations

### PLAN FOR THESE

- Autumn is the optimum time for pasture establishment/renovation due to warmer soil temperatures and reliable rainfall. When deciding on pasture species for steep land, think about dual purpose (forage/ground cover) species.
- Ordering soil conservation trees for stabilising steep slopes. Deciduous species such as poplar can be pruned to allow more light to the base for even grass growth throughout the year.
- Sensible grazing regimes will protect grass species and improve recovery. Even the most persistent species can be severely damaged by inappropriate grazing regimes and lack of maintenance.
- Consider introducing mat-forming species such as brown top into the mix as well as species that grow quickly after grazing.

### MAKE USE OF THESE

- Use subdivision fencing to separate areas that will tolerate heavy grazing (fertile gully floors and terraces) from more sensitive areas such as steep sidlings that have shallow soils.
- A nutrient budget is helpful to ensure just enough fertiliser is added to keep steep land productive. Use regular soil tests to determine requirements.
- Change the land use of difficult to manage pastoral units. Consider woodlots, forestry, space planted conservation trees or retire to native bush.
- Investigate carbon farming options.



Photo: Hard grazing steep land will result in heavy sediment load to unprotected streams.

### AVOID THESE

- Competition from existing pasture species when oversowing by pre-spraying with herbicide.
- Pest plant or animal infestations.
- Overgrazing in summer and heavy or prolonged rotations in winter which open up bare ground and expose it to soil erosion and weed infestation.
- Stock camping areas by planting more trees in paddocks and locating troughs to encourage stock to distribute more evenly throughout the paddock.

**GET PLANTING!**

...to prevent your valuable land from slipping and sliding!

### RESOURCES

**Land management factsheet:** [www.boprc.govt.nz/knowledge-centre/fact-sheets/land-management-fact-sheets](http://www.boprc.govt.nz/knowledge-centre/fact-sheets/land-management-fact-sheets)

**Land care:** [www.landcare.org.nz/Regional-Focus/Hamilton-Tauranga-offices/kaimai-catchments-project/SLM-Guide](http://www.landcare.org.nz/Regional-Focus/Hamilton-Tauranga-offices/kaimai-catchments-project/SLM-Guide)

# Designing a fence

Farm fences contain stock safely on your property. They make moving stock easy with little labour, and create laneways, yards and races for handling stock. Fences represent a significant capital item on your farm and careful planning will ensure they provide many years of service. Protection fences are used to keep stock out of sensitive or dangerous areas. These might include streams or steep stream gullies, native bush blocks, bogs, seeps and wetlands.

## PLAN FOR THESE

- Choose the best line possible for stability, ease of construction and maintenance. Fences close to streams are vulnerable to damage and more stable lines will be found along adjacent terraces or ridges. Consider using electric fencing in floodways to allow for flood flows and easier repair.
- Minimise any line preparation earthworks which may create erosion problems.
- Building fences is a skilled job and the use of an experienced fencer is strongly recommended.
- Gates are not necessary in a protection fence, however, to muster stray stock out or gain machine access, install a gate opening at a convenient point using four or five 50mm x 150mm timber rails.

## MAKE USE OF THESE

- Well-built strainer and angle assemblies on stable ground will give long service and reduce maintenance requirements.
- Use round wood for strainers, angles and stays. A strainer post every 200m is recommended for fences with lots of angles in it.
- Consider opportunities to improve farm sub-divisional fencing when constructing new fences.
- A temporary electric tape fence can help confirm your thoughts on fence placement. You will be able to observe stock reaction, grazing patterns, make accurate paddock size measurements and use measurements to cost the permanent fence.



Photo: A fencing contractor constructs a 9-wire post and batten fence for riparian retirement.

## AVOID THESE

- Building a fence which is not fit for purpose or doesn't suit the stock type.
- Gateways with poor vehicle clearance.
- Un-controlled crossings or access tracks through protection areas.

**GET  
FENCING!**

Reduce stock and crop loss and gain better water and soil quality.

## RESOURCES

**Protection fences:** [www.boprc.govt.nz/media/29128/landmanagement-090526-Factsheet03.pdf](http://www.boprc.govt.nz/media/29128/landmanagement-090526-Factsheet03.pdf)

**Riparian protection:** [www.boprc.govt.nz/media/29125/landmanagement-090526-Factsheet02.pdf](http://www.boprc.govt.nz/media/29125/landmanagement-090526-Factsheet02.pdf)



*Photo: A recently retired riparian margin. In the absence of grazing, weeds will need to be controlled and/or native plants established.*



The natural resources you benefit from as a landowner through soil, plants and water, is worth defending. Doing nothing could threaten the quality of future production affecting soil, crops, livestock and your lifestyle. It could decrease your land value. Our series of toolkits will help you future proof your land to ensure it remains productive and profitable.

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