

# Orepuki Catchment Group

Fresh water health and landscape influences  
in Orepuki Catchment

OREPUKI CATCHMENT



**THRIVING  
SOUTHLAND**

*Tōmū ana te whenua. Tōmū ana te takata.  
A thriving, prosperous land. A thriving, prosperous people.*

AS AT NOVEMBER 2021  
Further updates will be included as new  
information becomes available.

# Welcome to Orepuki Catchment brochure

This Orepuki Catchment Group brochure is one of a series of brochures on catchments in Southland.

Catchment Groups have been asking for more detailed insights into their individual catchments.

This brochure provides insights based on available information, bringing together published science, research, data and information on the state of water, soil and land in the Orepuki Catchment.

It provides details on what affects water quality and how these impact the rest of the catchment.

Although this brochure collates all the available information that has been brought together in a literature review commissioned by Thriving Southland - the Science Report [thrivingsouthland.co.nz/science-report](http://thrivingsouthland.co.nz/science-report) - it may not have all the details you know about in your catchment, or the research you may have done on your farm or in your Catchment Group.

## How to use this brochure

This brochure sets out (publicly available) details on:

- » Water quality
- » Landscape influences
- » Physiographic zones
- » Groundwater management zones (GMZs)
- » Measuring what lives in streams and rivers
- » Macroinvertebrate community index (MCI)
- » Where to get more information.

If you are not familiar with the terms and language used, read the brochure in conjunction with this glossary [environment.govt.nz/publications/environment-aotearoa-2019-glossary](http://environment.govt.nz/publications/environment-aotearoa-2019-glossary).

We also recommend you check out the Catchment Group page on [thrivingsouthland.co.nz/orepuki](http://thrivingsouthland.co.nz/orepuki) to learn more about the catchment and what projects the Catchment Group has underway or planned.

## Interpreting what the data in the brochure means

Because this brochure brings together the data available, we have deliberately not interpreted that data or explained what the trends may mean for your catchment.

We recommend you contact an environmental consultant, your Thriving Southland Catchment Group coordinator or Environment Southland to speak to experts who can explain what these trends and data may mean for your catchment, or for your farm specifically.

You can also check out a range of information on the Thriving Southland Information Resource Hub [thrivingsouthland.co.nz/infohub](http://thrivingsouthland.co.nz/infohub) which will connect you with tools and resources from many different organisations to help with understanding limit setting, environmental contributing factors, mitigations and options available to you.

## A little bit about Thriving Southland

Thriving Southland supports Southland's Catchment Groups to understand challenges and opportunities in their catchments and create innovative and exciting solutions.

We have a vision to create a prosperous Southland, healthy people, and a healthy environment, and believe that by working together, Thriving Southland's communities will create a better future for all by protecting the region's prosperity, heritage, environment and health.

## Thanks

Thank you to the farmers who supported the development of this brochure, and to the Ministry of Primary Industry for its Sustainable Land Use Programme which supports the work Thriving Southland is delivering for farmers and communities in Southland. Thank you also to Environment Southland who reviewed the content of this brochure.



# Water quality in Aparima Catchment

## Aparima Catchment

Orepuki is a sub unit of the Aparima Freshwater Management Unit (FMU). Orepuki ground and surface water discharge generally flows into the marine environment of Foveaux Strait.

## Summary of Orepuki Catchment

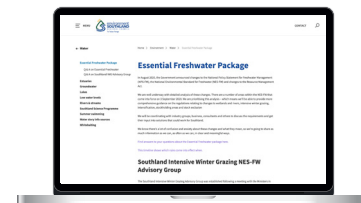
The hydrology, health and functions of a stream/river or area of groundwater are directly linked to the characteristics of its catchment, including the landscape, soils and human activities.

- » This catchment covers a mosaic of five different physiographic zones that differ greatly in nitrate and phosphorus levels from land use.
- » Part of the Orepuki catchment area overlies part of the Orepuki GMZ.
- » Lake George is a very shallow, semi sheltered, moderately flushed freshwater coastal lake that is located in Orepuki catchment.
- » There is insufficient data and information to comment on the state of water quality in the Orepuki catchment area. However, groundwater information from Environment Southland suggests phosphorus may become elevated in developed areas where groundwater is reducing (e.g. in peat areas).
- » Neighbouring farms in different zones may have very different water quality outcomes with similar farm practices due to different contamination movement and attenuation pathways (reducing the effects of contaminants).



