

19-D-01858

s 9(2)(a)

National Leader's Office

s 9(2)(a) @gmail.com

Dear s 9(2)(a)

Thank you for your email of 2 September 2019 requesting the following under the Official Information Act 1982 (the Act):

Economic analysis undertaken to assess the likely economic impacts of Essential Freshwater policy proposals:

- 1) *Excel spreadsheets received from external economic consultancies (final versions only)*
- 2) *Economic reports received from external economic consultancies (final versions only)*
- 3) *Reports, memos, produced internally on the economic impact, and shared at a Director level or higher (final version only, entire report rather than only that related to economic impact)*
- 4) *Excel spreadsheets held internally (final version, limit it to the single spreadsheet that contains total cost figures of final policy options, out of scope early versions or subsidiary spreadsheets)*
- 5) *Aide memoirs, briefing notes, and other documents (excluding emails) sent to Ministers' offices that contain information related to the economic impact of the policy proposals (final version only, entire report rather than only that in scope).*

On part 1 of your request

The Ministry is refusing this request under the following section of the Act:

Section 18(e) that the document alleged to contain the information requested does not exist or, despite reasonable efforts to locate it, cannot be found.

On part 2 of your request

The Ministry has identified a report received from an external economic consultancy in scope of your request. This report is listed as document 1 in the attached Table 2.

On parts 3, 4 and 5 of your request

The Ministry has identified a number of internally-produced reports related to the economic impact of the Essential Freshwater Programme. The majority of these were publicly released as part of the consultation process on 5 September 2019.

This information, detailed in Table 1 below, can be found at: www.mfe.govt.nz/consultation/action-for-healthy-waterways

Accordingly, the Ministry is refusing your request, as it pertains to the material listed in Table 1, under the following section of the Act:

Section 18(d): that the information requested is or will soon be publicly available.

The Ministry has further identified several internally-produced and circulated reports that contain information related to the economic impact of the Essential Freshwater programme. A number of briefing notes provided to the offices of Minister Parker and/or Minister O'Connor containing information related to the economic impact of the Essential Freshwater Programme have also been identified.

Some of the material identified was also referred to in our response to your earlier request relating to economic analysis (19-D-02028).

In the interest of expediency, we have provided you a first tranche of this material, listed below in Table 2.

Consultations regarding the content of the additional documents in scope of your request are ongoing. We will inform you of our decisions on these additional documents in due course.

Please note that due to the public interest in our work the Ministry for the Environment publishes responses to requests for official information on our website on our [OIA responses page](#) shortly after the response has been sent.

You have the right to seek an investigation and review by the Office of the Ombudsman of my decision to withhold information relating to this request, in accordance with section 28(3) of the Act. The relevant details can be found on their website at: www.ombudsman.parliament.nz.

Additionally, if you have any queries about this response, please feel free to contact ministerials@mfe.govt.nz

Yours sincerely



Katherine Meerman
Director, Water

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the Official Information Act 1982

Table 1: List of documents relevant to parts 3, 4, 5 of this request that are already publically available at: www.mfe.govt.nz/consultation/action-for-healthy-waterways

Document no.	Document date	Content	Decision	OIA sections applied
1	30-Aug-19	Interim Regulatory Impact Analysis for Consultation: Essential Freshwater Part I: Summary and Overview	Refused	S18(d)
2	30-Aug-19	Interim Regulatory Impact Analysis for Consultation: Essential Freshwater Part II: Detailed Analysis	Refused	S18(d)
3	31-Jul-19	Report of the Freshwater Leaders Group to the Minister for the Environment. July 2019	Refused	S18(d)
4	Sep-19	Regional Sector Commentary on Essential Freshwater Proposals: He Pito Kōrero e pa ana ki Ngā Tūtohu Mō te Waimāori	Refused	S18(d)
5	31-Aug-19	Impact testing of a proposed suspended sediment attribute: identifying erosion and sediment control mitigations to meet proposed sediment attribute bottom lines and the costs and benefits of those mitigations (Manaaki Whenua Landcare Research)	Refused	S18(d)
6	21-May-19	Impact of possible environmental policy interventions on case study farms, Volume 1 of 2: Main Report (Macfarlane Rural Business)	Refused	S18(d)
7	Sep-19	Action for healthy waterways – A discussion document on national direction for our essential freshwater	Refused	S18(d)
8	Aug-19	A review of New Zealand studies into the cost of degradation of freshwater ecosystems	Refused	S18(d)
9	Aug-19	A review of integrated assessment frameworks for environmental management	Refused	S18(d)
10	30-Jun-19	Modelling of Mitigation Strategies on Farm Profitability Testing Ag Package Regulations on-Farm (AgFirst)	Refused	S18(d)

11	30-Jun-19	Modelling the impact of freshwater mitigation scenarios: results for the Ruamāhanga Catchment (Manaaki Whenua Landcare Research)	Refused	S18(d)
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Table 2: List of Document provided under the Official Information Act 1982

Document number	Document date	Content	Notes
1	7-Jun-19	Essential Freshwater Package Final Report (Martin Jenkins)	Released in full.
2	12-Apr-19	2019-B-05474 Seeking agreement to national direction proposals (paper 1 of 3)	Released in full. This document contains early advice which, for some options, differs from the policy options currently proposed.
3	18-Apr-19	2019-B-05475 Seeking agreement to national direction proposals (paper 2 of 3)	Released in part. Minor redactions have been made under s 9 (2)(f)(iv) of the Official Information Act 1982. Also, paragraphs 71 and 108 have been deemed to be out of scope of your request. This document contains early advice which, for some options, differs from the policy options currently proposed.
4	23-Nov-18	2018-B-04987 Proposed sediment policy package	Released in part. Some redactions have been made under s 9 (2)(f)(iv) of the Official Information Act 1982. One entry in the appendix has been deemed out of scope of your request. This document contains early advice which, for some options, differs from the policy options currently proposed.
5	14-Jun-19	Table of impact testing for advisory groups	This summary document does not reflect our current understanding of the costs of the policies, or when any additional impact analysis will be procured. The interim regulatory impact analysis, contains a fuller, more up to date analysis of the impacts of the freshwater package You can find this analysis at www.mfe.govt.nz/consultation/action-for-healthy-waterways

ESSENTIAL FRESHWATER PACKAGE

Final Report

Narrative, intervention logic and impact assessment for a package of proposals aimed at protecting freshwater quality and ecosystem health

7 June 2019



Released under the Official Information Act 1982



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CONTENTS

Executive summary	1
Freshwater – an essential resource	3
Our most precious resource is at risk	3
Protecting our freshwater quality has significant long-term benefits	3
Government’s commitment to improve how freshwater is managed	5
Proposed changes to protect freshwater health	8
The problem with current freshwater regulation	8
Proposed changes to freshwater management	9
A comprehensive package of interventions to bring about benefits	10
Impact of the Essential Freshwater Package	24
Benefits of proposed changes to manage freshwater health	28
Costs of the proposed changes to freshwater management	31
Conclusions and next steps	41
Next steps	41

APPENDICES

Appendix 1 : Regulatory Tools for freshwater	44
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TABLES

Table 1: Proposed changes affect the management of freshwater and ecosystem health in the whole catchment.	15
Table 2: Costs of the Essential Freshwater Package (aligned to outputs from the intervention logic model)	34
Table 3: Summary of legislative and regulatory instrument to manage freshwater	44



FIGURES

Figure 1: Overview of the key outputs, costs and benefits of the Essential Freshwater Programme	2
Figure 2: Government response to climate change, freshwater and biodiversity drive transformation in urban and rural land use	7
Figure 3: Intervention logic of Essential Freshwater proposal	13
Figure 4: Method for estimating the scale and timeframes of the costs and benefits	25
Figure 5: Overview of the anticipated costs and benefits of the Essential Freshwater programme	27



PREFACE

This report has been prepared for the Ministry for the Environment by Bryan Field, Jennie Marks and Tim Borren from MartinJenkins (Martin, Jenkins & Associates Limited).

MartinJenkins advises clients in the public, private and not-for-profit sectors. Our work in the public sector spans a wide range of central and local government agencies. We provide advice and support to clients in the following areas: public policy; evaluation and research; strategy and investment; performance improvement and monitoring; business improvement; organisation improvement; employment relations; economic development; and financial and economic analysis.

Our aim is to provide an integrated and comprehensive response to client needs – connecting our skill sets and applying fresh thinking to lift performance.

MartinJenkins is a privately owned New Zealand limited liability company. We have offices in Wellington and Auckland. The company was established in 1993 and is governed by a Board made up of executive directors Kevin Jenkins, Michael Mills, Nick Davis, Allana Coulon and Richard Tait, plus independent director Sophia Gunn and chair Hilary Poole.

DISCLAIMER

This Report has been prepared solely for the purposes stated herein and should not be relied upon for any other purpose. To the fullest extent permitted by law, we accept no duty of care to any third party in connection with the provision of this Report. We accept no liability of any kind to any third party and disclaim all responsibility for the consequences of any third party acting or refraining to act in reliance on the Report.

We have not been required, or sought, to independently verify the accuracy of information provided to us. Accordingly, we express no opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise. We reserve the right, but will be under no obligation, to review or amend this Report if any additional information, which was in existence on the date of this Report, was not brought to our attention, or subsequently comes to light.



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EXECUTIVE SUMMARY

Context

The Ministry for the Environment (MfE) engaged MartinJenkins to:

- develop a cogent narrative for the Essential Freshwater Programme that can be used by MfE to help engage stakeholders and to use in policy products (including Cabinet Papers, and the public discussion document)
- develop an intervention logic model for the Essential Freshwater Programme
- assist with assessing and summarising the impact of the Essential Freshwater Programme as a whole package.

This report presents the abovementioned products. We have developed these products based on information provided by MfE. This information was drawn primarily from the initial drafts of many regulatory impact analyses undertaken for individual components the proposed policy changes that comprise the Essential Freshwater Programme. The assessment of costs and benefits of the proposed policy changes by MfE was largely qualitative in nature.

The material presented in this report is intended for internal use by MfE only.

Limitations of this report

The impact assessment presented in this report is largely qualitative. We have presented quantitative estimates of costs and benefits where these were available. We also note that the costs and benefits of the proposed policy changes within the Essential Freshwater Programme have some degree of overlap with each other.

As part of this report, we have developed a set of example scenarios. These example scenarios have been composed based on our understanding of the material that was available. They are illustrative only and need to be tested.

Overview of the Essential Freshwater Programme

The proposed changes within the Essential Freshwater Programme are aimed at halting the decline in freshwater quality and ecosystem health. The programme covers a range of activities, and the places where these activities occur. The outcomes sought by the programme are:

- **Environmental wellbeing:** Habitat and native biodiversity are protected, and ecosystem services are provided
- **Social and cultural wellbeing:** Freshwater is safe for people's use and enjoyment
- **Economic wellbeing:** New Zealand is known as a provider of quality products and has a reputation for clean and healthy water.

These outcomes are delivered by a suite of proposed interventions through policy changes to freshwater regulatory tools and mechanisms to support councils, communities and industries to transition.






Together they deliver:

- **policy direction** that provides clear and consistent objectives and strengthens the system
- **practice standards** that lift environmental performance of land management practices
- **bottom lines** that set thresholds needed for healthy ecosystems and to halt the loss of wetlands and streams
- **monitoring** and reporting requirements to inform management responses
- whole-of government investment to **support change** brought about by the regulatory proposals.

Figure 1 below summarises the outputs of the programme, and the high-level costs and benefits.

