

Murihiku Southland Water Quality Planning Process

2021- 2025

What this means for communities



**THRIVING
SOUTHLAND**



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Prepared For

Thriving Southland

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Reference: Landpro (2021) Southland's Water Quality Planning Process 2021, What this means for communities. Prepared for Thriving Southland.

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Version: **Final**

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Executive Summary

The purpose of this report is to provide some brief background to current freshwater planning processes and the longer term implications of changes to the Southland Water and Land Plan.

Specifically, this report endeavours to:

1. Outline the process that Environment Southland and Te Ao Mārama Inc¹ are following to develop a regional plan change, focussing on river, lake, groundwater and estuary health.
2. The likely implications for rural land use.
3. Identify measures that could be taken now to help improve freshwater and estuary health and to prepare for future initiatives to improve these.
4. Summarise potential opportunities to provide input into the proposed plan change process.

Outline the process that Environment Southland and Te Ao Mārama are following to develop a regional plan change, focussing on river water quality management

The recent “Essential Freshwater” programme developed by the Ministry for the Environment has introduced significant changes to how freshwater is managed in New Zealand. A key part of that programme has been the release of an updated National Policy Statement for Freshwater Management 2020 (NPS-FM) and new Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-F). The NPS-FM has introduced some fundamental changes to freshwater management in New Zealand. A key feature of this is the new requirement to “give effect to” Te Mana o te Wai and ensure that natural and physical resources are managed in a way that prioritises:

‘First - the health and well-being of water bodies and freshwater ecosystems

Second - the health needs of people (such as drinking water)

Third - the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future’.

The NPS-FM also includes updated requirements:

- For regional councils to develop a ‘limit setting process’.²
- For regional councils to actively involve tangata whenua in freshwater management.
- New national freshwater quality requirements such as a stricter ‘National Bottom Line’³ (NBL) for nitrate nitrogen from a median of 6.9 g/m³ to a median of 2.4 g/m³.

Over the next two years, Environment Southland and Te Ao Mārama in consultation with the regional community will develop “methods and limits” to achieve freshwater objectives.

¹ Te Ao Mārama Incorporated represents rūnanga in Murihiku on resource management matters.

² The NPS-FM defines this as either a limit on resource use or a take limit. For water quality, this will be the maximum amount of contaminants that can go into water and still achieve environmental outcomes.

³ The nitrate nitrogen NBL also requires the 95th percentile (95% of results) to be at or below 3.5 g/m³.

Environment Southland and Te Ao Māmara have stated that **the intention is to notify a change to the (currently proposed) Southland Water and Land Plan (pSWLP) by December 2023** to ensure that the process meets the statutory requirement for notification by 31 December 2024 (Section 80A(4)(b) of the RMA).

The likely implications for rural land use

The combination of existing water quality and the requirements of the NPS-FM mean that the forthcoming proposed plan change will require water quality improvements in most Southland rivers and streams that have a significant proportion of agricultural and/or urban activities in their catchments. However, the scale of improvement needed and the priority contaminants will often vary between catchments. For example, in some catchments, the priority contaminants are likely to be nitrogen, faecal indicator bacteria and sediment while in other catchments they may be faecal indicator bacteria, sediment and phosphorus.

The current technical information made available by Environment Southland at the end of 2020 also indicates that for the vast majority of Southland, Good Management Practices (GMPs)⁴ will not be enough to achieve the improvements required by the NPS-FM or the Draft Freshwater Objectives.

It is likely that in most rural catchments new contaminant loss mitigation initiatives and/or farm system changes will be required to improve water quality. Where there are significant gaps between the current and proposed water quality, changes required will be significant.

Identify measures that could be taken now to help improve water quality and to prepare for future initiatives to improve water quality

- **Understand your landscape and catchment.**
 - Find out the catchment information for the area your farm is located in – name of catchment, the things that are important in this catchment and the state of the freshwater within the catchment and estuary downstream.
 - Find the soil and physiographic maps relevant to your farm.
 - Align actions towards addressing the issues present in your catchment.

For example, if the priority water quality issue is periodic high concentrations of *E. coli*, then mitigation initiatives will need to focus mostly on measures that target surface runoff contaminants such as enhancing riparian management and less on nitrogen loss management.

⁴ GMPs are defined broadly in the pSWLP and include those listed in various factsheets on the [Environment Southland website](#).

- **Work together in catchment groups to develop and implement coordinated programmes targeted at improving ecosystem health and reducing priority contaminants.**
 - There are many effective measures that, if undertaken at a sufficient scale in a catchment, would make real contributions to improving freshwater and estuary health. However, to have measurable effects on water quality, initiatives need to be taken across a substantial portion of a catchment.
- **Consider how any freshwater and estuary improvement actions will impact on greenhouse gas emissions.**
 - Future requirements from Central Government are highly likely to require greenhouse gas emission reductions.
- **Put in place foundations for forthcoming changes at an individual farm level.**
 - Develop a Farm Environmental Management Plan⁵ to assess risks and opportunities and set a plan to address those.
 - Ensure implementation of good management practices.
 - Record any actions and any measurements of the impacts of the actions taken.
 - Use modelling tools to understand nutrient loss reduction options, going forward.

