

# Proposed new rules and regulations Manuherekia Rohe

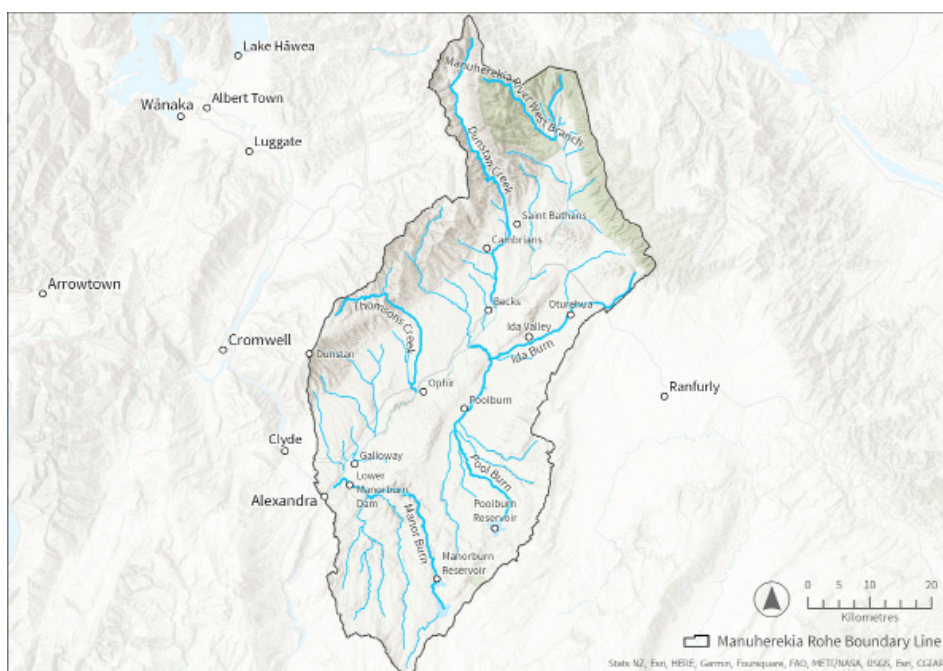
This summary provides an overview of the provisions relating to the Manuherekia Rohe (area). This includes environmental outcomes, target attribute states and area-specific rules and limits. The rules and limits are in addition to those in the region-wide rules covered in the other summaries.

If you are unsure of any particular terms, there is a glossary of terms.

Recent content updates:

- 13 October 2023:  
Amended information on cultivation in Table 2 for clarity
- 11 October 2023:  
Added bespoke limits and additional provisions for environmental flows for Manuherekia river
- 25 September 2023:  
Added the Manuherekia Rohe boundary map
- 24 September 2023:  
Added timeframe for achieving the environmental outcomes for target attribute states  
Added information regarding 'matters of control' in table 2

A map of the Manuherekia Rohe boundary is shown below.



## Environmental outcomes

In its new Land and Water Regional Plan ORC must set environmental outcomes for

the freshwater values identified in the Manuherehia Rohe. An environmental outcome statement describes the desired future state that communities in the Manuherehia Rohe and tangata whenua would like to see for a specific value.

The environmental outcome statements are very similar across all FMUs and rohe in Otago, which reflects the fact that the aspirations that tangata whenua and the different communities have for the environment are largely consistent across the region. Table 1 sets out the draft environmental outcomes for the Manuherehia Rohe.

