ENVIRONMENT SOUTHLAND
FACTSHEET

WATER AND LAND 2020 & BEYOND

Physiographic zone: Lignite/Marine Terraces

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 'Lignite/Marine' mean?

This zone refers to areas where organic-rich sediment occurs at or near the land surface. Distinct sediment types:

'Lignite' and 'coal' – found inland

'Marine Terraces' – found along the South Coast

The geology strongly influences water quality.

Key features of the Lignite/Marine zone

This zone has three distinct areas:

- Coal sediments – around Ohai, western Southland.
- Lignite sediments – southern edge of the Hokonui Hills from Grove Bush to Upper Charlton, eastern Southland.
- Marine terraces – near Southland's south coast from Bluecliffs to around the Haldane Estuary.

- Mostly low elevation, flat to gently undulating land, as well as coastal terraces.
- Geology with high organic carbon content has a strong influence over groundwater quality.
- High denitrifying potential in groundwater in areas close to organic carbon sediments.
- Some areas have extensive artificial drainage due to soils being slowly permeable and prone to waterlogging.
- Overland flow occurs in areas that are poorly drained and sloping.
- Little to no connection to main river systems, and therefore no dilution by pristine Bedrock/Hill Country and Alpine zone waters.

Water source and movement

- Streams are at risk of receiving contaminants from overland flow and artificial drainage.
- Some water will drain to underlying aquifers.
- Limited aquifers that have long ‘residence times’ (slow movement of groundwater through the aquifer).
- Extensive network of small streams.

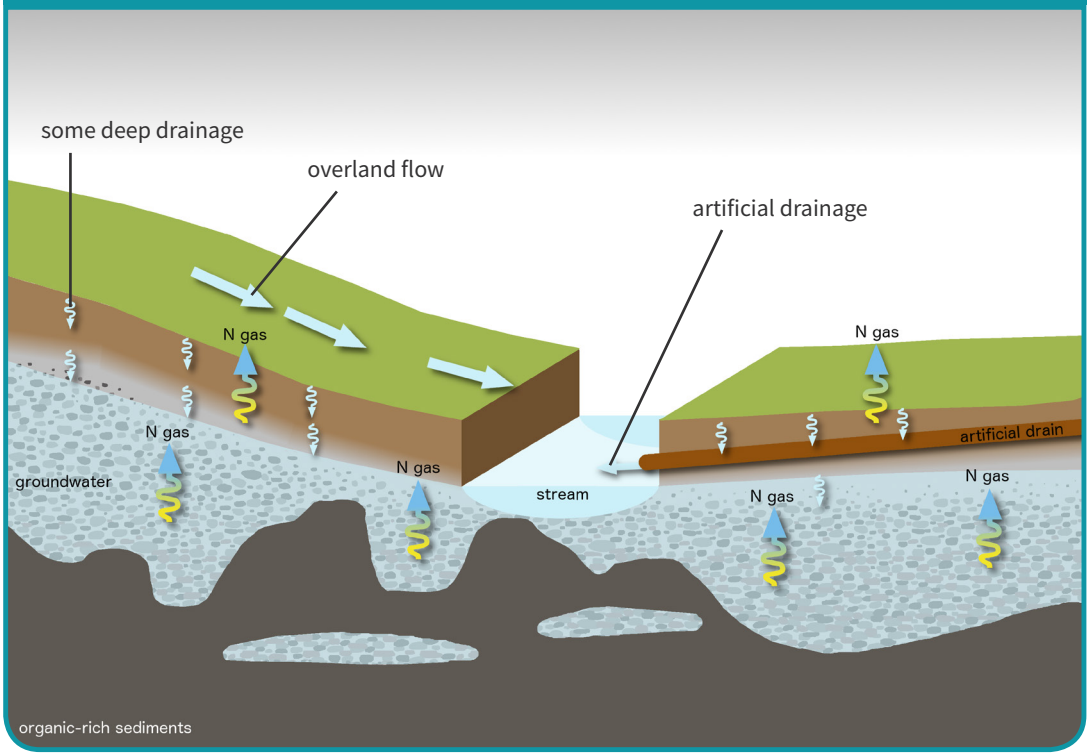
Contaminant movement

Soils have a moderate ability to remove nitrogen via a process called denitrification. However, this process is limited where water flows via overland flow or through artificial drainage. Little phosphorous build up occurs where lignite and marine sediments are close to the surface.

Groundwater that’s in close proximity to organic carbon sediments (such as coal or lignite) has a high ability to remove nitrate. Overall, aquifers are a minor source of stream contamination as there is little connection between aquifers and surface water in this zone. Aquifers form part of a regional-scale flow system and ultimately discharge at or near the coast.