Figure 1: Overview of the key outputs, costs and benefits of the Essential Freshwater Programme

KEY OUTPUTS							
Plans and regulations control freshwater pollution	Plans and regulations prevent loss of streams and wetlands	Fish passage is provided	Rights to discharge pollutants are fairly allocated	Farm environment plans help reduce environmental impact	Monitoring builds clear picture of the state of our freshwater	Regional councils engage with communities and mana whenua	Councils and land managers are supported to make change
OVERVIEW OF KEY COSTS							
<ul style="list-style-type: none"> • Targeted costs to businesses to bring about long-term sustainability of the economy (large) • Opportunity costs for businesses who can no longer adversely affect stream or wetland resources (small) • Costs for landowners to remediate fish passage by removing barriers (small) • Costs for rate-paying communities through councils to plan and implement regulations (small) • New systems to allocate rights to nutrients discharge could disrupt existing industries with flow-on impact across the economy (large) 				<ul style="list-style-type: none"> • Cost for landowners and businesses needing to manage their resource use and pollution (medium) • Costs for councils for increased capacity and capability for monitoring and reporting (medium) • Additional costs for council planning processes (small) • Costs for central government to invest in direct support initiatives and provision of information, tools and advice to support decision-making (small) 			
OVERVIEW OF KEY BENEFITS							
 <p>Environmental wellbeing Habitat and native biodiversity are protected and ecosystem services are provided</p> <p>Direct benefits to our natural capital as healthy water underpins our environmental wellbeing. Reducing water pollution and improving water quality is essential to biodiversity and protecting ecosystem functions needed by all living organisms The environment, its intrinsic value and the general public of New Zealand are the main beneficiaries</p>		 <p>Social and cultural wellbeing Freshwater is safe for people's use and enjoyment</p> <p>Direct benefits to our social and cultural wellbeing as healthy freshwater is an important part of our lives: for consumption, or part of our natural surroundings that provide recreation opportunities Restoring the mauri and wairua of our rivers helps restore mana whenua in communities Restoring freshwater quality improves the social licence to operate for farmers and other businesses The main groups benefiting are the general public, councils, mana whenua and farmers</p>		 <p>Economic wellbeing New Zealand is known as a provider of quality products and has a reputation for clean and healthy water</p> <p>New Zealand's economy is underpinned by having clean freshwater Protecting and managing freshwater is an essential part of our transformation to a more inclusive and sustainable economy that brings about benefits to all New Zealanders (very large) Food and beverage exporters and tourism industry operators benefit from maintaining and improving New Zealand's clean and pure global brand (very large) Increased resilience of infrastructure to natural hazards as result of reduced sediment in rivers (large) The main groups benefiting from this are the general public and businesses, including farmers in the longer-term</p>			
<p>Key – Small: (\$0-10 million) Medium: (\$10-100 million) Large: (\$100-1 billion) Very large: (\$1 billion+)</p>							

Conclusions and next steps

This report provides MfE with a cogent narrative for the Essential Freshwater Programme that can be used to develop material aimed at engaging stakeholders.

We note that the impact assessment presented in this report is largely qualitative, and in its current state is not adequate in inform final policy decisions on these proposals. Because of the expected scale of the costs and benefits of these policy changes, we recommend MfE extends this qualitative impact assessment and attempts to estimate the quantitative costs and benefits of the programme, focussing on the overall impact of the programme. We note that for many of the proposed changes, policy options have not been settled — this makes estimating the costs and benefits of the options very uncertain.



FRESHWATER – AN ESSENTIAL RESOURCE

Our most precious resource is at risk

New Zealand is fortunate to have abundant freshwater resources. Rivers and streams wind their way through our regions and supply our native ecosystems, agriculture, industry and urban centres with water — the essential resource we need for every part of our lives.

But the way we use our land and water is leading to declining water quality and is putting serious pressure on freshwater ecosystems. This means many of the habitats of our freshwater plants and animals are under threat. It also means that we are limiting the way we can use our resources. Polluted water cannot be used for our drinking supply without treatment and many of our lakes and rivers are too dirty for swimming and other types of recreation.

We have known this for a while, with repeated reports from central and regional government highlighting trend data on our water quality. The latest report is the State of Environment report, Aotearoa 2019, which shows further declines across New Zealand. In farming areas, water pollution affects almost all rivers and many aquifers, as well as some lakes and estuaries. Compared with catchments dominated by native vegetation, waterways in areas of pastoral farming have markedly higher levels of pollution by excess nutrients (like nitrogen), sediment, and pathogens² (including *E. coli*). Waterways can contain disease-causing bacteria from human or animal faeces, nutrients from farm run-off and urban areas, and heavy metals from vehicle pollution.

All these factors threaten our freshwater ecosystems and cultural values and may make our water unsafe for drinking, recreation and other uses.

While public awareness and concern is growing (and some behaviours are changing), efforts to date have been inadequate to meaningfully lift water quality.

Protecting our freshwater quality has significant long-term benefits

Actively working to improve freshwater quality has significant, fundamental long-term benefits for people and our prosperity, as well as the environment itself.

Water underpins our wellbeing

We are connected to water and its inherent qualities. Māori have long identified the connection through concepts of wairua (spirit) and mauri (life-force), as well as the importance of protecting water quality and making the connection between the health of the waterway and the health of the people.

¹ Ministry for the Environment & Stats NZ (2019). New Zealand's Environmental Reporting Series: Environment Aotearoa 2019. Available from www.mfe.govt.nz and www.stats.govt.nz.

² Pathogens are microorganisms that can cause disease like certain viruses and bacteria. *Escherichia coli* (*E. coli*) is a type of bacterium commonly found in the intestines of humans and other animals, some strains of which can cause severe food poisoning.



As is said in Whanganui,

“Ko au te awa, ko te awa ko au.” (I am the river, and the river is me.)

and

Ka mate te Awa, ka mate tatou te Iwi ([If the river] dies, we die as a people.)

Water pollution degrades cultural values such as mauri and wairua of waterways, and impacts the customary practices associated with mahingā kai and kaitiakitanga. When waterways are polluted it can also affect the mana associated with an iwi or hapū.

Polluted waterways also mean we cannot access water safely for recreational activities like fishing and diving into our favourite swimming hole. Lifting our environmental performance to sustain or enhance the quality of our environment is key to making the most of New Zealand’s natural resources and protecting these for future generations.

Water underpins our prosperity and the sustainability of our economy

In New Zealand, natural resources are at the heart of our success — a healthy productive environment defines who we are as a nation, enables us to engage with spectacular nature, allows us to produce products of amazing quality, attracts visitors to experience all that New Zealand has to offer.

As we strive to build a modern economy that is fit for the 21st century and beyond we need to produce and export higher value goods, without degrading our natural resources. As part of this, we must protect the most essential resource of all — our freshwater.

Making changes to better manage freshwater does require investment — and where water is already degraded these costs might be significant. However, the benefits far outweigh these costs. Clean water fundamentally protects our wellbeing and prosperity. Further, the cost of treating polluted water to make it available for everyday uses costs much more than protecting it in the first place.

In that sense, actively managing and protecting freshwater quality, is not a sunken cost but an investment, where the cost doing nothing far exceeds the cost of acting.

Changing the way we manage water, will also drive innovation and adoption of more sustainable land uses that add value to our products and ensure productivity into the future. It will be fundamental to ensuring New Zealand’s path forward as an ethical and sustainable exporter of high-value agricultural products.

Aligning our economy with our image that strengthens our identity and with Māori values of kaitiakitanga, and kōtahitanga, manaakitanga we can make most of our unique heritage, abundant natural resources, and maintain being a great place to live and visit.



Government's commitment to improve how freshwater is managed

Action to protect our clean freshwater

The Government has announced that it is committed to support and further develop an economy that is growing and working for all of us, improving the wellbeing of New Zealanders and their families, and making New Zealand proud by tackling the hard stuff, with compassion.

This kind of change is not easy and will require transition into doing things differently — perhaps even changing land use entirely in some places.

The benefits of healthy freshwater are essential, long-term and diffuse. That means people and nature have everything to gain but it will take time. In contrast, the costs can be comparatively short-term and concentrated. We do our best outlining these costs and benefits for the whole package.

This is only one part of the solution to transition the economy to increased sustainability. Better environmental management must be accompanied by smart investment in skills and employment that brings about benefit in the regions, market instruments must be used to drive the value of our products higher on the back of increased environmental performance and the transition from current farming methods to those more desirable in the future needs to be carefully managed and implemented (and at times directly supported).

It is important to understand that the action we must take to protect our water quality and health of freshwater ecosystems is one of the work programmes to improve the sustainability of our economy for the benefit of New Zealanders. We must also act to lower our emissions and adapt to the risks posed by climate change and move to more sustainable ways of using our land resources. We believe these initiatives work together to bring about the benefit of our valuable resources.

The sustainable land use budget package for 2019/20 reflects this, with key initiatives aiming at supporting the transformation of our economy to deliver better outcomes for the environment and our people.

The Essential Freshwater programme

In October 2018, Cabinet approved the Essential Freshwater work programme, which outlines the Government's commitment to action on freshwater.

With this proposal, we pick up on our commitment to set New Zealand on the path towards long-term improvements in freshwater quality and ecosystem health. To do this, we need to strengthen some of our rules to help stop degradation of our freshwater. Furthermore, we need to reverse past damage and address allocation and discharges of nutrients.

The objectives of the Essential Freshwater programme are to:

- stop further degradation and loss of freshwater quality and associated ecosystems
- reverse past damage through promotion of restoration activities to bring freshwater ecosystems back to a healthy state
- address water and nutrient allocation issues.



To achieve the Government's goals of healthier waterways and freshwater ecosystems, a coherent response through policy intervention is proposed.

Proposed reforms

This comprehensive package of changes to better protect freshwater quality and ecosystems will implement the core regulatory responses outlined in the Essential Freshwater work programme. It provides measures that will improve the management of freshwater using the suite of mechanisms available under the Resource Management Act 1991.

Together, the proposals will ensure clear and consistent national direction around the management of freshwater, set some bottom lines that ensure the ecosystem health and quality of water does not decline further and proposes support for on-farm transition and catchment restoration. The proposal includes amendments to regulations under the RMA, changes to the current NPS on Freshwater, as well as the introduction of a new National Environmental Standard for freshwater. It is augmented by other mechanisms such as non-regulatory support to ensure a just transition and shaping pathways to a high-value economy. Together, these interventions will reform the way pollution to freshwater is managed.

This package is a critical milestone in the delivery of the Essential Freshwater programme. It includes:

- amendments to the RMA, and regulatory changes through improvements to the NPS on Freshwater and introduction of a new NES that, together, provide:
 - **policy direction** that provides clear and consistent objectives and strengthens the system
 - **practice standards** that lift environmental performance of land management practices
 - **bottom lines** that set thresholds needed for healthy ecosystems and halting loss of wetlands and streams
 - **monitoring** and reporting requirements to inform management responses
- whole-of government investment to **support change** brought about by the regulatory proposals that include
 - Investing in council capability
 - Funding on-ground action to support restoration of higher-risk catchments and wetlands
 - Support for farmers with adoption of good management practice and certifying farm planners
 - Assisting involvement of hapū and iwi in council processes
- commencing wider public engagement in developing options for ways to allocate nutrient discharges and discussions on an enduring, fair and efficient allocation system for the future.

The proposals have been worked through by a dedicated cross-government task force, led by the Ministry for the Environment, Ministry of Primary Industries, with members drawn from the Treasury, Te Puni Kōkiri, Māori Crown Relations Unit, the Department of Internal Affairs, the Department of Conservation, the Ministry of Business, Innovation and Employment, as well as representatives from local government.