## What does this mean?

- » In August 2020, the Government announced changes to the National Policy Statement for Freshwater Management (NPS-FM), the National Environmental Standard for Freshwater (NES) and changes to the Resource Management Act. These outline changes in regulations relating to wetlands and rivers, intensive winter grazing, intensification, stockholding areas and stock exclusion.
- » More about Environment Southland's response to the Government's Essential Freshwater Package is here [es.govt.nz/environment/water/essential-freshwater-package](https://es.govt.nz/environment/water/essential-freshwater-package)



Environment Southland, in partnership with Te Ao Mārama Inc\*, has indicated that a proposed limits and targets plan change (LTPC) will be notified in 2023. This will establish nutrient limits and targets to improve the quality of groundwater and surface water. [waterandland.es.govt.nz/about/values-and-objectives](https://waterandland.es.govt.nz/about/values-and-objectives)

- » Environment Southland and Te Ao Mārama Inc have established a community-based regional forum to consider and advise on limits, targets and methods.
- » Plan changes will result in additional controls and rules in Southland that will be focused on reducing the loss of nutrients, specifically nitrogen and phosphorus, and reducing discharges of sediment and faecal microorganisms, from land to groundwater and surface water.
- » In the Environment Southland Proposed Water and Land Plan there is a focus on good management practices (GMPs) and farm environmental management plans (FEPs). You can view GMP factsheets for each physiographic zone on the Environment Southland website [es.govt.nz](https://es.govt.nz)

\* Te Ao Mārama Incorporated looks after mana whenua interests in resource management and other aspects related to local government in Southland. It is authorised to represent three Ngāi Tahu papatipu runanga in Murihiku/Southland. It is involved in the protection of the spiritual and cultural values of the region, including wahi tapu (sacred places), mahinga kai (gathering of food and resources) and other natural resources.



# Orepuki water quality

Surface water quality is assessed by testing how much nitrogen, phosphorus and *E. coli* is present. There are no LAWA or Environment Southland summary results for this catchment.

## MCI

Macroinvertebrates include the caddisflies, mayflies, stoneflies, worms and snails that live in rivers. They are an important food source for fish and birds and sensitive to the combination of nutrients, sediment and habitat. Due to this sensitivity, they are considered to be a good representation of overall water quality and ecosystem health. The different macroinvertebrates present can be identified and then converted to a score called the MCI.

A higher MCI score generally indicates a healthier stream. Generally, MCI scores range from >150 (very good water quality) to as low as 20 (very poor water quality).

The only MCI result for this catchment is at Waimeamea River at Young Road (LAWA October 2021):

## MCI

Monitoring site	5-year median	State	10-year trend	15-year trend
Waimeamea River at Young Road	110.5	<b>B</b>		

### KEY (STATE)

**A**  
Macroinvertebrate community indicative of pristine conditions with almost no organic pollution or nutrient enrichment.

**C**  
Macroinvertebrate community indicative of moderate organic pollution or nutrient enrichment. There is a mix of taxa sensitive and insensitive to organic pollution/nutrient enrichment.

National bottom line: MCI score 90

**B**  
Macroinvertebrate community indicative of mild organic pollution or nutrient enrichment. Largely composed of taxa sensitive to organic pollution/nutrient enrichment.

**D**  
Macroinvertebrate community indicative of severe organic pollution or nutrient enrichment. Communities are largely composed of taxa insensitive to inorganic pollution/nutrient enrichment.

### KEY (TREND)

Very Likely improving	Likely improving	Indeterminate
Very Likely degrading	Likely Degrading	Not Assessed

# Estuary health

Table: Estuary state information (provided by Environment Southland July 2021, es.govt.nz state and outcome map).

Our main FMU's in Southland culminate in estuaries before heading out into the marine environment. However, in the Orepuki ground and surface water discharge generally flows directly into the marine environment of Foveaux Strait. The below assessment of estuary health based on the sediment quality gives a good indication of what is happening upstream across all the catchments that feed into the waterways supplying the estuary and therefore impact on the ecosystems and the cultural values of the area.