Long-term farm planning needs to consider the range of likely contaminant loss reduction requirements to ensure that any significant investments (e.g. new land or infrastructure) and/or farm system changes will be robust choices.

Summarise potential opportunities to provide input into the proposed plan change process

Environment Southland and Te Ao Māmara Inc have jointly established a community based group called the Regional Forum that will make recommendations to Environment Southland and Te Ao Māmara Inc in 2022 on the potential methods and limits.

The recommendations will provide Environment Southland and Te Ao Māmara Inc with the basis to develop a proposed plan change with subsequent public notification and hearings. This process will involve opportunities for public input, and the information received in this consultation process will be an important part of the development of the proposed plan change.

It is important everyone with an interest in the farming sector and initiatives to improve freshwater and estuaries in Southland take advantage of opportunities to have an input into this process. Input is needed from the community to ensure that decision-makers fully understand all the potential implications of different possible approaches.

⁵ Central Government is introducing Freshwater Farm Plans (FFPs) as part of the Essential Freshwater policy package. These FFPs may replace Farm Environmental Plans (FEMPs).

1. Introduction

The purpose of this report is to provide some brief background to current freshwater processes and the longer term implications of changes to the Southland Water and Land Plan. Specifically, this report⁶ endeavours to:

- Outline the process Environment Southland and Te Ao Māmara Inc⁷ are following to develop a regional plan change, focussing on river, lake, groundwater and estuary health.
- Identify likely implications for rural land use.
- Identify measures that could be taken now to help improve freshwater and estuary health and to prepare for future initiatives to improve them.
- Summarise potential opportunities to provide input into the proposed plan change process.

Environment Southland and Te Ao Māmara have been working together over the past few years on the People, Water and Land Programme - Te Mana o te Tangata, te Wai, te Whenua (the mana of people, water and land).

This programme takes an integrated mountains to the sea approach, ki uta ki tai, and its vision is “inspiring change to improve Southland’s water and land”.

The collaboration between Environment Southland and Te Ao Māmara involves a number of significant changes, both in how water is managed and how its management is represented and understood.

This collaborative approach between Environment Southland and Te Ao Māmara requires an understanding and appreciation of the perspectives of Ngāi Tahu ki Murihiku in the management of land and water.

The recent “Essential Freshwater” programme developed by the Ministry for the Environment has introduced significant changes to how freshwater is managed in New Zealand. A key part of that programme has been the release of an updated National Policy Statement for Freshwater Management 2020 (NPS-FM) and new Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-F). These initiatives are designed to:

- Stop further degradation of New Zealand’s freshwater resources and improve water quality within five years.
- Reverse past damage and bring New Zealand’s freshwater resources, waterways and ecosystems to a healthy state within a generation.⁸

⁶ This report uses some essential terminology and jargon – please see Appendix A for a glossary.

⁷ Te Ao Māmara was established in 1996, to represent the ūnanga of Murihiku (area including Southland) on resource management matters.

⁸ mfe.govt.nz/essential-freshwater-new-rules-and-regulations

The NPS-FM has introduced some fundamental changes to freshwater management in New Zealand. A key feature of this new direction is the introduction of the new “Fundamental Concept – Te Mana o te Wai”. There is a new **hierarchy of obligations in Te Mana o te Wai, specified in the NPS-FM:**

- a) First, the health and well-being of water bodies and freshwater ecosystems*
- b) Second, the health needs of people (such as drinking water)*
- c) Third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.*

The NPS-FM also includes updated requirements:

- **For regional councils to develop a limit setting process.⁹**
- **For regional councils to actively involve tangata whenua in freshwater management.**
- **New national freshwater quality requirements such as a stricter national bottom line¹⁰ for nitrate nitrogen from a median of 6.9 g/m³ to a median of 2.4 g/m³.**

These national directions are going to have a significant effect on how activities that affect water quality will be managed in Southland.

In Southland Draft Murihiku Southland Freshwater Objectives (Draft Freshwater Objectives) were released in late 2020. This was an important step in a complex process that will have far reaching implications for many Southland communities.

Over the next two years, Environment Southland and Te Ao Māmara Inc in consultation with the regional community will develop methods and limits to achieve freshwater objectives. In other words, the next step in the process will involve developing detailed policies, rules and other implementation methods to ensure that freshwater objectives are achieved within 25 to 30 years.