Response to freshwater management and climate change further drives sustainable land use and land use change

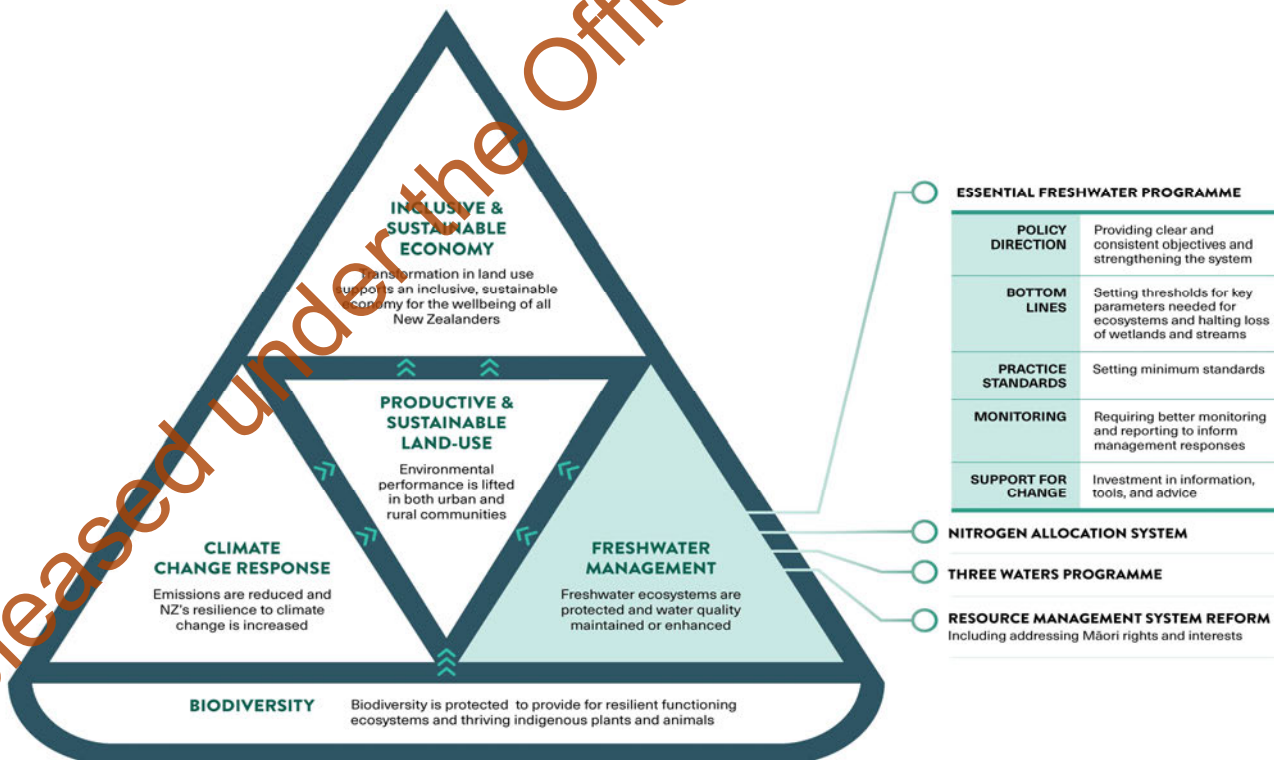
New Zealand is aiming to transform the economy to ensure it is environmentally and economically sustainable and brings social benefits to everyone. Protecting our water quality and freshwater ecosystems is an essential part of this. Other key parts are our response to climate change through reducing and mitigating emissions, and better uses of our land that help with the long-term production of high-value products. Many of the actions and initiatives to work towards this work together, not in isolation.

For landowners and managers, this programme will come on top of several other planned changes and drivers, including market demand for greater assurance around food safety and producers' environmental credentials. Also, weather events, technological advances, and increased competition from alternative food sources adds to this complexity.

However, many actions and responses work to address the drivers for climate change and water quality to drive land use to increased productivity and sustainability and unlock new and emerging markets.

Figure 2 shows how Government response to climate change, freshwater and biodiversity drive transformation in urban and rural land use that to an inclusive, sustainable economy for the wellbeing of all New Zealanders.

Figure 2: Government response to climate change, freshwater and biodiversity drive transformation in urban and rural land use



PROPOSED CHANGES TO PROTECT FRESHWATER HEALTH

The proposed changes are aimed at halting the decline in freshwater quality and ecosystem health across the range of activities, and the places where these activities occur.

In this chapter we outline the objectives and outcomes New Zealand aims to achieve and explain where changes are targeted, the type of interventions proposed and how these will bring about the objectives of the Essential Freshwater work programme.

In the next chapter, we explain more fully how these interventions bring about the essential benefits New Zealand needs to ensure the wellbeing and sustainability of its people, environment and economy.

The problem with current freshwater regulation

We know what causes freshwater quality decline and how to stop it

The way we use our land can have a detrimental effect on our waterways. It is widely accepted what causes freshwater pollution and loss of habitat for our freshwater plants and animals. These are detailed in the following section.

Urban development

Urban expansion and subdivision can lead to diversions, reclamations, culverting, or total loss of waterways. Wetlands maybe drained or degraded. Barriers in streams might stop fish migrating. Earthworks associated with urban development pollute the streams with sediment. Sediment makes the water turbid (murky) and brings with it phosphorus pollution which harms some plants and animals. Too much sediment in the water way can also change the streambed from stone and pebbles to sand which means the habitat changes and makes it unsuitable for many of our native plants and animals. Sediment build up on riverbanks can also pose a flood risk.

Agriculture

Managing the impact of farming brings challenges. Land use conversion to more intensive farming and growing can significantly increase the nutrient pollution of waterways with nitrogen, phosphorus and pathogens like *E. coli*. Farm animals that can access waterways directly pollute waterways with faeces, trample stream banks, increase the sediment pollution and destroy habitat for freshwater plants and animals.

There are other agricultural activities known to have high impacts on waterways if they are not managed in line with best practice. This includes growing some foods that require large quantities of fertiliser to produce (e.g. potatoes) and winter forage cropping for stock.



Cumulative impacts across catchments

In some cases, each land use activity might not have a big impact in isolation. But, as water travels down the catchment from the mountains to the sea, small individual impacts can have a large cumulative effect. By the time the river has been fed by many streams and drains these cumulative impacts can significantly degrade the water quality.

Therefore, it is important to manage the catchment as a whole and monitor the freshwater quality and ecosystem health along the way.

Current freshwater management is not enough to protect freshwater

Society has become increasingly aware of the impact people and their activities are having on the environment and are understanding that the consequences of degraded water quality. Councils have put in place some protections through plans and rules.

However, the changes are not effective and fast enough to stop the decline in freshwater quality and ecosystem health.

The planning process for councils to make better rules is taking too long and the effects of individual consents under the Resource Management Act 1991 are not adequately considering the cumulative impacts and the costs of pollution to society and the environment.

The proposed changes help clarify expectations for regulators, fix gaps in our knowledge and standardise management approaches at a greater speed and in a way that is nationally consistent.

Proposed changes to freshwater management

Managing freshwater is complex — it reaches across legislation, regulations and rules that are implemented by central, regional and local government.

The package of proposed changes tackles the management of freshwater and provides for increased protection of ecosystem health using a range of interventions to achieve the outcomes. It spans legislative and regulatory tools to manage freshwater resources and include provisions for non-regulatory support.

Legislation, regulatory tools and non-regulatory support

The overarching legislative framework for managing freshwater is the Resource Management Act 1991 (RMA). The key regulatory instruments to give national direction at under the RMA are National Policy Statements (NPS) and National Environmental Standards (NES).

Non-regulatory support and investments can also be instrumental in helping bring about outcomes. While the regulatory settings provide the framework for rules and what is allowed, support through investment (e.g. targeted incentives) can help get there faster.

We provide more information on how the regulatory framework works for managing freshwater quality and ecosystem health in Appendix 1.



Te Mana o te Wai

In te Ao Māori, te Mana o te Wai reflects the whakapapa of water which bestows an obligation on Māori to care and use water in a way that protects and enhances its mana and mauri. Te Mana o te Wai is a concept for all New Zealanders for protecting our special connections that we have for our local water bodies and sustaining its ability to provide for the health and wellbeing of future generations.

The concept of te Mana o te Wai or ‘the mana of the water’ says that our first obligation is to the water, to ensure that we protect its health. Our second obligation is to provide clean, fresh water for essential human health needs, and only when both those obligations are met can we consider economic use of the water.

In practice, te Mana o te Wai is an overarching framework for how all New Zealanders relate to, use, and make decisions about our water. The Essential Freshwater work programme is centred on our duty to protect and enhance te Mana o te Wai and to manage human activities in a way that protects the essential value of water. While we believe that our proposals contribute to upholding te Mana o te Wai, they are steps that form part of a much larger discussion and combined effort involving all New Zealanders. The meaning of te Mana o te Wai can vary for different communities and tangata whenua and depends on the values that they hold for their local water bodies. Upholding te Mana o te Wai is a long-term and continuous trajectory that requires the involvement of decision-makers, communities, and tangata whenua, as well as a suite of tools and processes at the national and local level.

A comprehensive package of interventions to bring about benefits

Healthy water supports healthy people — objectives and outcomes for New Zealand’s freshwater

The health of our people, our environment and our economy depend on the health of our water. The proposed changes to improve the management of freshwater are targeted to bring about a real change to water quality and ecosystem health. The outcomes reach across natural, social and cultural and financial capital by improving our wellbeing across the three domains.

With the overarching outcome of healthy waters support healthy people, we want to make sure New Zealand’s and freshwater ecosystems are protected and water quality maintained or enhanced. Part of this means that te Mana o te Wai is upheld.

The proposals work together through providing direction, requiring better information on the state of water and trends, setting bottom-lines and practice standards. Together, the package provides certainty about what needs to be done where to improve our freshwater quality and protect ecosystem health.





The Essential Freshwater proposals can be summarised in five key approaches to interventions. These are:

- **POLICY DIRECTION:** Providing clear and consistent objectives and strengthening the system
- **BOTTOM LINES:** Setting thresholds for key parameters needed for healthy freshwater ecosystems are established and halting any further losses of streams and wetlands
- **PRACTICE STANDARDS:** Requiring the adoption of good practice and setting minimum standards
- **MONITORING:** Requiring better monitoring and reporting to inform management responses
- **SUPPORT FOR CHANGE:** Whole-of government investment through information, tools, and advice.