Table 1: Draft environmental outcomes

Value	Environmental Outcomes for Manuherehia rohe	Attributes to measure and monitor
<b>NPSFM compulsory values (apply to every FMU/rohe)</b>		
<b>Ecosystem health</b>	Freshwater bodies support healthy freshwater ecosystems with thriving habitats for a range of indigenous species, and the life stages of those species, that would be expected to occur naturally.	<p><b>Rivers:</b></p> <ul style="list-style-type: none"> <li>Ammonia</li> <li>Nitrate</li> <li>Suspended fine sediment</li> <li>E. Coli</li> <li>Dissolved reactive phosphorus</li> <li>Periphyton</li> <li>Macroinvertebrates (MCI/ASPM)</li> <li>Fish IBI</li> <li>E. Coli primary contact sites</li> <li>Macroinvertebrates (QMCI) score*<sup>1</sup></li> <li>Deposited fine sediment*</li> <li>Dissolved oxygen*</li> <li>Ecosystem metabolism*</li> </ul> <p><b>Lakes:</b></p> <ul style="list-style-type: none"> <li>Phytoplankton (Chlorophyll-a)</li> <li>Total nitrogen</li> <li>Total phosphorus</li> <li>Ammonia</li> <li>Cyanobacteria*</li> <li>Submerged plants (natives)*</li> <li>Submerged plants (invasive)*</li> <li>Lake-bottom dissolved oxygen*</li> <li>Mid-hypolimnetic dissolved oxygen*</li> </ul>

<p><b>Human contact</b></p>	<p>Freshwater bodies support healthy freshwater ecosystems with thriving habitats for a range of indigenous species, and the life stages of those species, that would be expected to occur naturally.</p>	<p><b>Rivers:</b></p> <p>E. Coli</p> <p>Suspended fine sediment</p> <p>Periphyton</p> <p>E. Coli primary contact sites</p> <p><b>Lakes:</b></p> <p>Phytoplankton (Chlorophyll-a)</p> <p>Cyanobacteria (Biovolume cubic millimetres per litre)*</p>
<p><b>Threatened species</b></p>	<p>The freshwater habitats of threatened species are protected and support the persistence and recovery of threatened species over time.</p>	<p>All the attributes listed for Ecosystem Health above.</p> <p>Recency of presence</p> <p>National conservation category and status</p> <p>Regional conservation category and status</p> <p>Number of sub-populations</p>
<p><b>Mahika kai (food and resource gathering)</b></p>	<p>Mahika kai resources are restored to a condition in which populations of valued mahika kai species are self-sustaining and plentiful enough to support cultural take.</p> <p>Mana whenua are able to safely access, harvest and use these resources now and in the future.</p>	<p>All the attributes listed for Ecosystem Health above.</p>

Other values (apply to every FMU/rohe)		
<p><b>Natural form and character</b></p>	<p>Freshwater bodies and their riparian margins, and any connected receiving environment including any estuaries and hāpua (lagoon) are able to behave in a way that reflects their natural form and character to the greatest extent practicable, and the natural form and function of unmodified water bodies is protected.</p>	<p><b>Rivers:</b></p> <ul style="list-style-type: none"> <li>Suspended fine sediment</li> <li>Periphyton</li> <li>Macroinvertebrates (QMCI) score*</li> <li>Deposited fine sediment*</li> </ul> <p><b>Lakes:</b></p> <ul style="list-style-type: none"> <li>Phytoplankton (Chlorophyll-a)</li> <li>Cyanobacteria*</li> <li>Submerged plants (natives)*</li> <li>Submerged plants (invasive)*</li> <li>Lake-bottom dissolved oxygen*</li> <li>Mid-hypolimnetic dissolved oxygen*</li> </ul>
<p><b>Drinking water supply</b></p>	<p>Provided the health and wellbeing needs of water bodies and freshwater ecosystems are met, source water from water bodies (after treatment) is safe and reliable for the drinking water supply needs of the community.</p> <p>Activities do not introduce or increase the concentration of contaminants in water, so that, after existing treatment, it no longer meets drinking water standards</p>	
<p><b>Wāhi tūpuna (sites of significance to iwi)</b></p>	<p>Cultural associations with wāhi tūpuna are maintained, visible, and whānau are able to access, use and relate to wāhi tūpuna now and in the future.</p>	