More detailed information on the proposed plan change process and the supporting technical information can be found on the [Environment Southland Water and Land website](#).

Environment Southland and Te Ao Māmara Inc have stated the intention is to notify a change to the (currently proposed) Southland Water and Land Plan (pSWLP) by December 2023 to meet NPS-FM requirements.

⁹ The NPS-FM defines a limit as either a limit on resource use or a take limit. For water quality, this will be the maximum amount of contaminants that can go into water and still achieve environmental outcomes.NPS-FM

¹⁰ The nitrate nitrogen NBL also requires the 95th percentile (95% of results) to be at or below 3.5 g/m³.

2. Regional Plans

All regional plans have to give effect to national policy statements. Environment Southland and Te Ao Māmara Inc have developed new Draft Freshwater Objectives (environmental outcomes and target attribute states) as the first step of this process. The NPS-FM 2020 specifies many requirements for regional plans, including a limit setting process, which requires environmental outcomes to be identified, target attribute states to be set and timeframes for achieving the targets.

It is important to understand that regional plan objectives cascade down eventually to specific controls on land use.

This is a relatively complex framework, but essentially it involves the following steps:

Table 1 A summary of how values and environmental outcomes cascade down to specific land use controls

Step	Example
1. Establish values – things people think are important about water.	Ecosystem health – e.g. extent of plant growth e.g. periphyton ¹¹ and phytoplankton ⁷ .
2. Use the values to establish attributes (how you are going to measure each value).	Amount of plant biomass measured by chlorophyll- <i>a</i> concentrations.
3. Set environmental outcomes and target attribute states for each attribute – where does the community want the attribute to be in the future.	For example, peak periphyton concentrations to not exceed XYZ mg/m ² .
4. Set limits – these meet the outcomes that the community wants.	For example, maximum river and/or lake water nutrient concentrations and maximum annual loads of N & P in the catchment.
5. Establish methods to achieve those limits e.g. controls on land use such as nitrogen and phosphorus individual farm limits.	Measures to ensure losses from land use and discharges are managed to ensure compliance with the maximum catchment loads, e.g. maximum nutrient losses per hectare for specific land uses.

Note: The above process is iterative. For example, the timeframe for achieving some target attribute states in some places may be reviewed once the limits and methods needed to achieve these are understood.

¹¹ Periphyton = algae that grow on stones in flowing water or lakes. Phytoplankton = algae that grow in the water column.

3. The Draft Murihiku Southland Freshwater Objectives

The Draft Freshwater Objectives are a combination of narrative¹² and numeric¹⁰ objectives.

3.1 Narrative objectives

The draft narrative freshwater objective – primary:

“Te Mana o te Wai, the mauri of water within each freshwater management unit, will be recognised and protected through the combination of all relevant numeric and narrative freshwater objectives for waterbodies, which together provide for te hauora o te taiao, te hauora o te wai and te hauora o te tangata, within a ki uta ki tai management framework.”

This is a very broad draft objective that largely reinforces the N-FM, and emphasises the need to recognise the fundamental cultural significance of water and provide for the health of land, water, and people.

There are draft narrative objectives for:

- Ngā Puna (Springs)
- Ngā Wainuku (Groundwater)
- Ngā Repo (Wetlands)
- Ngā Awa (Rivers and Streams)
- Ngā Roto (Lakes)
- Ngā Ngutuawa (Estuaries)
- Takutai Moana (Open Coast).

This is an example of the current draft narrative objective for a river:

“All rivers and streams are maintained and improved wherever possible, such that:

a) the natural characteristics of rivers and streams are maintained with regard to their quality, including water clarity and the condition of their beds and banks, as well as their extent, hydrology, variability, form and function, including their connection with other waterbodies, and indigenous vegetation; and enhanced or restored wherever possible in places where these characteristics have been diminished or lost;

b) the quality, diversity, including species diversity and spatial diversity, connectivity, extent and function of instream and riparian habitats of rivers and streams:

i. are healthy ecosystems that support the range of species naturally associated with them,

¹² A narrative objective is one that relies on words e.g., a description of the aquatic ecosystem health status sought. A numeric objective supports a narrative objective and specifies a measurable target e.g., the median concentration of nutrients in a river.

including desirable microbes, invertebrates, molluscs, plants, fish and birds, taonga and mahinga kai species characteristic of each waterbody and its class;

ii. are free from undesirable microbes, slimes, fungal growths, nuisance blooms, invasive and/or pest species, emerging contaminants, including contaminated sediments, and undesirable or uncharacteristic changes in temperature or pH;

iii. provide for indigenous fauna to utilise their full range of aquatic and riparian habitats at each life stage, including access to feeding, spawning and nursery areas;

iv. enable populations of threatened indigenous species to recover in number and distribution; and

v. support cultural resources, associations and practices that are or have been associated with them, which may include cleansing and health giving properties, safe drinking water, safe harvesting of resources and/or healthy and abundant mahinga kai species that are culturally and physically safe to gather and consume, including within nohoanga and mātaītai and as a result of phasing out direct discharges to water; and

c) people interacting with them are protected from the presence of pathogens and other contaminant risks, including human faecal sources, and uncharacteristically bad smelling waters, and there are no concerns expressed regarding contact with rivers and streams, or harvest or consumption of resources from them, including no need for health warnings.”