Through these interventions, key outputs are achieved:



Intervention logic

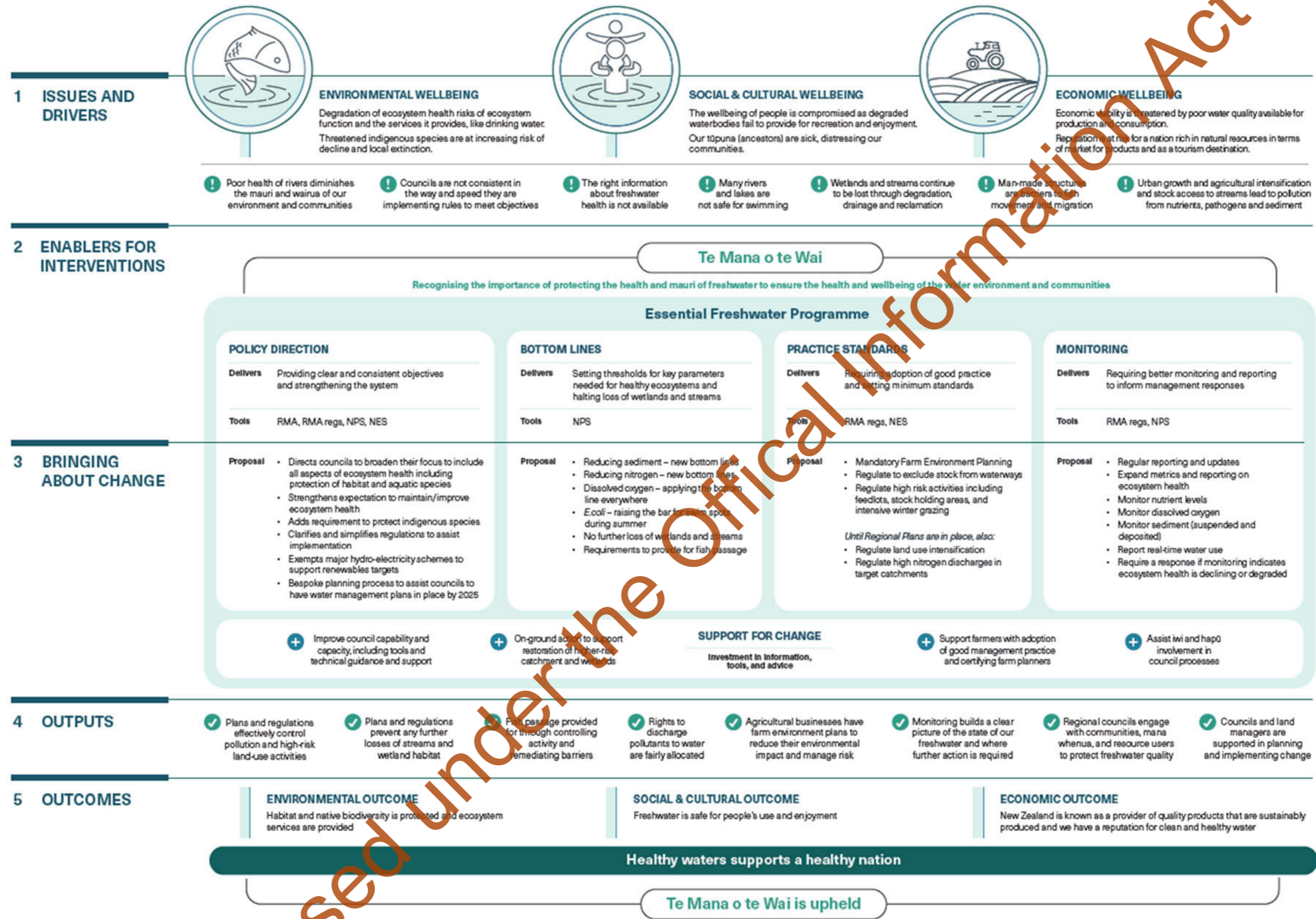
We have mapped how the proposed changes to freshwater management will improve freshwater quality and ecosystem health, see Figure 3

This intervention logic model is a picture of the Government's theory of change that shows how the proposals, as part of the Essential Freshwater programme, are expected to lead to long-term changes in water quality and protection of ecosystem health. It should be read from top to bottom and highlights the main groups of interventions and resulting outcomes.

The model has been informed by The Treasury's Living Standards Framework, which has been developed to consider the collective impact of policies on intergenerational wellbeing. The Framework puts wellbeing at the core of policy development and evaluation, and goes beyond just fiscal and economic measures.



Figure 3: Intervention logic of Essential Freshwater proposal



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The changes affect management of freshwater and ecosystem health in the catchment


The proposed new regulations will change the management of freshwater and ecosystem health in the whole catchment. Water is part of all aspects of our life, so changes to the way we manage it will affect the work of councils, landowners and managers, as well as communities as users and ratepayers — each of whose activities impact on water quality.

The conditions and impact of activities vary from catchment to catchment and farm to farm. To achieve the objectives for freshwater and ecosystem health, the requirements on communities, farmers and growers will also vary.

The summary of how proposed changes are characterised by land use activity in this section is illustrative only. To ensure that this helpfully demonstrates the impacts that may result from the proposed changes, it will need to be tested with officials, councils and industry.

The sort of changes that can be expected, based on the location and activity in a given catchment, are outlined in Table 1.

Table 1: Proposed changes affect the management of freshwater and ecosystem health in the whole catchment.

Catchment as a whole	
	<p>The community and mana whenua need to continue to have discussions about their long-term vision and plan for each catchment, facilitated by regional councils.</p> <p>Councils will have to do more and do some things more quickly in terms of monitoring and reporting factors that are important for freshwater health including freshwater fish.</p> <p>The bottom lines for pollution from nutrient, pathogens and sediment will be made more stringent and raise the bar of what is expected. The plan will need to do more to keep the whole of the ecosystem healthy.</p> <p>The plans then need to outline how the catchment is managed to ensure water quality and ecosystem health is maintained or improved.</p> <p>There will be increased support to ensure mana whenua can engage in this process.</p> <p>Some higher-risk catchments will be able to get support for on-ground restoration.</p> <p><i>All streams and rivers</i></p> <ul style="list-style-type: none"> • All management must explicitly include the protection of threatened fish species. • Man-made barriers that prevent fish from moving and migrating must be removed (There are some exceptions for nationally significant infrastructure that generates renewable energy). • Management needs to ensure that important factors for freshwater and ecosystem health, like dissolved oxygen, biodiversity (MCI, fish, plants) and low levels of pollution, are maintained or enhanced for all rivers. <p><i>All wetlands</i></p> <ul style="list-style-type: none"> • All wetlands are protected and no further losses are allowed. • All damaging activity to wetlands must be prevented. <p><i>Swim spots</i></p> <ul style="list-style-type: none"> • In summer, all swims spots will need to meet a higher level of water quality to make sure people can swim safely. • Management of any activity upstream needs to control pollution from <i>E. coli bacteria</i> that make water unsafe.



Forests and forestry



Forests are likely to increase on steep, erosion-prone hills in catchments to help manage sediment pollution, sequester carbon and provide habitat for native biodiversity.
Forests planted for harvest will need to ensure the erosion and sediment run-off does not pollute waterways and degrade streams and wetlands.

Hill-country — Sheep and beef farming



Sheep and beef farms will need to include important environmental information in their farm plans. Farm plans will set out achievable environmental outcomes for the property and put in place a plan of action. The planning process will help make sure everyone knows what needs to be done on their farm in line with the limits set for the catchment.

Stock needs to be fenced out of waterways in lower-lying areas. On steeper slopes, pastures with high stocking density of cattle and deer will also need to be fenced to keep stock out of waterways.

Erosion-prone hills might need planting to limit sediment run-off.

The way fertiliser is used might change to ensure the right amount is used and does not pollute waterways.

Consents will be required for feedlots and longer-term holding areas for cattle.

Any further intensification of land use is restricted unless no increase in pollution can be ensured.

Dairy farm



Dairy farmers will need to include important environmental information in their farm plans. Farm plans will set out achievable environmental outcomes for the property and put in place a plan of action. The planning process will help make sure everyone knows what needs to be done on their farm in line with the limits set for their catchment.

In polluted catchments this might mean there is need to act to significantly reduce surplus nitrogen.

Stock needs to be fenced out of rivers, streams and drains and the setback of fences might increase to better protect against pollution.

Farms need to continue to manage effluent discharges and a reduction might be required to keep the catchment healthy. In particular, nitrogen will need to be kept down to a level that is sustainable for the catchment.

The way fertiliser is used might change to ensure the right amount is used and does not pollute waterways.

Any farms using irrigators will need to have a water meter installed that records real-time use.

Any further intensification of land use is restricted unless no increase in pollution can be ensured.

Feedlots and stock holding areas will be controlled and managed to prevent effluent pollution.

Winter grazing will need consent in some places and will need to be in line with best practice.

Vegetable cropping



Crop farmers will need to include important environmental information in their farm plans. Farm plans will set out achievable environmental outcomes for the property and put in place a plan of action. The planning process will help make sure everyone knows what needs to be done on their farm.

The way fertiliser is used might change to ensure the right amount is used and does not pollute waterways.

Any further intensification of land use is restricted unless no increase in pollution can be ensured.

Urban development



District and regional councils need to work together to make sure impacts of urban development can take place within catchment limits.

Urban developers must protect all streams and wetlands. No wetlands or length of stream may be lost, and all damaging activity must be prevented.

All discharges to storm water and pollution coming out of pipes is controlled more tightly to make sure the pollution levels do not further degrade freshwater health in the catchment.



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Example scenarios that highlight the impacts of the proposed changes

This section provides hypothetical scenarios as examples of how the proposed changes may affect different types of businesses. We include scenarios for:

- hill country sheep & beef station
- lowland dairy farm
- vegetable growers on fertile flat land
- suburban housing development on modified greenfield site.

These example scenarios have been composed based on our understanding of the material that was available. They are illustrative only. To ensure that the scenarios helpfully demonstrate the impacts that may result from the proposed changes, they will need to be tested with officials, councils and industry to ensure that they have been translated appropriately to the activities portrayed within. This will need to happen before they are used in external-facing documents

Hill country sheep & beef station

Context

Almost 3,300 dry stock farms make up 8.6 million hectares of New Zealand's landscapes used for primary production. Sheep farming has a strong history and is a key part of our heritage, sense of identity and international brand. Historically, hill country farms were incentivised to clear the once-forested hills and convert it to pasture. Initially these properties were largely farmed for wool production and now predominantly for red meat.

Environmental impacts with sheep and beef farming largely result from the increased risk of soil erosion from storm events when converting forest cover to pasture. Soil washing off the hills and streambank erosion increases sediment and phosphorus pollution in waterways.

Many initiatives across New Zealand are underway to help tackle soil erosion. These include space-planting of poplars and willows, retiring of pasture on steep slopes to allow regeneration of native forest, generating honey from mānuka scrub or establishing forestry.

Councils and industry are working with farming communities to lift the environmental performance of the sector. The industry goal is to have farm plans in place for all sheep and beef farms by 2021 and in some regions, farm environment plans are already required through regulation. Farm plans help a farmer map the soil erosion risk of their farm and then prioritise actions to minimise this over time. Erosion control is an on-going task for farmers.



Scenario

The family run business encompasses 400 hectares of land in pasture.

The farmer has been working with councils for years to help prevent erosion across the steeper land on the farm. The hillsides and gullies that had the most severe risk of erosion have been retired and are returning to scrub. Those that are still productive have poplar poles space-planted to secure soil.

Some of the steeper gullies are fenced off to allow for regeneration of scrub and to exclude stock.

There has not been a regulatory requirement to have a farm environment plan in place in this region. However, the farmer is aware of the industry strategy and was expecting to need to put a plan in place in the coming years.

Optimising and diversifying operations through new farm plan

The revised National Policy Statement will mean the council needs to engage with the community in catchments to ensure bottom lines are set and actions are taken to maintain or improve water quality by 2025. As a family business with a long history in the catchment and as the largest landowner, the farmer wants to make sure their farm is represented in planning meetings and considers standing as a member of the catchment committee.

Key changes brought about by new regulations mean that within five years the fencing of all streams on lower reaches must be completed. Some larger streams are already fenced but the distance from the water's edge needs to be increased. This means four kilometres of stream will now need to be re-fenced on this property by 2025 if the stocking density exceeds 18 stock units per hectare.