<p><b>Fishing</b></p>	<p>Fish are safe to eat; and</p> <p>Insofar as it is consistent with the protection of indigenous and threatened species, the spawning and juvenile rearing waters for trout and salmon are provided for.</p>	<p><b>Rivers:</b></p> <p>E. Coli</p> <p>Suspended fine sediment</p> <p>Periphyton</p> <p>Nitrate</p> <p>Suspended fine sediment</p> <p>Macroinvertebrates (MCI/ASPM)</p> <p>Fish IBI</p> <p>Macroinvertebrates (QMCI) score*</p> <p><b>Lakes:</b></p> <p>Phytoplankton (Chlorophyll-a)</p> <p>Cyanobacteria (Biovolume cubic millimetres per litre)*</p>
<p><b>Irrigation, cultivation and production of food and beverages</b></p>		<p><b>Rivers:</b></p> <p>Suspended fine sediment</p> <p>Periphyton</p> <p>Water quantity</p>
<p><b>Wetlands</b></p>	<p>Wetlands are protected, and their ecosystem health, indigenous biodiversity, and hydrological functioning is restored where degraded.</p>	<p><b>Rivers:</b></p> <p>E. Coli</p> <p>Suspended fine sediment</p> <p>Periphyton</p> <p>Nitrate</p> <p>Suspended fine sediment</p> <p>Macroinvertebrates (MCI/ASPM)</p> <p>Fish IBI</p> <p>Macroinvertebrates (QMCI) score*</p> <p><b>Lakes:</b></p> <p>Phytoplankton (Chlorophyll-a)</p> <p>Cyanobacteria (Biovolume cubic millimetres per litre)*</p>

<b>Taoka species (treasured species)</b>	Thriving, connected habitats for indigenous species are restored and sustained for ever and their mauri is intact.	
<b>Values that apply to specific FMU</b>		
<b>Commercial and industrial</b>	Provided the health and wellbeing of water bodies and freshwater ecosystems and human health needs are met, commercial and industrial activities are enabled.	<b>Rivers:</b>  Suspended fine sediment  Periphyton
<b>Hydro-electric power generation</b>	Existing hydro-electric generation activities are developed, operated, maintained and upgraded in a way that meets the environmental outcomes to the greatest extent practicable.	

## Target attribute states

Attributes are indicators that we can measure and monitor. Attributes tell us about the state of a river or lake. A target attribute state (TAS) is the state that an attribute must achieve to make sure that an environmental outcome is met. The timeframe for achieving the TAS for each FMU is set by the environmental outcomes for the FMU. For the Manuherehia Rohe, the environmental outcomes are to be achieved by 2050. By monitoring attributes and comparing their baseline state with their TAS we learn how well we are on track towards achieving the environmental outcomes for this rohe.

While the environmental outcome statements are largely consistent across Otago, baseline states and TAS are usually specific to each FMU and rohe. Attributes for each value and baseline states for those attributes have been identified along with trends derived from the Otago Regional Council's State of the Environment (SoE) monitoring data.

The baseline state and TAS for the Manuherehia Rohe are in the map below.

Zoom into an area and view the various locations of proposed monitoring sites in an area(s).

Select the yellow dot representing a proposed monitoring site to see the Target Attribute States.

You can further select the Target Attribute States table to view a larger version of the table.

(Note: If you are on a mobile device, tap on the arrow next to the 'X' icon for the table to show.)

- An interactive map is available online for you to view:
- [www.orc.govt.nz/landwaterproposedchanges](http://www.orc.govt.nz/landwaterproposedchanges)

## FMU provisions

National direction requires Council to set limits as rules or action plans (as appropriate) to achieve the environmental outcomes. This can be done at a region-wide level or at FMU/rohe level. The draft region-wide rules are set out in different briefing papers, including the briefing papers Primary Production, Wastewater, Stormwater, Earthworks, Water Quantity and various others. However, for the Manuherekia Rohe a number of specific rules are proposed that are needed to make sure the environmental outcomes for this rohe are achieved over time. These additional rules, which will be included in the Manuherekia rohe chapter of the new Land and Water Regional Plan, are shown in the table below.