3.2 Numeric objectives

It is important to understand that the current numeric Draft Freshwater Objectives have been developed in the context of:

- The current state of water quality.
- Uses and values of freshwater in Murihiku Southland.
- The five Freshwater Management Units (FMUs) for Southland
 - Fiordland and Islands
 - Waiau
 - Aparima
 - Oreti
 - Mātaura (The Environment Court has recently issued an interim decision on the pSWLP that strongly indicates that the Waituna Lagoon/Waipārera will be made a separate FMU¹³).
- The categorisation of water bodies in Southland e.g. for rivers: lowland soft bed, lowland hard bed, hill, mountain, lake-fed, spring-fed.

¹³ <https://www.environmentcourt.govt.nz/assets/Documents/Publications/2019-NZEnvC-208-Aratiatia-Livestock-Limited-v-Southland-Regional-Council.pdf>

- The NPS-FM requirements for water quality attributes, bands and national bottom lines.¹⁴

The concept of hauora - a state of health, which can be thought of as meaning fit, well, vigorous and robust, reflecting healthy resilience. The draft numeric objectives for rivers are provided in Appendix C. The full set of numeric objectives, including those for lakes, estuaries and groundwater are contained in [Draft Murihiku Southland Freshwater Objectives](#).

As an example of how the numeric objectives work, a Southland stream is reported ([LAWA](#)) as having a five year (2015-2020) median nitrate nitrogen of 3.7g/m³. This means that the stream would be classified as in the C Band and the forthcoming plan change would need to include provisions to improve the water quality to bring the quality to at least the B Band (median nitrate nitrogen between 1.0 – 2.4 g/m³).

The Draft Freshwater Objectives indicate the intention, within a 25 - 30 year period, to eventually improve that water quality to the A band (median nitrate nitrogen less than 1.0 g/m³).

The attribute bands are illustrated below.

Table 2: Nitrate nitrogen attribute bands from the NPS-FM 2020

Value (and component)	Ecosystem health (Water quality)	
Freshwater body type	Rivers	
Attribute unit	mg NO ₃ – N/L (milligrams nitrate-nitrogen per litre)	
Attribute band and description	Numeric attribute state	
	Annual median	Annual 95th percentile
A High conservation value system. Unlikely to be effects even on sensitive species.	≤1.0	≤1.5
B Some growth effect on up to 5% of species.	>1.0 and ≤2.4	>1.5 and ≤3.5
National bottom line	2.4	3.5
C Growth effects on up to 20% of species (mainly sensitive species such as fish). No acute effects.	>2.4 and ≤6.9	>3.5 and ≤9.8
D Impacts on growth of multiple species, and starts approaching acute impact level (that is, risk of death) for sensitive species at higher concentrations (>20 mg/L).	>6.9	>9.8
This attribute measures the toxic effects of nitrate, not the trophic state. Where other attributes measure trophic state, for example periphyton, freshwater objectives, limits and/or methods for those attributes may be more stringent.		

¹⁴ Some of the current numeric objectives in the Draft Freshwater Objectives were set under the 2017 version of the NPS-FM and will need updating to be consistent with the current NPS-FM, e.g. nitrate nitrogen.

3.3 The current state of Southland's freshwater and future challenges

Environment Southland has recently made available technical publications that compare water quality in Southland with the Draft Freshwater Objectives^{15,16}. These reports include detailed assessments of water quality data and the conclusions have been incorporated into the Draft Freshwater Objectives. The key conclusions from these detailed assessments can be summarised as:

- Water bodies in the Fiordland and Islands FMU are highly likely to be in near pristine condition and the future focus will be on maintaining that situation.
- Outside of the Fiordland and Islands FMU, the results from many groundwater and surface water quality monitoring sites meet numerical Draft Freshwater Objectives. However, many do not.
- The most substantial gaps between the current water quality and the numerical Draft Freshwater Objectives (taking account of the NPS-FM) exist for lowland rivers for *E. coli*, nitrate nitrogen¹⁷, phosphorus and objectives related to sediment.
- There are also significant gaps at some lowland sites for other Draft Freshwater Objectives such as those that relate to periphyton and macroinvertebrates.

It is useful to appreciate that water quality contaminant management measures by themselves will not ensure that all the narrative Draft Freshwater Objectives will be achieved. Additional factors will need to contribute to achieving many of the objectives e.g. river flow regimes and riparian and instream habitats.