There are also some wetland remnants around the duckpond which the council considers significant. This needs to be fenced and can no longer be grazed. Planting of the wetland and riparian margins will be an important mitigation to reduce the risks of weeds spreading onto the pasture.

There are also some old culverts with overhangs and a small weir that are a barrier for native fish. As their consents are expiring soon, restoring fish passage becomes part of the farm plan.

With new regulations in place, the farmer will engage a farm adviser to help identify the best ways to use the land in line with the new regulatory requirements, industry standards as well as council incentive schemes for erosion and conservation planting.

The plan maps out a pragmatic action plan to implement for the next five to ten years. The farms contribution of sediment and phosphorus discharge will be considered as part of the council's plan to limit pollution in the catchment. It may be necessary to retire further eroding slopes to keep the discharges down.

Costs, benefits and outcomes

The costs of all fencing combined with retiring land are substantial. The farmer explores ways of optimising the way the property is used. The farmer makes decisions on which paddocks to retire based on the relationship between stocking density and which streams need to be fenced off, as well as erosion.



Through investing in a mix of forestry and mānuka, the profitability can be improved on marginal land and eroding slopes by way of income from honey, carbon credits and some harvest. The vegetation around the protected wetland and rivers adds an attractive backdrop.

The council's riparian programme supports the planting of stream margins and wetlands to reduce risks of weed spreading and to gain biodiversity benefits for terrestrial and freshwater. The farmer chooses to make the wetland an aesthetic feature and improve the maimai for duck shooting season.

Lowland dairy farm

With 3,972 farms over about 2.6 million hectares, dairy farming contributes 3.5 percent³ of the country's GDP and remains New Zealand's single largest export sector for goods.

Total land in effective dairy production has stayed relatively constant with productivity gains achieved through increased milk production from increased feed levels, particularly palm kernel extract, maize silage and in recent years fodder beet, as well as improvements in feed conversion efficiency.

Dairy farming can have significant impact on water quality if nutrient pollution from urine patches and effluent applications is not managed well. Nitrogen-loss to waterways can be particularly challenging.

Scenario

This 150-hectare farm has 400 cows on low-lying, fertile land with some rolling hills and a total of 3 kilometres of streams running through it.

The farm is a system 3 dairy farm, where 10-20 percent of total feed is imported to extend lactation and to feed replacement stock.

Through the industry farm plan cattle are excluded from all significant waterways and significant wetlands. There's also some riparian planting in place. The main stock river crossings already have bridges in place and there are a couple of older culverts that provide stock crossings over the other streams on the farm. The farm also has a nutrient budget.

Optimising landscape features and fertiliser use through new farm plan

With the proposed changes the farmer notes an increase in Council planning activity, particularly for setting nutrient limits and allocations in the catchment. The low-lying nature of the Waikato farm means that new rules may affect this farm before others. The farmer takes a keen interest in the council limit-setting process and decides to make sure they participate in the catchment committee.

The farmer engages a certified farm advisor to help them understand and meet the new rules and practice expectations. The farm advisor helps develop a FEP which identifies several high-risk areas on the farm, as well as specific practice changes that the farmer will need to make to address these.

To protect several streams and wetlands, 4 km of fences need to be moved or installed at an average of 5 metres of more from both streams and drains. The farmer also needs to plan for further riparian planting alongside the larger streams and upgrade the culverts, so they allow for fish passage. This

³ Dairy farming and processing combined



will result in a loss of some productive land. New Council rules require planting of riparian setbacks to provide shade to meet dissolved oxygen levels, whilst providing for improved fish habitat.

To better understand the effects of abstracting water from the rivers, the consent now requires real-time water metering.

The farm has some intensive winter grazing areas that are deemed to be high-risk. The FEP sets out the good management practice that needs to be applied to prevent soil erosion and pugging to meet the consent requirements.

The farm advisor also helps update the nutrient budget and undertake a Nitrogen-surplus calculation. New rules will impact on the current farming system, resulting in the need to significantly reduce nitrogen leaching over time. The FEP identifies how the farmer can initially reduce nitrogen losses to meet the new Nitrogen-surplus requirements. This is done through helping the farmer optimise current fertiliser applications. However, for the long-term nitrogen reduction targets, the farmer also needs to consider other actions, such as improving pasture quality, planting low nitrogen species such as plantain into the pasture, stand-off pads or changing stocking rates.

The farmer cannot make all the changes at once. The Farm Environment Plan helps the farm to identify and prioritise which changes are the most important for meeting new rules and which changes could be made in coming years. It also highlights the future capital investment required allowing an informed conversation with the bank.

Costs, benefits and outcomes

New fencing, as well as re-fencing, is relatively cost effective as a double wire electric fence is all that's required to exclude stock. However, the planting programme continues to be a significant farm investment. Over time, alongside improving water quality and the visual appeal of the farm, the plantings provide shade and shelter to help meet animal welfare requirements.

Real-time water measurement helps the farmer identify and fix leaks in the water supply, reducing pumping costs, whilst providing valuable data for the water take consent renewal process.

Improved intensive winter grazing management helps to reduce impacts on soil quality. This decreases re-grassing costs, whilst greatly reducing sediment run-off into farm waterways. It also ensures animal welfare requirements are met.

Initial changes to nutrient management create financial benefits for the farmer as the fertiliser applied is better used. However, some of the subsequent farm practice changes to meet the nitrogen loss limits require a significant rethink of the farming system, alongside capital investment. Whilst production drops, the changes help to ensure the farm becomes more profitable and resilient over time. They also help the farm reduce its greenhouse gas emissions.



Vegetable growers on fertile flat land

Context

Horticulture brings in about \$6 billion of export and retail revenue to New Zealand and takes up less than one percent of New Zealand's total land area. Horticultural businesses are significant employers in most regions across the country.

The industry relies on New Zealand's rich productive soils and temperate climate. To help manage pest and disease issues the land use for vegetable growing is often rotational. It can be very intensive with high yields over small areas.

The key impacts on water quality is nitrate pollution from fertiliser primarily through drainage to groundwater. Sediment and associated phosphorous loss from cultivated soils can also create significant impacts in some growing regions.

Scenario

A 210-hectare vegetable growing operation in Hawke's Bay grows squash, maize, sweetcorn, tomatoes and asparagus predominantly on Class 1 and 2 soils. Alongside the home farm, the operation has several short-term lease paddocks.

The grower is following the best practice guidelines for commercial vegetable productions and has opted for the environmental add-on of the industry support tool to make it easier to manage council rules alongside their NZGAP industry audit.

Optimising fertiliser use through the new farm plan

Vegetable cropping is now considered a high-risk activity and requires a consent with conditions set to reduce any adverse impact.

With the new rules in place, the grower engages a farm adviser to help complete the environment module of NZGAP — the industry assurance scheme being recognised as meeting the Farm Environment Plan minimum requirements. This brings together the industry standards and environmental best practice with any local Council rules. The adviser also helps with the completion of a nutrient budget which allows the calculation of the Nitrogen-surplus for the farm.

The Farm Environment Plan, in combination with the nutrient budget, identifies how the business can gain efficiencies through better crop-rotation to manage nutrients and improve timing of applications to match growth stages — all informed by increased soil nutrient monitoring.

One of the large lease blocks has a stream running through it and sheep are grazed at relatively high stocking levels during the winter. Temporary electric fencing is used to exclude them from the waterway.

To better understand the effects of abstracting water from the rivers, the irrigation consents now require real-time water metering and daily transfer of data to the Regional Council.

Any plans for further intensification of land use or expansion of the growing business will now require a consent.



Costs, benefits and outcomes

There are some initial increased costs in consenting, to gain advice and carry out more detailed soil monitoring, but this is offset by yield increases. The grower soon decides to transition to proven precision cropping technologies over time, initially investing in precision cultivation and planting equipment alongside precision irrigation. Yields start to increase as the grower becomes skilled in the use of technology.

There is some extra labour cost associated with the temporary fencing of waterways, but the grower observes that the benefits to the waterway are considerable, particularly when it rains as there is much less sediment run-off into the creek.

Due to the number of water-takes and short-term lease paddocks, moving to real-time water measurement results in a significant cost, but it also helps the grower better monitor their irrigation and is integral to the adoption of precision irrigation. This optimises pumping costs and yields, whilst providing valuable data for the water take consent renewal process.

Suburban housing development on modified greenfield site

Context

New Zealand's population is nearing 5 million and continues to grow. There are concerns about the availability and affordability of housing. Most New Zealanders live in cities and the need for more homes is centred around larger cities. There are also provincial towns that are undergoing growth and transition to more urban-based activities.

Traditionally, most urban centres have developed on our best land — often fertile floodplains near the coast. Current urban growth is leading to a further spreading, where the area of urban land increased by 10 percent between 1996 and 2012, especially around Auckland, Waikato, and Canterbury. Between 1990 and 2008, 29 percent of new urban areas were on 'versatile' land. This type of land often has the best, or 'high-class' soils and has many agricultural uses (like growing food).

Urban expansion into new areas can have significant effects on water quality because of the sediment run-off from earthworks. Another important impact can be the loss or degradation of streams and wetlands.

The following scenario provides a hypothetical example of how the new proposals might play out in relation to urban development.

Example scenario: Suburban housing development on modified greenfield site

A housing development is proposed on a highly modified site at the fringes of a suburb with good public transport connections. There is a small stream running through the property that ends in a degraded wetland. The District Council's priority is to enable new medium-density housing to be built in priority and well-connected areas — this site ticks all the boxes. A developer is working closely with the council to commence work on providing fifty townhouses and apartments.



Protecting water quality and ecosystem health by design

In some areas, the proposed changes in the Essential Freshwater Programme, will have significant combined impact on urban development and any proposed urban infrastructure, building new subdivisions and new housing.

Under the proposed changes, the District Council and Regional Council will be required to work together to ensure the impact on the catchment as a whole does not lead to increased pollution and exceed the limits for the catchment. They will look at nutrient, pathogen (eg E. coli) and sediment pollution.

Under the existing rules, the developer needs to avoid, remedy and mitigate any adverse impacts, including sediment pollution.

As part of the design for the site, drainage works, and culverting were anticipated. With the proposed rules in the Essential Freshwater Package, the drainage and culverting cannot be carried out as planned. The developer needs to redesign the site to ensure no length of stream and none of the wetland area are lost. Furthermore, the stream and wetland must not be degraded in the process.

It may be possible to redirect the stream, if the design involves adding to its length and restoring its ecological values. The wetland cannot be moved as part of the mitigation of impacts. The wetland must be protected, and its condition improved.

Costs, benefits and outcomes

The need to leave the wetland where it is, has significant impact on the design and plans for the site. Given these constraints and costs, the developer chooses to make it a feature as part of a shared green space.

To go with the design requirements, the stream will be redirected towards the edge of the property where it eventually joins up with the wetland. This will lead to a doubling of the stream length. As part of this, an expensive restoration project is designed that includes the establishment of a rocky stream bed and significant set-back with native planting on the edges leaving space for the stream to meander.

A walk and cycleway along the stream and wetland park links residents to the centre of the suburb and public transport connections.

These new requirements incur additional costs to the project, which may reduce the expected profit margins for the development.

The new design and connection to the new park (which links the homes to the suburb centre and public transport routes) increase the property values and the initial forecast profit margins can be met.

The council is excited to have achieved a balance between the community's need for new housing in a location with good connections to public transport, and the ecological values of the stream and wetland. People who live in the development love walking and cycling beside the wetland park, and the local kids continue to enjoy feeding the eels in the stream.

The development is heralded as a good example of contemporary urban design that supports wellbeing.