Table 2: Overview of proposed additional provisions for Manuherekia Rohe

Contaminants of concern	Draft LWRP
<p><b>Rivers</b></p> <p>Periphyton (TNTP)</p> <p>E. Coli</p> <p>Suspended fine sediment</p> <p><b>Groundwater</b></p> <p>Arsenic</p> <p>E. Coli</p>	<ul style="list-style-type: none"> <li>• Consent required for dairy farming and dairy support which allows all activities on farm to be considered in order to require reductions in contaminant losses. Controlled activity status with conditions:               <ul style="list-style-type: none"> <li>• the dairy farm is existing</li> <li>• has a freshwater farm plan</li> <li>• average stocking rate no greater than 2.5 cows per hectare</li> <li>• livestock are wintered on the land</li> <li>• synthetic nitrogen fertiliser cap of 100 kgs per hectare per year</li> </ul> </li> <li>• Matters of control are:               <ul style="list-style-type: none"> <li>• the content of, and compliance with, the farm’s certified freshwater farm plan</li> <li>• the timing of any actions or good management practices proposed to achieve the environmental outcomes for the rohe</li> <li>• methods to avoid or mitigate adverse effects of the activity on water quality</li> <li>• methods to reduce contaminant loss</li> <li>• stocking rates</li> </ul> </li> <li>• If controlled activity conditions cannot be met, the activity requires a discretionary consent.</li> <li>• Cultivation permitted subject to conditions relating to setbacks from waterbodies, depending on slope.               <ul style="list-style-type: none"> <li>• 5m on a slope of less than 10 degrees</li> <li>• 10 metres on slopes between 10 and 20 degrees</li> </ul> </li> <li>• Cultivation on slopes over 20 degrees, only permitted if the following conditions are met:               <ul style="list-style-type: none"> <li>• for the renewing or establishing of pasture only,</li> <li>• using no tillage or direct seed drilling only</li> <li>• 10 m setbacks from water bodies and wetlands.</li> </ul> </li> <li>• If the permitted activity conditions cannot be met the activity requires a discretionary consent.</li> </ul>

## Environmental flows and levels and limits on take, diversion and damming of water

The Manuherehia Rohe chapter will also include take limits and environmental flows and levels for rivers, lakes and aquifers in this rohe.

Take limits reflect the total quantity of water that can be taken, dammed or diverted from a stream, river, lake or aquifer. Once the combined rate of take for all consented water takes, diversion or damming activities from a water body matches this take limit no further water can be allocated in new consents.

Environmental flows (for rivers or streams) or environmental levels (for lakes and aquifers) include minimum flows or levels that when reached all consented (and some permitted) takes, diversions and damming activities must cease. These restrictions on water taking, diversions or damming activities typically occur during dry periods and are needed to make sure after important values, such as threatened fish, drinking water supply or mahika kai (food and resource gathering) values, are looked after.

## Lakes

Environmental levels and take limits for the lakes and reservoirs in the Manuherehia Rohe are shown in the table below.

Given its uniqueness, it is proposed that a narrative take limit is set for the Blue Lake. This limit will prohibit any new takes, damming or diversions (except for takes that are permitted under the Resource Management Act 1991) that could impact water levels this lake. The prohibition will ensure that this lake will continue to behave in its current state.

Reservoirs in this rohe, such as the Poolburn Dam and the Manorburn Reservoir will be subject to the minimum flow and take limit set for the Manuherehia River catchment.

Name	Environmental level(s)	Take limit (litre per second)
<b>Natural lakes (unmodified)</b>		
<b>Blue lake</b>	Natural minimum water level	Narrative — no new taking, diversions, damming or discharges from the lake or upper catchment.
<b>Controlled lakes</b>		
<b>Idaburn Dam</b> <b>Lower Manorburn Dam</b> <b>Falls Dam</b> <b>Greenland Reservoir</b> <b>Manorburn Reservoir</b> <b>Moa Creek Reservoir</b> <b>Poolburn Reservoir</b>	Lake level managed by the minimum flow of the Manuherehia river catchment	Subject to the take limit of the Manuherehia river catchment.