The combination of existing water quality and the requirements of the NPS-FM means the forthcoming proposed plan change will require water quality improvements in most Southland rivers and streams that have a significant proportion of agricultural and/or urban activities in their catchments. However, the scale of improvement needed and the priority contaminants will often vary between catchments. For example, in some catchments, the priority contaminants are likely to be nitrogen, faecal indicator bacteria and sediment while in other catchments they may be faecal indicator bacteria, sediment and phosphorus.

An important example of the detailed assessments undertaken by Environment Southland is provided in Table 4 (from Norton *et al*/2020¹²). While there is a lot of information in this table it is relatively easy to look at these diagrams for each FMU and obtain a reasonable understanding of the extent of differences between the 2019/20 state of water quality and the Draft Freshwater Objectives. All those examples where the coloured boxes are red, brown or purple indicate locations where significant catchment management measures are needed to improve water quality to meet

¹⁵ Greer M (2020) Assessment of baseline water quality in the Southland Region against draft freshwater objectives, Aquanet Report

¹⁶ [Norton N *et al* \(2020\) Current Environmental State and the "Gap" to Draft Freshwater Objectives for Southland, Environment Southland Report.](#)

¹⁷ Nitrate nitrogen is an important water quality attribute both as a nutrient and as a potential toxicant.

the numeric freshwater objectives.

It is also very important to appreciate that the Draft Freshwater Objectives include narrative and numeric objectives for all water bodies in the region, including groundwater, lakes and estuaries and the achievement of those will include establishing policies and rules for the relevant catchments. For example, the water quality, ecosystem status and cultural values of an estuary can be affected by catchment activities and catchment management will also be driven by estuary objectives.

Table 4: An example of an assessment undertaken by Environment Southland¹⁸ of the Oreti FMU water quality monitoring sites relative to water quality attributes (note that the “Fair” rating for nitrate toxicity may not align with the current NPS-FM National Bottom Line)

Streams and rivers state: Oreti FMU 2019	Natural state	Lowland soft bed														Lowland hard bed													Hill							Mountain	Spring fed													
		Dunstable Stream at Dunsdale Reserve	Mokotua Stream at Awarua	Hedgehope Stream 20m u/s Makarewa Confl	Hedgehope Stream at Block Road	Makarewa River at Counsell Road	Makarewa River at King Road	Makarewa River at Lora Gorge Road	Makarewa River at Wallacetown	Makarewa River at Winton - Hedgehope Hwy	Makarewa River u/s Hedgehope Confluence	Otepuni Creek at Nith Street	Silver Stream at Lora Gorge Road	Trenders Creek at Hall Road	Tussock Creek at Cooper Road	Waiwaiwa Creek 1 at Lornville Riverton Highway	Bog Burn d/s Hundred Line Road	Dipton Stream at South Hillend-Dipton Road	Oreti River at Branxholme	Oreti River at Wallacetown	Otapiri Stream at Anderson Road	Otapiri Stream at Otapiri Gorge	Waihopai River at Dacre	Waihopai River at Kennington	Waihopai River at Kennington Road	Waihopai River at Waihopai Dam	Waihopai River u/s Queens Drive	Waikiwi Stream at North Road	Winton Stream at Benmore - Otapiri Road	Winton Stream at Lochiel	Winton Stream at Winton Substation Road	Cromel Stream at Selbie Road	Irthing Stream at Ellis Road	Oreti River at Benmore	Oreti River at Lumsden Bridge	Oreti River at Mossburn	Oreti River at Winton Bridge	Oreti River at Ram Hill	Oreti River at Three Kings	Oreti River at McKellar's Flat	Murray Creek at Cumming Road	Murray Creek at Double Road								
National compulsory attributes																																																		
Periphyton (Chl-a mg/m ²)																																																		
Nitrate toxicity (mg/L)																																																		
Ammonia toxicity (mg/L)																																																		
Dissolved oxygen (mg/L) ¹																																																		
E. coli (E. coli/100 mL)																																																		
Southland attributes																																																		
Macroinvertebrates (MCI, wadable rivers only)																																																		
Temperature - summer (°C, Dec-Mar)																																																		
Temperature - winter (°C, May-Sep)																																																		
E. coli at popular bathing sites (E. coli/100 mL)																																																		
Clarity (visible distance, m)																																																		
Deposited fine sediment (% cover)																																																		
Suspended fine sediment (turbidity, FNU)																																																		
Benthic cyanobacteria (% cover)																																																		
Filamentous periphyton (% cover)																																																		
Diatoms and cyanobacteria (% cover)																																																		
National compulsory attributes requiring an action plan																																																		
Dissolved Reactive Phosphorus (mg/L)																																																		
Fish (IBI)																																																		
Additional attributes for information																																																		
Dissolved inorganic nitrogen (mg/L)																																																		
Deposited fine sediment (% cover)																																																		
Deposited fine sediment (Quorer method)																																																		

Footnotes:
1. This is a national compulsory attribute below point source discharges and a Southland attribute elsewhere

¹⁸ Norton N et al (2020) Current Environmental State and the “Gap” to Draft Freshwater Objectives for Southland, Environment Southland Report.