IMPACT OF THE ESSENTIAL FRESHWATER PACKAGE

The objective of the Essential Freshwater programme is to:

- stop further degradation and loss of freshwater quality and associated ecosystems
- reverse past damage through promotion of restoration activities to bring freshwater ecosystems back to a healthy state
- address water and nutrient allocation issues.

Together, the proposed changes provide an impactful intervention. Wide-ranging, long-term benefits are expected across environmental, social, cultural and economic wellbeing domains. While the benefits are fundamental for the wellbeing of all New Zealanders, there are real costs to communities and councils as well as landowners and businesses.

In the sections below, we summarise the benefits and costs and provide detail in tables that are based on the available information at the time of preparing this report.

Costs and benefits are assessed at a national level, but the relative size of these impacts will vary from region to region, and from sector to sector.

Approach and assumptions

As discussed, the proposed changes fall into five broad categories: policy direction; monitoring and reporting requirements; practice standards; and bottom lines. These proposed changes are designed to work together to bring about the system change necessary to improve freshwater quality (and to realise the benefits of having clean and healthy freshwater). The proposed changes will lead to key outputs of the programme (e.g. Plans and regulations control freshwater pollution). Figure 3 earlier in this document summarises the intervention logic of the Essential Freshwater Programme, and how proposed changes link to outputs and outcomes.

The interventions work together to bring about the systems change required to improve freshwater. Because of this, the benefits and costs cannot easily be disaggregated across the interventions as they do not bring about the outputs, and therefore the outcomes, in isolation. As the summary of impacts is based on the data and analysis available at the time of writing, recommendations for areas of further impact analysis are noted in the final this section of this report.

The assessment of costs and benefits of the proposed package was based primarily on initial draft regulatory impact analyses MfE had undertaken at a policy by policy level. Where other sources are used, these have been referenced.

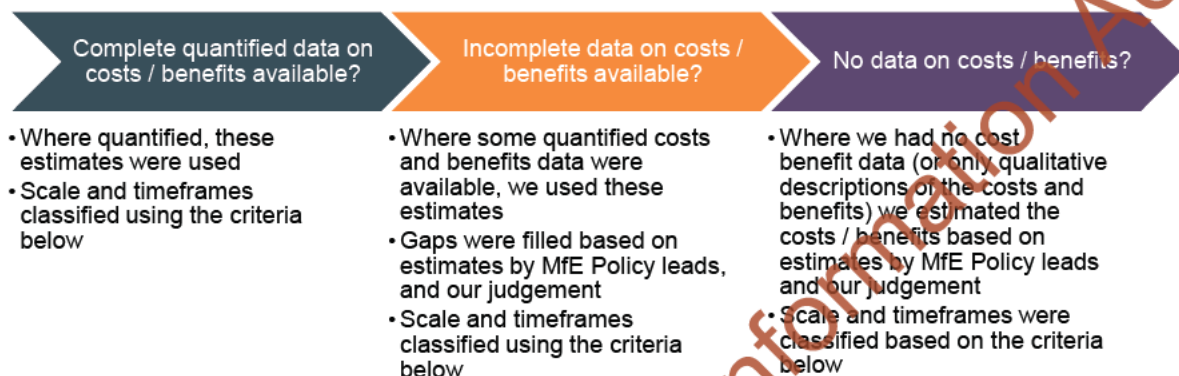
On review of the regulatory impact analysis undertaken by MfE, there were few estimates of quantitative costs and benefits data — most of the information was qualitative (or quantitative cost and benefit data was still in preparation). Given the lack of quantitative cost and benefit data, we had to apply some judgement in our meta-analysis to fill these gaps.



Furthermore, we identified where the costs and benefits of the proposed changes overlapped and took that information into account in our estimates.

Our estimates of costs and benefits followed a prioritised workflow. This shown in Figure 4 below.

Figure 4: Method for estimating the scale and timeframes of the costs and benefits



Criteria for assessing the scale and timeframes of costs and benefits

The criteria below were used in this report for assessing the costs and benefits of the proposed regulatory changes. We used the same criteria for costs and benefits, to enable some level of comparison.

- Scale of costs and benefits:
 - small (\$0–10 million)
 - medium (\$10–100 million)
 - large (\$100 million–1 billion)
 - very large (\$1 billion or more).
- Timeframe of costs and benefits:
 - Short-term (1–5 years)
 - Med-term (5–10 years)
 - Long-term (10 years or more).

In the absence of quantitative data, or estimates by MfE officials, our assessments of scale of impact is largely based on our judgement, and comparison with other regulatory impact analyses.

It could be argued that some councils are well on their way improving water quality and ecosystem health already and thus the proposed changes do not add significant benefit beyond the status quo. However, given the importance of this resource to our culture, economy and international reputation, we have made the underlying assumption that there is significant benefit in lifting the environmental performance of land use to better protect freshwater resources at a national level and beyond individual efforts of councils currently.



Overview of costs and benefits

Figure 5 below summarises the outputs, high level costs and benefits of the Essential Freshwater Programme. The diagram also presents the estimated scale of the costs and benefits of the programme.

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Figure 5: Overview of the anticipated costs and benefits of the Essential Freshwater programme

KEY OUTPUTS						
Plans and regulations control freshwater pollution	Plans and regulations prevent loss of streams and wetlands	Fish passage is provided	Rights to discharge pollutants are fairly allocated	Farm environment plans help reduce environmental impact	Monitoring builds a clear picture of the state of our freshwater	Regional councils engage with communities and mana whenua Councils and land managers are supported to make change
OVERVIEW OF KEY COSTS						
<ul style="list-style-type: none"> Targeted costs to businesses to bring about long-term sustainability of the economy (large) Opportunity costs for businesses who can no longer adversely affect stream or wetland resources (small) Costs for landowners to remediate fish passage by removing barriers (small) Costs for rate-paying communities through councils to plan and implement regulations (small) New systems to allocate rights to nutrients discharge could disrupt existing industries with flow-on impact across the economy (large) 			<ul style="list-style-type: none"> Cost for landowners and businesses needing to manage their resource use and pollution (medium) Costs for councils for increased capacity and capability for monitoring and reporting (medium) Additional costs for council planning processes (small) Costs for central government to invest in direct support initiatives and provision of information, tools and advice to support decision-making (small) 			
OVERVIEW OF KEY BENEFITS						
 <p>Environmental wellbeing Habitat and native biodiversity are protected and ecosystem services are provided</p> <p>Direct benefits to our natural capital as healthy water underpins our environmental wellbeing. Reducing water pollution and improving water quality is essential to biodiversity and protecting ecosystem functions needed by all living organisms The environment, its intrinsic value and the general public of New Zealand are the main beneficiaries</p>	 <p>Social and cultural wellbeing Freshwater is safe for people's use and enjoyment</p> <p>Direct benefits to our social and cultural wellbeing as healthy freshwater is an important part of our lives: for consumption, or part of our natural surroundings that provide recreation opportunities Restoring the mauri and wairua of our rivers helps restore mana lost in communities Restoring freshwater quality improves the social licence to operate for farmers and other businesses The main groups benefiting are the general public, councils, mana whenua and farmers</p>	 <p>Economic wellbeing New Zealand is known as a provider of quality products and has a reputation for clean and healthy water</p> <p>New Zealand's economy is underpinned by having clean freshwater Protecting and managing freshwater is an essential part of our transformation to a more inclusive and sustainable economy that brings about benefits to all New Zealanders (very large) Food and beverage exporters and tourism industry operators benefit from maintaining and improving New Zealand's clean and pure global brand (very large) Increased resilience of infrastructure to natural hazards as result of reduced sediment in rivers (large) The main groups benefiting from this are the general public and businesses, including farmers in the longer-term</p>				

Key – Small: (\$0-10 million) Medium: (\$10-100 million) Large: (\$100-1 billion) Very large: (\$1 billion+)



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Benefits of proposed changes to manage freshwater health

Environmental wellbeing

Native biodiversity and ecosystem services are protected

The changes proposed are set to have direct benefits to our natural capital because healthy water underpins our environmental wellbeing.

Better planning by councils and new regulations for activities on land will mean that the health of our freshwater can be protected through:

- lowering pollution entering waterways (including sediment, nitrogen, phosphorus and *E. coli*) and reducing groundwater contamination
- promoting riparian planting to allow roots from trees to help filter nitrogen from groundwater while trees stop soil erosion and pollution from run-off. Streams shaded by vegetation keep water cool which helps provide fish habitat and reduce algae growth
- halting further loss of streams and wetlands to protect wildlife habitat and ensure provision of valuable nutrient cycling, and flood protection services
- protecting native freshwater habitat where populations of threatened species can recover
- removing barriers to fish passage to allow freshwater fish to pass safely (for breeding)
- adopting less intensive farming practices and better farm management practices (which also supports the goals of reducing of greenhouse gas emissions from farms).

Scale of benefits

Improving water quality is essential to supporting New Zealand's unique biodiversity, our plants and animals that live in and around our waterways are increasingly under threat, and we must not lose them. These benefits are expected to be **long-term** — we expect it to take time for improved water quality to result in our threatened species recovering. The intrinsic value of protecting these species is **very large** in scale.

On-farm actions to reduce water pollution (eg reduced stocking rates, low-nitrogen feeds, better effluent and waste disposal) will also reduce greenhouse gas emissions from agriculture. This benefit is **perpetual**. While the scale of these direct benefits for farmers at current carbon prices is **small**, they will likely increase in line with the carbon price.

Beyond the environment and its intrinsic values, the general public of New Zealand are the main beneficiaries.



Social and cultural wellbeing

Freshwater is safe for people's use and enjoyment

The proposed changes are set to have direct benefits to our social and cultural wellbeing. We need to use healthy water in every part of our lives and the better its quality the easier it is to treat and use for our consumption. Water is as part of our natural surroundings that provide recreation opportunities. Restoring the mauri and wairua of our rivers helps restore mana lost in communities.

Better planning by councils and new regulations to manage and protect freshwater will mean that people can benefit because

- the healthier the water supply is, the easier it is to ensure safe drinking water
- more people want to spend time in nature (e.g. swimming and fishing), which is good for their mental and physical wellbeing
- there is a lower risk of people becoming ill from swimming in water contaminated with *E. coli* or toxic algal blooms
- mana whenua are better able to participate in cultural practices, such as mahingā kai
- mana whenua partner with central and local government to help improve the water quality in their areas, thereby practising kaitiakitanga
- local communities and councils engage in a conversation about their aspirations and priorities for freshwater quality, thereby building greater participation in local democratic processes
- improved environmental performance means farmers and other industries relying on water have better social licence to operate. This reduces stress on them and improves their wellbeing.

Scale of benefits

Having clean water to swim and play in has significant benefits for people. Being out in nature is beneficial for mental health. Also, having a lower risk of becoming ill after swimming and access to cleaner drinking water will mean that there is a lower burden on the health system from waterborne diseases. We estimate that the scale of these benefits is **very large** and will occur over the next **5–10 years** (and ongoing).

The changes proposed will also enhance the ability of mana whenua to undertake traditional cultural practices (eg mahingā kai) in support of the Crown / Māori partnership under the Treaty of Waitangi (Te Tiriti o Waitangi). We estimate that the scale of this benefit is **very large** and will occur over the next **5–10 years**.

Furthermore, communities will be more engaged in the process of setting aspirations and priorities for water quality, and farmers will benefit from better social licence to operate (through better environmental performance). We estimate these benefits to be **large** in scale and to occur over the next **5–10 years**.

The main groups of people benefiting here are the general public, councils, mana whenua and farmers.