## River catchments

Bespoke limits and environmental flows will be set in the Land and Water Regional Plan for the Manuherehia River. A staged increase in environmental flows over time has been proposed to achieve ecosystem health for the river. This would be implemented as follows:

Name	Environmental flow(s)	Take limit (l/s)	Further primary allocation available (estimate based on best available)
River catchments managed by bespoke limits			
Manuherehia at Campground	900 l/s (from notification) 1200 l/s (from 2030) 2500 l/s (from 2040)	Maximum instantaneous rate of take of 32,000 l/s	No

The draft LWRP contains the following additional provisions related to environmental flows in the Manuherehia:

- All water take consents that expire after 2030 called in, reviewed and the 1200 l/s minimum flow applied.
- All water takes, retakes, uses, and discharges require metering.
- Maximum instantaneous rate of take of 32,000 l/s to enable conditional reconsenting:
- Reconsenting based on actual use, not previous allocation.
- Reconsenting based on an efficiency test.
- Reconsenting take averaged over time and will account for seasonal conditions.
- Reconsenting will consider a reasonable amount being sought.
- No new primary allocation water.
- Fish barriers installed in tributaries before the minimum flow is raised beyond 1200 l/s.
- Over time, minimum flows will be established in the upper catchment and/or residual flows on the tributaries.
- Over time, water allocation to be addressed, likely via a future plan change.
- More enabling flow harvesting provisions, while still allowing for flow variability at higher flows.

## Aquifers

The Manuherehia rohe contains various aquifers.

For some aquifers that are not hydraulically connected to surface water, such as the Manuherehia Claybound Aquifer and the Ida Valley Groundwater Management Zone, take limits will be set based on a proportion (35%) of the mean annual recharge of that aquifer. National direction also requires Otago Regional Council also to set environmental levels for these aquifers. Because we will not have sufficient groundwater level monitoring data to set environmental levels in the Land and Water Regional Plan when it will be notified, environmental levels for these aquifers will be set at a later date.

For the Manuherehia Alluvium Aquifer, which has a close hydraulic connection to Manuherehia river, any taking of water will be subject to the take limits and environmental flows set for this river.

Name	Environmental flow(s)	Take limit (volume)
<b>Aquifers with default limits</b>		
<b>Ida Valley Groundwater Management Zone</b>  <b>Manuherehia Claybound Aquifer</b>  <b>Manuherehia Groundwater Management Zone</b>	Not required to be included in the new LWRP at this time	35% mean annual recharge
<b>Alluvial ribbon aquifers</b>		
<b>Manuherehia Alluvium Aquifer</b>	Groundwater level managed by the river catchment minimum flow	Subject to river catchment take limit

## Outstanding water bodies

Outstanding water bodies are water bodies that have one or more outstanding values. National direction requires the Otago Regional Council to identify outstanding water bodies and protect their important values. The table below lists the outstanding water bodies in this rohe and describes their outstanding values.

Below is a map featuring all the water bodies in Otago.

You can zoom in and view the various water bodies in an area(s).

Water bodies are shown in a blue colour. Select an area to view the water body name.

(Note: if you are on a mobile device, after selecting a water body, tap on the arrow next to the 'X' icon to view more information.)

An interactive map is available online for you to view:  
[www.orc.govt.nz/landwaterproposedchanges](http://www.orc.govt.nz/landwaterproposedchanges)