Estuary	Soft mud	Nutrients in sediment	Oxygen in sediment	Macroalgae cover	Seagrass loss	GEZ*
Waiau Lagoon/Te Wae		Orange	Yellow			
Lake Brunton			Green			
Waituna Lagoon/Waiparera (not assessed)						
New River Estuary	Orange	Orange	Orange	Yellow	Orange	Orange
Jacobs River Estuary	Orange	Yellow	Orange	Orange	Orange	Orange
Waikawa Estuary	Orange	Yellow	Orange	Green	Orange	Green
Haldane Estuary	Yellow	Green	Teal	Teal		Teal
Freshwater Estuary	Teal	Green	Teal	Green	Yellow	Teal
Waimatuku Estuary		Yellow	Yellow			
Toetoes Estuary	Yellow	Green	Orange	Yellow	Orange	Green

**KEY** Very Good Good Fair Poor

\* Gross Eutrophic Zone (GEZ) is defined as an area that has low sediment oxygenation (<1cm aRPD), soft mud (>25% mud content) and the presence of high macroalgal cover (>50% cover). These areas are in poor condition and can no longer support most estuarine animals and shellfish.



# Landscape influences

What we do on the land can affect our water, but how it affects our water depends on a range of factors, including how our landscape works. It is useful to look at:

- » Physiographic zones which help explain how nitrogen, phosphorus, sediment and faecal micro-organisms (such as *E. coli*) move and are attenuated (reduced e.g. by biological or chemical processes).
- » GMZs which highlight the connectivity between land, surface water and groundwater.

## Physiographic zones

Southland has been divided into nine physiographic zones to help understand how water moves across the landscape and why water quality is better in some places than others. Each physiographic zone represents an area that has similar factors influencing water quality, such as climate, topography, geology and soil type.

Most of the Orepuki Catchment area falls into the bedrock/hill country and peat wetlands physiographic zones. There are smaller areas of lignite/marine terraces, oxidising and gleyed physiographic zones (see map below). These zones differ in the way contaminants are transported and attenuated within the catchment.



# Orepuki Catchment showing physiographic zones

## Bedrock/hill country – overland flow

This zone is found on rolling to steep land below 800 metres. It is characterised by high rainfall and a dense network of branching streams.

Water quickly flows down-slope to nearby streams following high or prolonged rainfall. Nitrogen, phosphorus, sediment and faecal micro-organisms are all carried with water, particularly during late autumn and winter.

## Bedrock/hill country - artificial drainage

Generally located on developed land along the base of hillslopes, artificial drainage is needed in areas of low slope and low subsoil permeability.

## Peat wetlands

This zone features poorly drained peaty soils that are extremely acidic. The water table in these areas is high. Developed areas require extensive artificial drainage. Soluble phosphorus concentrations are high in acidic oxygen depleted ground and surface waters; conversely nitrate concentrations are low.

## Gleyed

This zone is generally found in areas that were once wetlands. It is characterised by a dense network of streams and a high water table during winter. The overland flow variant is found on sloping areas.

## Lignite-marine terraces - overland flow

Located on gently undulating to rolling land that has a high potential for overland flow.

## Lignite-marine terraces - artificial drainage

Located on gently undulating land that has slow subsoil permeability and may be seasonally wet.

Organic-rich sediments like lignite are found at depth within this zone. The presence of these sediments has a strong influence on reducing the amount of nitrate in groundwater. Denitrification\* rates are high.