4. What are the likely implications for rural land use?

The proposed plan change process will result in a revised suite of policies and rules that will include a range of methods to address the communities' objectives for freshwater including how to improve water quality in catchments. There will be new region-wide requirements that, for example, will need to at least include the management of activities covered by the temporary provisions introduced with the NES-F. In addition, there will be catchment specific provisions.

We are not able to predict what the specific provisions of the forthcoming proposed plan change will be. **However, it is clear that in most rural catchments new contaminant loss mitigation initiatives and/or farm system changes will be required to improve water quality. In those catchments where there are significant gaps between the current water quality and the draft numeric objectives, the changes required will be significant.**

Regional plans typically include a package of specific rules that:

- Encourage some activities.
- Discourage other activities.
- Identify specific requirements for many activities.

Rules that support nutrient management objectives are often combined with a package of nutrient loss reduction targets, usually implemented largely through the resource consent process. This may result in resource consent conditions that require compliance with a long-term annual numerical nutrient loss target.

The technical information made available by Environment Southland at the end of 2020 also indicates that for the vast majority of Southland, **Good Management Practices (GMPs)¹⁹ will not be enough to achieve the improvements required by the NPS-FM or the Draft Freshwater Objectives.**

Limit setting will almost certainly include identifying catchment based nutrient loss targets, e.g. a long-term annual average XYZ tonnes of nitrogen per year. That catchment nutrient loss target would then be allocated across the catchment. How numerical nutrient loss targets would be allocated in Southland Murihiku is unknown at this stage. Methods used in other parts of New Zealand include:

- Grandparenting (baseline) relative to a reference period²⁰ with or without reductions relative to those reference period losses.

¹⁹ GMPs are defined broadly in the pSWLP and include those listed in various factsheets on the [Environment Southland website](#).

²⁰ This is the primary step usually used. For example, the NES-FW uses a 2014 – 2019 reference period.

- Requiring land that has a higher nutrient loss to have higher reductions than less intensive land use.
- Requiring specific GMPs to be implemented by a specific date and then require reductions relative to those GMP loss rates.

5. What can be done now to help improve water quality?

- **Understand your landscape and catchment.**
 - Find out the catchment information for the area your farm is located in – name of catchment, the things that are important in this catchment and the state of the freshwater within the catchment and estuary downstream.
 - Find the soil and physiographic maps relevant to your farm.
 - Align actions towards addressing the issues present in your catchment.
For example, if the priority water quality issue is periodic high concentrations of *E. coli*, then mitigation initiatives will need to focus mostly on measures that target surface runoff contaminants such as enhancing riparian management and less on nitrogen loss management.
- **Work together in catchment groups to develop and implement coordinated programmes targeted at improving freshwater and estuary health and reducing priority contaminants.**
 - There are many effective measures that, if undertaken at a sufficient scale in a catchment, would make real contributions to improving freshwater and estuary health. However, to have measurable effects on water quality, initiatives need to be taken across a substantial portion of a catchment.
- **Consider how any freshwater and estuary improvement actions will impact on greenhouse gas emissions.**
 - Future requirements from Central Government are highly likely to require greenhouse gas emission reductions.
- **Put in place foundations for forthcoming changes at an individual farm level.**
 - Develop a Farm Environmental Management Plan²¹ to assess risks and opportunities and set a plan to address those.
 - Ensure implementing good management practices.
 - Record any actions and any measurements of the impacts of the actions taken.
 - Use modelling tools to understand nutrient loss reduction options going forward.

There are many useful guides to the types of initiatives that can be taken to reduce the losses of

²¹ Central Government is introducing freshwater farm plans (FFPs) as part of the Essential Freshwater policy package. These FFPs may replace Farm Environmental Plans (FEMPs).

contaminants to water. These generally fit into two categories:

- Nitrogen loss (which primarily drains through the soil to groundwater and usually eventually to surface water) mitigation.
- Surface runoff contaminants i.e. sediment, phosphorus and faecal indicator organisms (*E. coli* is commonly used for freshwater and enterococci in coastal waters).

There will be different approaches required to manage nitrogen compared to surface runoff contaminants.

There is a large amount of information available, not only on the options available to reduce contaminant losses, but also on their cost effectiveness. Professional advice should be sought before embarking on a specific programme.