Economic wellbeing

New Zealand is known as a provider of quality products that are sustainably produced and we have a reputation for clean and healthy water

The proposed changes are set to bring about fundamental, long-term benefits to our economy. The changes to how we protect and manage freshwater are an essential part of our transformation to a more inclusive and sustainable economy that brings about benefits to all New Zealanders.

The proposed changes mean that:

- farmers can continue farming now and into the future though adopting more sustainable practices
- New Zealand's international brand is supported by adopting more sustainable farming practices that protect the environment — this brand attracts higher prices for our products and attracts tourists coming to enjoy our great outdoors
- New Zealand produces and exports high-value products that fetch a premium price on the international market because improved environmental performance enables farmers to achieve the standards required by sustainable accreditation schemes
- our clean waterways and healthy ecosystems provide the stunning landscapes and outdoor opportunities domestic and international tourists come to enjoy across our regions
- access and treatment to water for consumption and industrial uses is more cost-effective as the water requires less treatment to make it safe for use.

Scale of benefits

New Zealand's economy is underpinned by having clean freshwater. Our biggest export earner is tourism, and food exports (including dairy and meat) are also very important to the economy. Improving our freshwater quality is vital for protecting our reputation as a pristine tourist destination, and our reputation as a producer of high quality, sustainable food products.

This will be ever more important in the future as consumers expect more sustainable products and higher quality experiences. The benefits of protecting this brand are **very large**. These benefits are **long-term** and perpetual in nature.

Furthermore, concentrating on producing products with better environmental credentials unlocks higher value markets to our producers, as does adding value to the products (eg making cheese instead of milk powder). Farmers and food processors would benefit from these changes. We estimate these benefits to be **large** in scale and occur over the **long-term**.

Finally, mandatory farm environment plans will create jobs for farm planners and auditors around New Zealand. Furthermore, institutions will need to train and qualify these people. This new industry will provide an economic benefit — we estimate the scale of the benefit to be **medium** and to occur over the next **5–10 years** (and on-going).

The groups likely to benefit from this are the general public, farmers, and food processors in the longer-term.



Costs of the proposed changes to freshwater management

Clearer objectives and tighter regulatory controls for nutrient pollution means that the environment is the ultimate beneficiary of the Essential Freshwater programme.

The costs of the proposed changes will fall on councils, landowners, farming businesses and developers. The costs borne by councils are ultimately borne by ratepayers since councils will need to recover costs from communities through rates.

Below we specify the nature of these costs. However, until policy decisions have been made (and economic analysis can be undertaken on that basis) the scale and location of impact are difficult to estimate.

Table 2 gives more detail on the parties affected by these changes. Readers should note that in order to avoid cost overlaps, this table notes costs to particular parties only once. However, some cost overlaps remain because actions to reduce one type of pollutant will likely reduce other pollutants as well.

Cost to councils and communities

Generally, councils — and therefore the rate-paying community — will face significant costs to undertake the planning and setting of rules, monitoring, processing of resource consents, working with community and mana whenua to articulate aspirations and set objectives for each catchment. Councils will need to ensure all planning is undertaken and new regional plans reflect national direction by 2025.

Councils are likely to further invest in programmes for erosion control and riparian margin management and need to increase in the number of land-management staff with expertise in erosion, nutrient pollution and farm planning.

Planning, monitoring, reporting compliance and enforcement activity will also increase in the shorter term as timeframes for finalising the new plans are brought forward.

There will be costs with establishing new and more comprehensive monitoring regimes for all waterways for a wider range of parameters.

- Ensuring regional plans are amended to reflect the proposed changes by 2025 means that the costs of all plans and regulations to effectively control pollutants are incurred over the next five years. This will involve extensive engagement with mana whenua, the community and businesses
- Halting further losses of streams and wetlands will involve some costs to councils to ensure identification of wetlands and all streams, and any associated monitoring equipment and expertise
- Making sure farms plans are in place to reduce environmental impact will mean councils need to invest in internal processes and systems as well as in relationships with external farm advisors



- Increasing regulatory requirements to prevent intensification of land use and high-risk activities will require an increase in councils' consenting processes. This includes receiving and processing resource consent applications, compliance monitoring and enforcement
- Increased expectations for monitoring and reporting on freshwater health will require investment in monitoring regimes, associated equipment, capability and capacity
- Remediation of existing structures (e.g. weirs, dams etc) to provide for fish passage will incur costs for planning and undertaking the works.

Cost to landowners and businesses

Farmers and other businesses will likely need to engage with the planning process led by regional councils. This will ensure that any plans for catchments and associated limits reflect community aspirations and priorities and what this means for them.

For business not already meeting the new practice standards, there will be implementation costs for infrastructure and changing on-farm practices to comply with any conditions on the new resource consent and farm plans.

Furthermore, there may be significant flow-on effects from impacts to other businesses resulting from reduced agricultural production (including milk and meat processors).

- Costs associated with gaining consents for high risk land-use activities that were previously permitted incur cost to the applicant. Beyond the application and processing fee this may also include the costs to implement more stringent conditions to meet targets.
- Farmers and growers will bear the costs of preparing farm environment plans. Further costs would be incurred for auditing and updating plans.
- The costs associated with implementing actions to reduce environmental impact (in line with Farm Environment Plans) will vary widely. There are significant differences between land use types, landscape and soil structure — every farm is different.
- Costs to control nutrient pollution, including those associated with implementing mitigations (e.g. loss of productive land and reduced stocking rates, fencing off larger riparian margins, and investing in better ways to manage effluent). Reduction in farm profitability is likely because of these increased costs and reduced revenues (a likely result from reduced stocking rates). Where the costs of implementation outweigh profits, a transition to different land uses may be required — this also requires investment. The impact and associated costs are likely to be higher for farming business in catchments where significant reduction in nutrient pollution is required.
- The costs to address sediment pollution include development and implementation of erosion and sediment control plans, which include the costs of planting, and loss of productive land to grazing.
- Reduced production from agriculture will flow on to reduced profits for food processors (eg milk processors and meat processors).
- There could also be significant costs associated with stranded investment in infrastructure where amended regional plans and regulations requires land-use change in order to meet water quality (and other) objectives.



- Excluding stock from waterways incurs costs where farmers do not already have fences with an adequate set-back. Although not required by the regulations, farmers would likely need to plant riparian margins with native vegetation to manage the spread of weeds and improve the control of pollution.
- There will be forgone profit for developers as a result of regulations protecting streams and wetlands from increased costs of remediation, increasing complexity to plan 'with or around' the streams and wetlands, and reduced area available for development and other uses.
- Installation of water meters that record real-time water take for businesses using irrigators will incur installation and operating costs.
- There may be significant social costs incurred through the burden of complexity and uncertainty on the mental health and wellbeing of farmers.

Costs to central government

The government is committed to invest in support for change as part of the sustainable land use package, of which this programme is a part.

Central government will need to build the capability and capacity of regional councils to implement the new regulations. The changes may also require investment in further research and development of guidance on pragmatic land management intervention to bring about environmental benefits.

Investment in support will include:

- improving the council capability and capacity, including tools and technical guidance and support
- funding for on-ground action to support the restoration of higher-risk catchment and wetlands
- supporting farmers with adoption of good management practice and certifying farm planners
- assisting mana whenua involvement in council processes.



Table 2: Costs of the Essential Freshwater Package (aligned to outputs from the intervention logic model)

Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
	Bottom lines		
Plans and regulations prevent any further losses of streams and wetland habitat	<ul style="list-style-type: none"> • Opportunity costs of other uses of wetlands • Foregone profit for developers from increased costs and/or reduced number or size of lots available for development 	<ul style="list-style-type: none"> • Wetland identification • Wetland condition monitoring 	<ul style="list-style-type: none"> • Costs to develop guidance for councils and other stakeholders • Support for restoration of higher-risk catchments and wetlands
	Practice standards		
Plans and regulations effectively control pollution and high-risk land use activities	<p>High risk land-use activities</p> <ul style="list-style-type: none"> • Costs to obtain a resource consent for high-risk land use activities (~\$3k per consent) • Costs associated with infrastructure for those not already meeting the minimum standards, and costs of changing on-farm practices to comply with any conditions on the new resource consent(s) • Costs (burden of complexity and uncertainty impacts on the mental health of farmers) associated with complex decision-making processes about farm systems that balance business objectives, with environmental objectives (and other objectives, such as animal welfare and biosecurity) • Costs associated with investment in infrastructure becoming stranded if regional plans or regulations requires land-use change in order to meet water quality (and other) objectives <p>Stock exclusion</p> <ul style="list-style-type: none"> • Fencing costs to implement required setback. • Providing stock water reticulation for stock that are no longer able to access drinking water. 	<p>High risk land-use activities</p> <ul style="list-style-type: none"> • Increased burden on councils for processing resource consents 	<p>High risk land-use activities</p> <ul style="list-style-type: none"> • Developing implementation support and interpretation guidance



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
Plans and regulations effectively control pollution and high-risk land use activities (cont.)	<ul style="list-style-type: none"> • Small scale loss of productive land as a result of the setback requirements. • Average costs per hectare for dairy farms are \$1200-1,470/ha and for sheep and beef farms \$55-\$152/ha. These costs assume a 5 m setback and include fencing, riparian planting and loss of productive land.⁴ 		
Bottom lines			
	<p>Sediment</p> <ul style="list-style-type: none"> • Development and implementation of erosion and sediment control plans • Riparian management efforts • Earthworks management <p>Nutrients</p> <ul style="list-style-type: none"> • Deintensification and nutrient management in catchments of soft-bottomed rivers • Increased costs to individual land users (widespread land use change may be required in the long-term) • Reduction in farm profitability because of abatement costs or reduced stocking rates • Flow on impacts to other businesses resulting from reduced agricultural production (including milk/meat processors) 	<p>Sediment</p> <ul style="list-style-type: none"> • Subsidy and work programmes for erosion control and riparian margin management • Increase in the number of land-management staff with expertise in erosion / sediment control • Increase in planning staff <p>Nutrients</p> <ul style="list-style-type: none"> • Setting objectives and limits • Ongoing compliance and monitoring (including bringing these costs forward) <p>Dissolved oxygen</p> <ul style="list-style-type: none"> • Establishing monitoring sites on waterways and monitoring and reporting of data from these sites 	<p>Sediment</p> <ul style="list-style-type: none"> • Work programmes targeting erosion reduction • Tax-deduction for on-farm spend related to land management interventions • Research and guidance on management intervention <p>Nutrients</p> <ul style="list-style-type: none"> • Develop national thresholds by sector • Develop partnerships with primary sector organisations <p>Dissolved oxygen</p> <ul style="list-style-type: none"> • Producing guidance for managing dissolved oxygen in waterways

⁴ Journeaux, P. 2019. Modelling of mitigation strategies on farm profitability: testing Ag package regulation on-farm. (Draft#2) AgFirst.