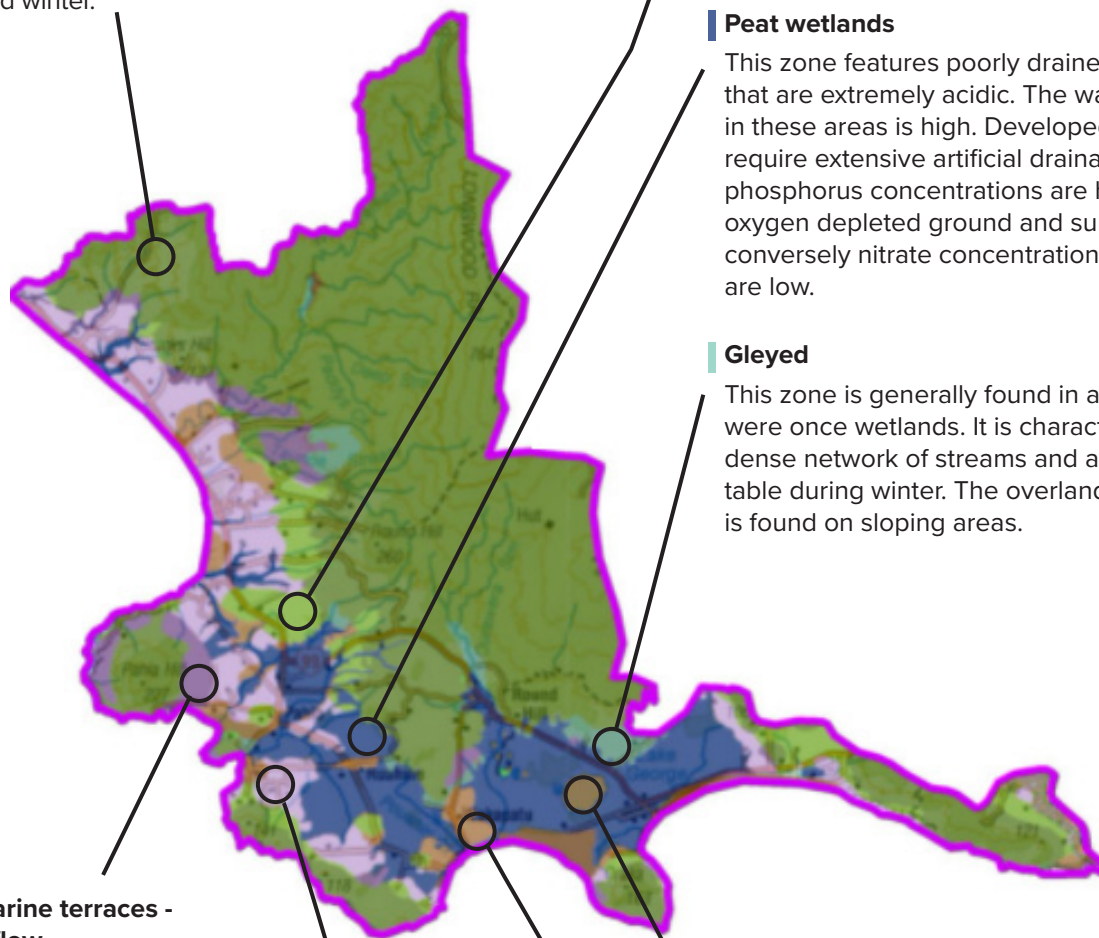
## Oxidising - overland flow

The overland flow variant is found on steeper areas where water preferentially flows over the land surface.

## Oxidising

Soils and aquifers in this zone have high risk of nitrogen build-up due to low rates of denitrification\*.