Here are just some useful sources of information:

- [Environment Southland Good Management Practices](#) Environment Southland's advice on generic good management practices (GMPs) for a range of farm systems. These should be prioritised because the pSWLP expects them to be implemented and the wider farming industry bodies support these GMPs.
- [Southland Science Report – Actions on the ground and what farmers can do right now](#) A summary of mitigation strategies available.
- [Management practices and mitigation options for reducing contaminant losses from land to water in Southland](#) AgResearch report from 2016 but still provides a very useful short summary of methods to reduce contaminant losses to water.
- [Forages for Reduced Nitrate Leaching programme](#) More detailed options for managing forages in the soil system to reduce N losses to water as well as implications for greenhouse gas emissions.
- [Relative cost-effectiveness of mitigation options for different farm systems](#) Our Land and Water web-based summaries of mitigation options, descriptions, co-benefits and relative cost-effectiveness.
- [AgResearch Interactive GIS map indicating potential to reduce N loss to water](#) This high-level indicative map provides an indication of the potential for reducing nitrogen losses.
- [Quantifying contaminant losses to water from pastoral land uses in New Zealand III. What could be achieved by 2035?](#) Recent research report from leading NZ scientists on what contaminant loss reductions could be achieved with current techniques.
- [Mitigation options and effects on nitrogen leaching and](#) Research results that indicate some options that can have benefits for both nitrogen leaching and greenhouse gas

- [greenhouse gas emissions](#) emissions.
- [On farm costs of mitigation options](#) Background information of the estimated on-farm costs of various contaminant loss mitigation strategies.

6. Long-term decision-making

It is critically important to appreciate that there will be significant new region-wide and catchment specific contaminant loss mitigation requirements.

Long-term farm planning needs to consider the range of likely contaminant loss reduction requirements to ensure that any significant investments (e.g. new land or infrastructure) and/or farm system changes will be robust choices.

It is challenging to make decisions now about the right thing to do when there are many uncertainties about the implications of new rules for specific farms. However, this highlights the need to ensure that current decision-making takes account of a wide range of likely future contaminant loss reduction scenarios.

There will be greater clarity as Environment Southland and Te Ao Māmara publish more information over the next two years.

Professional advice should be sought before making major long-term decisions that could have implications for meeting likely future contaminant loss requirements. Scenarios should also consider the impact on green house gas emissions. This includes purchasing new land, investing in major new infrastructure, significant changes to farm systems, etc.

7. Providing input into the development of limits and methods

Environment Southland and Te Ao Māmara Inc have jointly established a community based group called the Regional Forum, that will make recommendations to Environment Southland and Te Ao Māmara Inc in 2022 on potential methods and limits.

The recommendations will provide Environment Southland and Te Ao Māmara Inc with the basis to develop a proposed plan change with subsequent public notification and hearings. This process will involve opportunities for public input, and the information received as part of this consultation process will be an important part of the development of the proposed plan change.

It is important that everyone with an interest in the farming sector and initiatives to improve freshwater and estuaries in Southland take advantage of opportunities to have an input into this process. Input is needed from the community to ensure decision-makers fully understand all the

potential implications of different possible approaches. The Regional Forum has scheduled workshops for 2021 and 2022 around Southland.

<https://waterandland.es.govt.nz/about/regional-forum/forum-workshops>

There will be opportunities to provide feedback and to engage with forum members prior to their recommendations being finalised.

Appendix A: Some important terminology

The following are some keywords and associated definitions from the Draft Freshwater Objectives, some are Māori perspectives on water and some are technical descriptions of water.

Table 1: Summary of some keywords and terms used in the NPS-FM and definitions²²

Word/concept	Definition
Attribute	<i>a measurable quality of a waterbody which may be nationally directed, regionally developed or derived from Ngāi Tahu Indicators of Health Draft Murihiku Southland Freshwater Objectives.</i>
Hauora (taiao, wai, tangata)	<i>a state of health, which can be thought of as meaning fit, well, vigorous and robust, reflecting healthy resilience (refer to Section 4.4) within the context of providing for te hauora o te taiao (the health of the environment), te hauora o te wai (the health of the water) and te hauora o te tangata (the health of the people).</i>
Ki uta ki tai	<i>a Ngāi Tahu knowledge system and a nationally directed and regionally directed integrated management framework that applies spatially and considers the interactions between lands (whenua), waters (wai), the living world (taiao and koiora), people and communities (tangata) as well as between different waters and waterbody types (refer to Section 4.2).</i>
Limit on resource use	<i>means the maximum amount of a resource use that is permissible while still achieving a relevant target attribute state.</i>
Mauri	<i>life force. "Mauri is an energy which binds and animates all things in the physical world. Without mauri, mana cannot flow into a person or object." (Teara)</i>
Murihiku Southland	<i>the Southland region within the takiwā or tribal territory of Ngāi Tahu ki Murihiku.</i>
Ngāi Tahu ki Murihiku	<i>Papatipu Rūnanga of the Southland region that includes Awarua Rūnanga, Waihopai Rūnanga, Ōraka-Aparima Rūnaka and Hokonui Rūnanga as described in the Te Rūnanga o Ngāi Tahu (Declaration of Membership) Order 2001.</i>
Te Mana o te Wai	<i>a nationally directed and regionally directed principle of freshwater management that recognises the mana, or importance, of waterbodies and is concerned with protecting the mauri of waterbodies, described as a korowai, or cloak of protection, that applies within freshwater management units.</i>