Unique identifier	Site identifier	Values and characteristics
<b>Ecology</b>		
ECL14	<b>Upper Manuherekia</b>	<ul style="list-style-type: none"> <li>• The Central Otago roundhead galaxias are found in the Manuherekia river catchment.</li> <li>• The Alpine galaxias ‘Manuherekia’ (<i>Galaxias paucispondylus</i> ‘Manuherekia’) occupies the Manuherekia River upstream of Falls Dam reservoir.</li> <li>• The present-day upper limit is of the alpine galaxiid ‘Manuherekia’ is at the confluence of the West and East branches of the Manuherekia River. At present it is restricted to the braided unstable reach of the Manuherekia River downstream of the confluence.</li> <li>• The braided river habitat that supports alpine galaxias ‘Manuherekia’ also has breeding populations of black fronted tern, banded dotterel, black billed gull and wrybill.</li> <li>• The spring fed tributaries and adjacent wetland support wetland vegetation and macrophyte communities and are feeding habitat for pied stilts.</li> <li>• A wetland close to Falls Dam supports a small population of Central Otago roundhead galaxias, and this is the only known population of this fish remaining upstream of Falls Dam and as such is a key population for maintain the geographic range of Central Otago roundhead galaxias. The proposed outstanding water body, while centred on alpine galaxias ‘Manuherekia’ also includes the diverse freshwater ecosystems, wetlands of the upper Manuherekia valley and the Central Otago roundhead population.</li> </ul>
ECL15	<b>Hopes Creek</b>	<ul style="list-style-type: none"> <li>• Hopes Creek is occupied by Clutha flathead. The fish survive in harsh temperature and low flow conditions possibly creating populations that are adapted to the localised extreme environment. Therefore, Hopes Creek provides a significant area of habitat for Clutha flathead with low or no modification and no introduced species. The populations present are also likely to be adapted to the local environmental conditions.</li> </ul>

<b>Physical</b>		
None identified.		
<b>Recreation</b>		
None identified.		
<b>Natural character</b>		
NAT12	<b>Hopes Creek</b>	<p><b>Active bed</b></p> <p>Intricate and intact system of narrow streams and wetlands, including bogs and sedge wetlands located on the high-lying plateau area of Knobby Range in the lower Manuherekia Catchment (west of Manorburn Reservoir).</p> <p>Water quality is high with some influence from stock grazing.</p> <p>Largest population of flathead galaxias nationally and upper reaches remain free from introduced species.</p> <p>Large area of habitat for the nationally critical threatened Teviot galaxias.</p> <p>No structures or modifications within the active bed of streams, however stock may have access.</p> <p>Unmodified flow regimes, with no bores or water takes. These are found further downstream, and lower reaches of these water bodies are excluded from outstanding water body identification.</p> <p><b>Margin</b></p> <p>Margins are characterised by tall tussockland including red and snow tussock. At lower altitudes lowland short tussockland is more common.</p> <p>Low intensity grazing by sheep and cattle.</p> <p>Limited structures or modifications, including vehicle tracks and fords.</p> <p><b>Context</b></p> <p>The south-east of this area is encompassed within the Manorburn Conservation Area which provides for remote experiences in a largely natural landscape.</p> <p>The context is characterised by a gently sloping peneplain and tall tussockland.</p> <p>No settlement is present, but the wider landscape context includes high-country farming on several stations.</p> <p>Stock grazing is present throughout this area, but land improvement is very limited.</p> <p>Overall, the natural elements, patterns, and processes remain largely unmodified.</p>