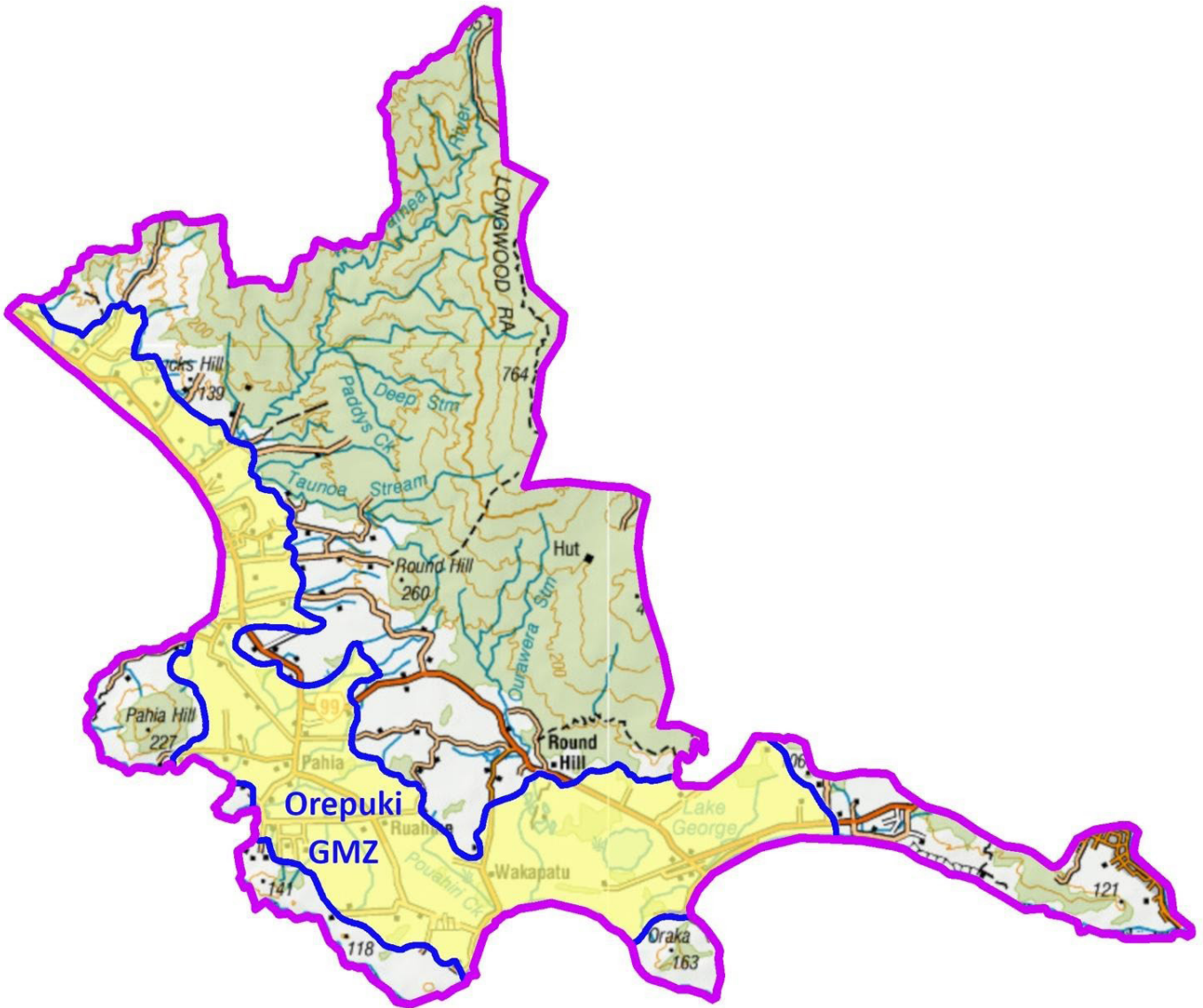
The combination of flat land and well drained soils results in high rates of nitrogen leaching (deep drainage) to underlying aquifers.



\*Denitrification occurs when nitrate is converted to nitrogen gas via various reactions involving bacteria. Where denitrification occurs, nitrogen is effectively lost from soil and water as a gas. This is a form of attenuation.

# GMZ - Orepuki Catchment

Part of the Orepuki Catchment area overlies part of the Orepuki GMZ.