²² From the [Draft Murihiku Southland Freshwater Objectives](#), the NPS-FM 2020 and www.teara.govt.nz

Appendix B: The Draft Freshwater Objectives – six principles

The development of the Draft Freshwater Objectives has been based on the following six principles²:

- A. A state of hauora will be the result of the interaction of a combination of attributes, including Ngāi Tahu Indicators of Health.
- B. The nature and behaviour of particular waterbodies are important to understand when considering attributes.
- C. Nationally directed attributes alone cannot describe a state of hauora for waterbodies, so additional measures are needed, including assessing against Ngāi Tahu Indicators of Health.
- D. Where a water quality attribute is associated with risk of people getting sick, this risk will be reduced to the lowest possible level.
- E. Where a water quality attribute is assessing levels of toxicity, or aspects of harm, to aquatic species, in order to avoid harm to these species this risk will be reduced to the lowest possible level.
- F. Hauora is most likely to be provided for when waterbodies are closest to their natural condition, so an understanding of natural state or reference state is needed to help decision-makers.

Appendix C: Draft numeric freshwater objectives for rivers (source: Draft Murihiku Southland Freshwater Objectives)

In the column headers “D” = the bottom of the decision envelope (i.e., the minimum numeric state); “H” = the bottom of the hauora envelope; and “T” = the top of both envelopes.

Attributes ⁴	Natural State rivers	Lowland Soft Bed			Lowland Hard Bed			Hill			Mountain			Lake Fed			Spring Fed			
		D	H	T	D	H	T	D	H	T	D	H	T	D	H	T	D	H	T	
National Compulsory Attributes																				
Periphyton (Chl- <i>a</i> ; mg/m ²)	no change ¹	C	C	A	C	C	A	B	B	A	A	A	A	A	A	A	A	A	A	
Nitrate Toxicity (mg/L)		B	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A
Ammonia Toxicity (mg/L)		B	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A
Dissolved Oxygen (mg/L) ³		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
<i>E. coli</i> (<i>E. coli</i> / 100mL)		B	A	A	B	A	A	B	A	A	A	A	A	A	A	A	A	B	A	A
Cyanobacteria ⁴ (biovolume mm ³ /L)		n/a			n/a			n/a			n/a			A	A	A	n/a			
Southland Attributes																				
<i>E. coli</i> (at Popular Bathing Sites) ²		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Macroinvertebrate Community Index (MCI) (wadeable rivers only)	no change ¹	C	C	A	C	C	A	B	B	A	A	A	A	C	C	A	C	C	A	
Temperature (°C, 5-day CRI; 1 Dec-30 Mar)		C	C	A	C	C	A	C	C	A	B	B	A	B	B	A	B	B	A	
Temperature (°C max, May - Sept)		n/a			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Clarity (visible distance; m)		C	B	A	B	B	A	B	B	A	A	A	A	A	A	A	A	A	A	A
Benthic Cyanobacteria (% cover)		A	A	A	B	A	A	B	A	A	A	A	A	A	A	A	A	B	A	A
Deposited fine sediment (% cover)		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Suspended sediment (turbidity FNU/NTU)		C	C	A	C	C	A	C	C	A	A	A	A	C	C	A	C	C	A	

Table footnotes:

n/a means the attribute does not apply for that class.

For numbers and other detail associated with “ABCD” states see Norton et al., (2019).

1: The wording used currently in the pSWLP Appendix E for rivers and lakes is “*The natural quality of the water shall not be altered.*” 2: “Popular Bathing Sites” are listed in the pSWLP Appendix G.

3: The national compulsory attribute applies only below point sources but application to all river section is referenced here based on pSWLP Appendix E standards

4: Some additional attributes considered include; dissolved inorganic nitrogen (DIN), dissolved reactive phosphorus (DRP), fish (Index of Biotic Integrity), macroinvertebrates (QMCI, ASPM), ecosystem metabolism. However, at time of writing these have not been recommended for use as numeric freshwater objectives for a variety of reasons including lack of local data and insufficient certainty, as discussed in Norton and Wilson (2019) and Norton et al., (2019). These attributes will be reviewed in light of the NPS-FM 2020 and subsequently considered for use in limit setting and any related action plans.