<p>NAT13</p>	<p><b>Manuherekia</b></p>	<p><b>Active bed</b></p> <p>Steep network of largely unmodified streams on the eastern tops of the Dunstan mountains that form the headwaters of tributaries to the mid and lower reaches of the Manuherekia main stem (see also DUNC11: Dunstan Mountains for outstanding water bodies on western slopes).</p> <p>Water quality is high with very minor stock influence above the confluence in these upper reaches.</p> <p>No structures and limited modifications, including stock which may have access to the active bed.</p> <p>Unmodified flow regimes due to absence of water takes and bores, with no abstraction occurring at higher elevation.</p> <p><b>Margin</b></p> <p>Cushion herbfields dominate along the exposed the range crests.</p> <p>Lower-lying part of upper catchment contains a mixture of hard tussock, silver tussock, and low producing grassland, while margins along the upper reaches in the headwaters contain snow tussock.</p> <p>Gullies along incised streams contain matagouri, and limited manuka and kanuka scrub.</p> <p>No structures within the margins however stock grazing and vehicle tracks are present.</p> <p><b>Context</b></p> <p>Located on the eastern slopes of the Dunstan Mountains, the area is an exposed and mountainous landscape, particularly near the summit ridges.</p> <p>The area overlooks the Manuherekia Valley below which is intensively farmed with irrigation utilising water abstracted from the mid and lower Manuherekia and its tributaries.</p> <p>No settlements are found in the headwaters, however at lower altitudes isolated structures include huts and those related to stock grazing occur.</p> <p>While the land is used for extensive grazing, the natural elements, patterns, and processes remain dominant and largely unimpeded.</p> <p>Opportunities for the public to experience the landscape’s largely natural, exposed and wild character within the Lauder Basin Conservation Area.</p>
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<p>NAT14</p>	<p>St Bathans</p>	<p><b>Active bed</b></p> <p>Largely unmodified water bodies within the upper reaches of the Manuherekia River, draining the St Bathans and Hawkdun Mountains draining into Dunstan Creek and the Manuherekia East and West Branches.</p> <p>Dunstan Creek has a slightly braided section in the headwaters before entering a gorge.</p> <p>Only habitat for the Alpine galaxias ‘Manuherekia’.</p> <p>Breeding habitat for black fronted tern, wrybill, banded dotterel and black billed gull.</p> <p>Water quality is high in the upper Manuherekia with very minor stock influence above the confluence of the two branches.</p> <p>No structures or modifications, with the Idaburn Naseby Race being excluded from the outstanding water body identification.</p> <p>Unmodified flow regimes due to absence of bores and water takes. Tributaries that discharge into the Ida irrigation race have been excluded from outstanding water body identification.</p> <p><b>Margin</b></p> <p>Margins are largely lined with subalpine tall tussockland including species such as Chionochloa rigida and Chionochloa macra.</p> <p>Gullies and gorges are often lined with matagouri, manuka and kanuka scrub.</p> <p>Crack willow is very limited.</p> <p>High altitude areas contain alpine grasses and herbfields on the margins or bare unvegetated scree slopes.</p> <p>No structures but limited modifications include vehicle tracks and tramping tracks.</p> <p><b>Context</b></p> <p>Located within the Oteake Conservation Park and Dunstan Peaks Conservation Area the mountainous landscape is highly natural.</p> <p>The area adjoins the Canterbury - Otago regional boundary and Hawkdun Range to the east, and Lindis Pass to the west.</p> <p>No settlements, and limited structures including tramping huts.</p> <p>Overall, the natural elements, patterns, and processes are dominant and highly legible.</p> <p>Opportunities for wild and remote experiences within the mountainous headwaters of the Manuherekia River and Dunstan Creek.</p>
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Natural features and landscapes		
LAN38	<b>Manorburn and Greenland Reservoirs</b>	<ul style="list-style-type: none"> <li>• Artificial water reservoirs completed in 1914 for irrigation purposes.</li> <li>• While artificially constructed, active bed remains devoid of structures with the exception of the Manorburn Dam.</li> <li>• Greenland Reservoir is surrounded by tall tussockland while the lower reaches near the Manorburn Reservoir is surrounded by grassland.</li> <li>• Highly memorable and legible features within the Rough Ridge landscape.</li> </ul>
LAN39	<b>Poolburn Reservoir</b>	<ul style="list-style-type: none"> <li>• Artificial water reservoir completed in 1931 for irrigation purposes.</li> <li>• While artificially constructed, active bed remains devoid of structures with the exception of the Pool Burn Dam.</li> <li>• Margins of the Pool Burn Reservoir are surrounded by grassland.</li> <li>• Highly memorable and legible feature within the Rough Ridge landscape.</li> </ul>
LAN40	<b>Upper Lauder Creek</b>	<ul style="list-style-type: none"> <li>• Narrow, rocky stream devoid of structures and consents.</li> <li>• Margins are largely clad in tall tussockland and regenerating native vegetation (manuka and kanuka). The south-western extent of Lauder Creek is bordered by grassland.</li> <li>• Coherent river channel is highly expressive of their formative processes.</li> <li>• The upper extent of Lauder Creek is encompassed within the Lauder Basin Conservation Area.</li> </ul>

