ENVIRONMENT SOUTHLAND
FACTSHEET

WATER AND LAND 2020 & BEYOND

Physiographic zone: Gleyed

Southland's physiographic zones allow us to better understand why we have variations in water quality in different areas. We've divided Southland into nine different zones according to factors such as soil type, geology and topography. Through them we can target solutions to higher risk areas as opposed to a region-wide, generalised approach.

Understanding your zone

Each zone is different in the way contaminants build up and move through the soil, areas of groundwater, and into our streams and rivers. Physiographic zones allow us to target advice and management strategies to keep farm nutrients on the farm and out of waterways.

The Physiographics of Southland project was developed as part of *Water and Land 2020 & Beyond* so we can better understand:

- where our water comes from
- how water moves through the landscape
- why we have differences in water quality across the region

What does 'Gleyed' mean?

The Gleyed zone is found in low-lying areas.

Soils are poorly drained, prone to waterlogging, and have distinctive grey or rust-coloured spots or mottles.

Soils and aquifers can remove some to all nitrogen via denitrification.

Key features of the Gleyed zone

- Low-lying flat to undulating land on alluvial terraces, located between the major river systems on northern and southern plains.
- Generally found in historic wetland areas, and have a high water table during winter that's up to one metre below ground.
- Soils are generally fine textured, prone to water-logging, and have extensive artificial drainage (mole and tile drains).
- Some nitrogen is removed from water infiltrating through the soil zone via denitrification (lost as nitrogen gas).
- Loss of nutrients, sediments and microbes via artificial drains following heavy or prolonged rainfall are a key feature of this zone.
- Water in this zone is not directly linked to any of the major rivers and therefore does not experience dilution from Alpine or pristine Bedrock/ Hill Country zones.

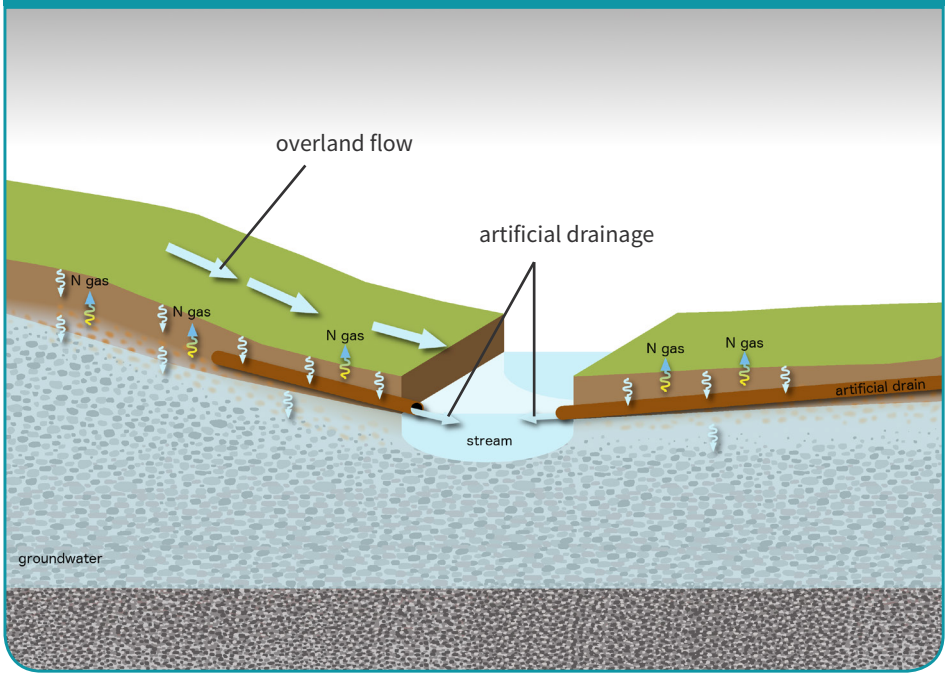
Water source and movement

- When soils are wet, excess water from rainfall in flatter areas will flow via an extensive drainage network to nearby streams.
- In undulating areas excess water may also flow across the land surface as overland flow (runoff) during heavy rainfall.
- Some water will slowly make its way down to underlying aquifers.
- Aquifers are shallow and interconnect with streams and drains.

Contaminant movement

Soils may accumulate and store nitrogen during summer and early autumn when soil moisture levels are low. However, some nitrogen will be removed from the soil and aquifers via denitrification (lost as nitrogen gas), resulting in relatively low groundwater nitrate concentrations. Accumulated nitrogen starts moving with water when soils become wet in late autumn and winter and may be lost via artificial drains or overland flow.

Contaminant movement when soils are wet



During periods of heavy rain, phosphorus, nitrogen, sediment and microbes flow with water overland (overland flow) and via artificial drain networks to neighbouring streams. Some nitrogen is lost to underlying groundwater however the denitrifying ability of soils results in low levels of nitrogen contamination in groundwater.

What does this mean for water quality?

√ Some denitrification may occur within the soil zone.

X Artificial drainage rapidly move excess soil water and contaminants to rivers and streams particularly during heavy rainfall and wet periods.

Improving Southland's water quality

The following good management practices are applicable to all physiographic zones in Southland:

- Capture nutrients, sediment and microbes in wetlands and sediment traps
- Nutrient management
- Riparian management
- Effluent management

Good management in the Gleyed zone

In addition to the above, good management in the Gleyed zone includes measures for reducing the effects of artificial drainage and overflow drainage.

Reduce the effects of artificial drainage by:

- Protecting soil structure, particularly in gullies and near stream areas
- Reducing phosphorus use and loss
- Reducing the accumulation of surplus nitrogen in the soil, particularly during autumn and winter
- Avoiding preferential flow of effluent through drains
- Capturing contaminants at drainage outflows

Reduce the effects of overland flow by:

- Protecting soil structure, particularly in gullies and near stream areas
- Managing critical source areas (CSA)
- Reducing phosphorus use or loss

Physiographic zones and the Southland Water and Land Plan

Environment Southland has developed a proposed Southland Water and Land Plan, using the science behind the physiographic zones to inform the plan and provide a tailored approach to particular issues that have been identified for each zone.

The main aim of the plan is to introduce new methods that help to halt any further decline in water quality by managing activities that we know adversely affect the quality of Southland's freshwater – such as land use intensification, wintering and stock in waterways. A key focus of the changes is to shift all land owners towards good management practices in ways that will give the best gains for maintaining water quality.

Further information

For more information about physiographic zones and good management practices contact Environment Southland. Phone 0800 76 88 45 or email service@es.govt.nz. You can also find out more about the Physiographics of Southland and your zone on our website, www.es.govt.nz.

What zone is your property in? View our map online: http://bit.ly/waterandlandmaps

Soils in the Gleyed zone are poorly drained, often waterlogged and usually found in low-lying areas.

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Te Taiao Tonga

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