Stream flow can get very low in summer due to a lack of recharge (top-up) from groundwater. This makes them particularly vulnerable to contaminants in overland flow during heavy summer rain.

Lignite areas and contaminant movement



Most contamination loss occurs when soils are wet. Where land is sloping, water flows across the land via overland flow to nearby streams following heavy rainfall. Streams receive contaminants from artificial drains in flatter areas. Nitrate leaching to groundwater is less of an issue for this zone.

What does this mean for water quality?

√ Little nitrogen build-up in deeper groundwater due to high rates of denitrification.

√ Phosphorus build-up in soils is low where lignite and marine sediments are close to the surface.

X Streams are at risk from contaminants moving via overland flow and artificial drainage during heavy rainfall and when soils are wet.

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 Lignite/Marine Terraces zone

In addition to the above, good management in the Lignite/Marine Terraces zone includes measures for reducing the effects of overland flow and artificial drainage.

Reduce the effects of overland flow by:

- Protecting soil structure, particularly in gullies and near stream areas
- Managing critical source areas (CSA)

Reduce the effects of artificial drainage by:

- Protecting soil structure, particularly in gullies and near stream areas
- 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

Physiographic zones and the Southland Water and Land Plan

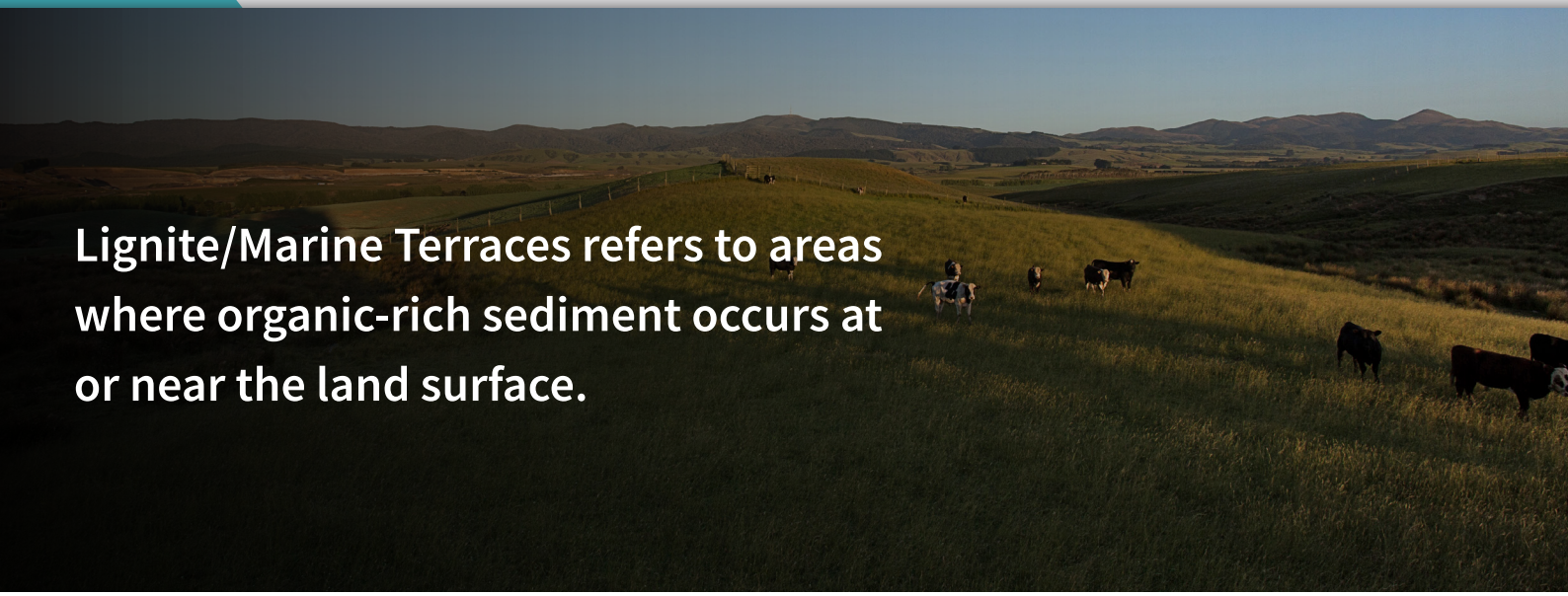
Environment Southland has developed a proposed Southland Water and Land Plan, using the science behind the physiographic zones to inform the plan and provide a tailored approach to particular issues that have been identified for each zone.

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



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