LAN41	<b>Upper Dunstan Creek</b>	<ul style="list-style-type: none"> <li>• Intact and narrow braided river with no structures of consents.</li> <li>• Vegetation within the margins includes tall tussockland and matagouri scrub. Some areas of grassland are also present.</li> <li>• Distinctive feature within the narrow valley between the St Bathans Range, and Dunstan Mountains.</li> </ul>
LAN42	<b>Upper Manuherekia</b>	<ul style="list-style-type: none"> <li>• Intact braided river formed through tectonic uplift of the Southern Alps.</li> <li>• Braided river channels remain unimpeded or restricted by modifications and structures.</li> <li>• Margins are clad in grassland within the lower reaches of the river, while the upper reaches are surrounded in intact tall tussockland.</li> <li>• Coherent braided river channels are highly expressive of their formative processes.</li> <li>• The Manuherekia river is recorded as being a kainga mahinga kaiwhere tuna (eels), pora (‘Māori turnip’), weka, pārerā (grey duck), pūtakitaki (paradise duck), and kōareare (edible rhizome of raupō/bulrush), were gathered.</li> </ul>
LAN43	<b>Poolburn Gorge</b>	<ul style="list-style-type: none"> <li>• Distinctive incised gorge within the Raggedy Range.</li> <li>• Active bed is surrounded by coherent areas of grassland, steep rock, and willows.</li> <li>• Incised gorge is a highly legible landscape feature and expressive of its formative processes.</li> </ul>
LAN44	<b>Ophir Gorge</b>	<ul style="list-style-type: none"> <li>• Distinctive incised, rocky gorge to the north-east of the Raggedy Range.</li> <li>• Active bed is surrounded by coherent areas of grassland, steep rock, matagouri scrub, and willows.</li> <li>• Incised gorge is a highly legible landscape feature and expressive of its formative processes.</li> </ul>

## Economic profile and snapshot

While freshwater policies might be designed and applied specifically to the Roxburgh Rohe, their impacts may be felt beyond. Hence the Roxburgh Rohe, the neighbouring Manuherekiā Rohe, and the northern part of the Taieri Rohe are combined when considering socio-economic information. These communities have close economic ties, i.e., residents are likely to live in one of the areas while working/spending in the other areas. The three areas combined are referred to as the 'Inland'.

In 2018, the area was home to around 13,000 residents (6% of Otago's population), which had increased by 15% since 2006. The economy of this area depends on the water-reliant agriculture sector (which provides for one in five jobs) and tourism related industries (15% of all jobs). Administrative Services (13%) is the third largest sector in the area; and the Employment Services sub-category provides 10% of all jobs. Together, all these industries account for around half of the employment in the 'Inland' area.

An understanding of Māori history and the Māori economy is essential for policy development and policy impact assessment. Not only does pre-European Māori history help shape modern day New Zealand, but the Māori economy is also integral to the New Zealand economic system. ORC is partnering with Aukaha and Te Ao Marama to develop an overview of Kāi Tahu history and economy.

- [View the Manuherekiā economic snapshot that provides local economy information](#)
- [View more regional economic information](#)
- [View the media release for new Otago economic reports](#)

## 2021 Economic Studies to support minimum flows

- [View the Manuherekiā Catchment Economics summary \(Dr. McDonald & Dr. Yang\)](#)
- [View the Economy-wide Impacts of Proposed Policy Options for the Manuherekiā Catchment draft report \(Dr. McDonald & Dr. Yang\)](#)
- [View the Manuherekiā Enterprise Model Methodology \(Abacus Bio\)](#)
- [View the Manuherekiā Enterprise Model Methodology Appendix \(Abacus Bio\)](#)