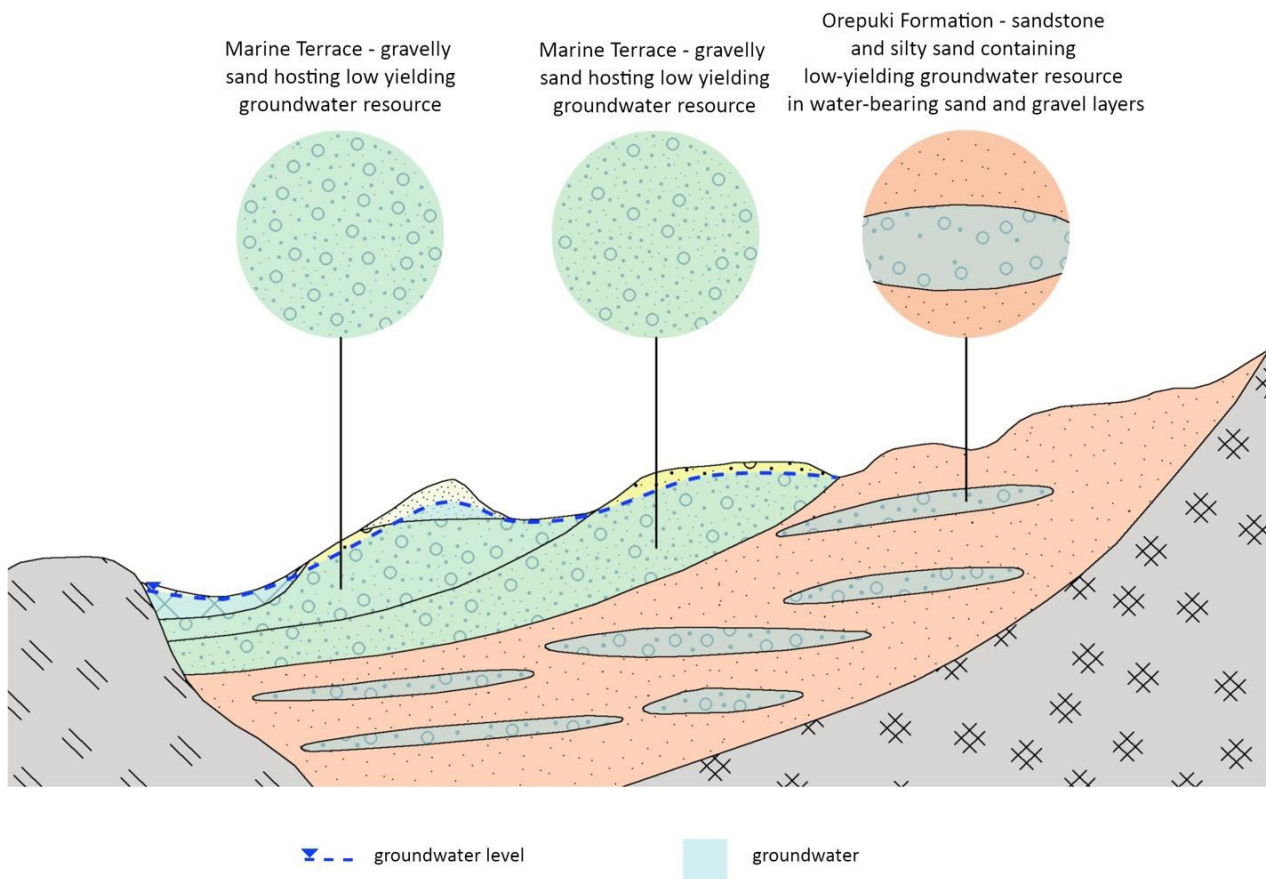




# Orepuki GMZ

The Orepuki GMZ covers approximately 7,300 ha around the coastal margin of the southern end of Longwood Range.

- » Depth to groundwater typically ranges from about three to five metres below ground level, but may be shallower in low-lying wetland areas and deeper closer to the base of Longwood Range.
- » See below for a diagrammatic cross-section of this GMZ showing areas of groundwater (source [es.govt.nz/environment/water/groundwater/groundwater-management-zones/orepuki](http://es.govt.nz/environment/water/groundwater/groundwater-management-zones/orepuki)).
- » Groundwater recharge in this zone is derived from local rainfall that soaks through the soil. Some recharge may occur via infiltration from small streams draining the Longwood Range. Groundwater discharge mostly flows into Foveaux Strait.



**Quaternary sediments**  
(mostly gravel and sand, or peat)

- Q1 Sand
- Peat
- Q5 Alluvium
- Q7 Alluvium

**Tertiary sediments**  
(mostly sandstone)

- Orepuki Formation sandstone
- Orepuki Formation sand and gravel

**Basement rock**

- Median Batholith volcanic intrusives
- Brook Street Terrane

## Groundwater quality Orepuki GMZ

- » Nitrate = generally low
- » Phosphorus = generally low but can become elevated in areas with strongly reducing groundwater
- » *E. coli* = low, but risk may be elevated close to source.



## Find out more

**Environment Southland Aparima flood warning fact sheet**

[bit.ly/3cLate5](https://bit.ly/3cLate5)

**Find out more about physiographic zones**

[bit.ly/2OI7z7F](https://bit.ly/2OI7z7F)

**Find out more about Southland's groundwater**

[bit.ly/30Db5g1](https://bit.ly/30Db5g1)

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## Find out more about stream health

**Environment Southland**

[es.govt.nz/environment/water/rivers-and-streams](https://es.govt.nz/environment/water/rivers-and-streams)

**Land Air Water Aotearoa (LAWA)**

[lawa.org.nz](https://lawa.org.nz)

**Ministry for the Environment**

[environment.govt.nz/facts-and-science/freshwater](https://environment.govt.nz/facts-and-science/freshwater)

**Link to iwi freshwater objectives**

[bit.ly/2P4HsBV](https://bit.ly/2P4HsBV)

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## Get in contact

**For more information about your catchment and to contact your local catchment coordinator**

021 466 700 | [office@thrivingsouthland.co.nz](mailto:office@thrivingsouthland.co.nz)

[thrivingsouthland.co.nz/catchment-groups](https://thrivingsouthland.co.nz/catchment-groups)



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