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
Bottom lines			
Existing barriers to fish passage are removed and prohibited in any new structures	<ul style="list-style-type: none"> Remediation of existing structures (eg weirs, dams etc) to provide for fish passage 	<ul style="list-style-type: none"> Remediation of existing structures (eg weirs, dams etc) to provide for fish passage Increased compliance, monitoring and enforcement costs 	<ul style="list-style-type: none"> Costs to develop guidance for councils and other stakeholders
Practice standards			
Agricultural businesses have farm environment plans to reduce their environmental impact and manage risk	<p>Farm environment plans</p> <ul style="list-style-type: none"> Costs to farmers and growers for preparing FEPs. Approximately \$3,500 per farm x 28,000 additional farm plans = \$98 million. These costs will be incurred in 5-10 years. Costs to implement actions from the FEPs (scale will depend on the region and the farm system — for Canterbury irrigation schemes, farmers budget \$10–30k per annum for implementing FEP actions. This is a mix of capital and operational expenditure. Some FEPs may identify the need for large, one-off capex, eg an effluent treatment system upgrade of \$100k) Costs of auditing FEPs. On average expected to cost \$1,500 per farm every two years. Assuming 40,000 farms will now require audits, the total cost is around \$30 million per annum. Some farms will have to reduce production to comply with regulations — this may reduce their profits Reduced production from agriculture will flow on to reduced profits for food processors (eg milk processors and meat processors) 	<p>Farm environment plans</p> <ul style="list-style-type: none"> Costs of compliance, monitoring and enforcement. ECan evidence suggests requiring 1 FTE per 1,000 farm plans. Assuming 28,000 additional FEPs, 28 FTE would be required nationwide. Assuming one FTE costs \$150k, this implies a total cost of \$4.2 million per annum. <p>Regulations to prevent intensification of land use</p> <ul style="list-style-type: none"> Compliance, monitoring and enforcement costs Costs to process resource consent applications (although the costs would likely be recovered through an application fee) Costs to amend plans to be consistent with regulations 	<p>Farm environment plans</p> <ul style="list-style-type: none"> Building institutions for recognition and training of FEP writers and auditors Research into the efficacy of different FEP mitigation practices, sharing lessons learned from FEPs



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
<p>Agricultural businesses have farm environment plans to reduce their environmental impact and manage risk (cont.)</p>	<p>Regulate to prevent intensification of land use</p> <ul style="list-style-type: none"> • Farmers wishing to intensify their operations would face additional costs through having to gain resource consent and for Overseer budgets (approx. \$5k for both) • Opportunity costs for farmers planning to intensify who can no longer do so: <ul style="list-style-type: none"> - Forestry -> dairy: ~\$44,000/ha - Forestry -> sheep/beef: ~\$32,000/ha - Sheep/beef -> dairy: \$19,000/ha • Dairy farms are worth around \$30-35k/ha so these intensifications are unlikely given current commodity prices. 		
Bottom lines			
	<p>Reducing nitrogen surpluses</p> <ul style="list-style-type: none"> • Excessive nitrogen leaching will need to be reduced below a specified cap — this will only be significant for catchments impacted by high nitrogen levels, and only until 2025 when the regional plans under the NPS will be in place. The costs of this proposed change to farmers will: <ul style="list-style-type: none"> - likely result in ongoing reduced profits for farms in these catchments currently over the thresholds - bring forward the ongoing costs for farms by five years <p>The farms affected by the Reducing nitrogen surpluses will be subject to having a FEP already, so additional impact will be low.</p> • Farmers over the Reducing nitrogen surpluses threshold will need to get their FEPs audited every 	<p>Reducing nitrogen surpluses</p> <ul style="list-style-type: none"> • The costs to regional councils related to enforcing the reducing nitrogen surpluses proposal will be only marginally higher than the costs to councils associated with FEPs. 	<p>Reducing nitrogen surpluses</p> <ul style="list-style-type: none"> • Costs to develop national thresholds by sector, and to manage relationships with primary sector organisations (eg Dairy NZ, Beef+Lamb NZ etc). These will be only marginally higher than that for FEPs already noted. • Provincial Growth Fund applications in catchments with high-N levels may need to be more closely scrutinised if they are likely to result in increased N leaching.



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
Agricultural businesses have farm environment plans to reduce their environmental impact and manage risk (cont.)	<p>year — this will pose an additional cost of \$1,500 per farm affected per year.</p> <ul style="list-style-type: none"> There may be social costs to farmers related to Reducing nitrogen surpluses from stress due to the additional compliance burden 		
Policy direction			
	<p>Maintain or improve</p> <ul style="list-style-type: none"> Opportunity costs — additional discharges and intensification can only occur with mitigations that mean water quality will not decline 	<p>Maintain or improve</p> <ul style="list-style-type: none"> Costs for analysis and the production of reports 	
Monitoring			
Monitoring builds a clear picture of the state of our freshwater and where further action is required	<p>Report real-time water use</p> <ul style="list-style-type: none"> Water users with consent for greater than 5 litres per second will incur costs of installation and operation of mandatory telemetry equipment. Total annual cost of telemetry for all water users is estimated to be ~\$10 m. Installation cost is approximately \$1,350 per user. For users with cell coverage (8,000 – 9,500 users), ongoing transmission cost will be about \$300 per year. User with insufficient cell coverage (2,000 – 3,500 users) will require satellite installation (\$1,500) with ongoing operating cost of ~\$1,200 per year. 	<p>Report real-time water use</p> <ul style="list-style-type: none"> Cost of adding telemetry data to existing systems. ~\$4 m per year in total nationwide. <p>Monitoring nutrient levels, sediment and dissolved oxygen</p> <ul style="list-style-type: none"> Cost of establishing monitoring sites at the Freshwater Management Unit scale. \$5,000 - \$100,000 per site depending on consenting requirements. Cost of dissolved oxygen logger device. \$5,000 - \$13,000. <p>Expanded metrics and reports on ecosystem health</p> <ul style="list-style-type: none"> Compliance, monitoring and enforcement costs 	<p>Report real-time water use</p> <ul style="list-style-type: none"> Cost of analysis and dissemination of data. About \$100,000 per year.



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
Regional councils manage land and water resources in a way that reflect community and mana whenua values and protect freshwater quality	Bottom lines		
	<p>Sediment and nutrient costs are included elsewhere</p> <p>E. coli bottom lines (swimmability in summer)</p> <ul style="list-style-type: none"> One-off fencing costs for stock farmers not affected by existing regulations 	<p>Sediment and nutrient costs are included elsewhere</p> <p>E. coli bottom lines (swimmability in summer)</p> <ul style="list-style-type: none"> Compliance, monitoring and enforcement costs (noted to be the same as existing because councils already monitor swimming spots during summer) Upgrade costs to wastewater treatment plants, plus ongoing treatment of wastewater 	<p>Sediment and nutrient costs are included elsewhere</p>
	Support for change		
		<p>Consultation with mana whenua / iwi on water quality plans</p> <p>Councils will need to consult with (and consider) the views of mana whenua and iwi when composing their plans. These costs should be no different to the costs associated with planning under the existing NPS-FM.</p>	
Councils and land managers are supported in planning and implementing change	Support for change		
		<p>Bespoke planning process to assist councils to have water management plans in place by 2025</p> <ul style="list-style-type: none"> Costs to produce plans brought forward by five years as the existing settings allowed councils flexibility to have their plans in place by 2030 	<p>Improve council capability and capacity</p> <ul style="list-style-type: none"> Central government will need support building the capability and capacity of regional councils to implement the new regulations. This may include developing guidance and tools.



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Output	Costs to landowners and businesses	Costs to councils (passed on to communities)	Costs to central government
Rights to discharge pollutants to water are fairly allocated	Bottom lines		
	<p>Sediment and nutrient costs are included elsewhere</p> <ul style="list-style-type: none"> The Ruamahanga catchment modelling indicated that if the Reducing nitrogen surpluses were set to 30 kg/ha regional gross output could fall by 7% and employment could fall by 5% (note this is a stringent threshold, and these results may not extend linearly to other regions/catchments). 	<p>Sediment and nutrient costs are included elsewhere</p> <ul style="list-style-type: none"> However, regional councils are the regulators that must make decisions on how rights to discharge are allocated — there may be additional costs to councils related to how these decisions are made. 	<p>Sediment and nutrient costs are included elsewhere</p>

Source: Ministry for the Environment (drawn from regulatory impact analyses for the proposed changes)

Note: Quantitative information on costs has been included where available at the time of compiling.

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CONCLUSIONS AND NEXT STEPS

This section provides the Ministry for the Environment (MfE) our concluding remarks, and our recommendations for further work to be done between public consultation and when Cabinet considers final policy decisions.

This report provides MfE with a cogent narrative for the Essential Freshwater Programme that can be used to help develop material needed for briefings and \ stakeholder engagement. We have also produced several visual products (including the intervention logic model on page 13 and the overview diagram presenting the anticipated costs and benefits of the programme on page 27) that may be used as a basis for further designs in line with MfE's style guide.

We note that the impact assessment presented in this report is largely qualitative, and in its current state is not adequate in inform final policy decisions on these proposals. Because of the expected scale of the costs and benefits of these policy changes, we recommend MfE extends this qualitative impact assessment and attempts to estimate the quantitative costs and benefits, focussing on the overall impact of the programme. We note that for many of the proposed changes, policy options have not settled — this makes estimating the costs and benefits of the options very uncertain.

Next steps

Recommendations for further impact analysis

We recommend that MfE undertakes further work to estimate the costs and benefits of the Essential Freshwater Package to inform regulatory impact assessment. Any further impact assessment should be carried out systematically to estimate the costs and benefits of the package across several dimensions (e.g. affected parties, regions, and sectors).

We recommend that MfE continues to develop and refine messaging to support the Essential Freshwater Package in parallel with public consultation. We think that the Essential Freshwater Package will attract a huge amount of public and industry interest and stakeholder views may be highly polarised. Any further analysis should bear in mind the questions likely to be asked by decision-makers, affected parties and the general public. These could include wider questions like:

- What are the anticipated land use changes that could be driven by these regulations?
- What are the opportunities and risks resulting from these land use changes?
- What is government's role in supporting this transition?
- Do different sectors and regions have different opportunities to transition? How do these differ?

MfE may wish to undertake some low-key engagement to ensure the types of questions people will ask are understood, and answers for these can be prepared.

We recommend that MfE develops an evidence strategy and framework to direct any modelling to deliver the breadth and depth of evidence required prior to final policy decisions being made in late-2019. This work could be undertaken in parallel with public consultation.



Generally, we recommend that MfE attempts to estimate the fiscal benefits of the package since this is a major gap in the analysis. In the following text we identify the costs and benefits that we think are gaps or require refinement.

Costs

We recommend that MfE undertakes further work to estimate the costs of the Essential Freshwater Package in parallel with public consultation. Where options are to be consulted on, we think that MfE should estimate the costs associated with these options — this, in effect, drives the modelling strategy for this work, whereby each option becomes a scenario or sensitivity.

The following lists costs that we consider need refinement:

- High priority:
 - Overall economic impact (considering the anticipated land use change) and the flow-on effects for other industries (ie dairy and meat processors) in terms of national and regional GDP, employment and land prices
 - Regional impacts of the package — what are the areas where change is likely to be particularly impactful because of the predominant sector and current water quality?
 - On-farm costs to implement changes required to improve water quality, including sectoral differences (ie costs for red meat farms, costs for dairy farms etc) and regional differences
 - Estimating the costs on regional councils, including the variation based on rules councils currently have in place and the costs of the administrative burden and upgrading any wastewater plants etc.
 - Costs of anticipated land use change that may result from the package (also by sector and by region)
- Lower priority:
 - Estimating costs of meeting bottom-lines by catchment. This could be done by identifying waterways that do not meet thresholds from attribute tables and estimating the mitigations necessary (including any land use changes required to meet them)
 - Analysis of isolated or packaged options to support Ministers' decisions when negotiating final policy decisions (ie Ministers will negotiate in the lead up to final policy decisions being made and will want to know the costs and benefits of certain combinations of components of the package).

Benefits

We recommend that MfE undertakes further work to estimate the environmental, social and economic benefits of the Essential Freshwater Package in parallel with public consultation. Where possible, MfE should focus on estimating the monetised benefits of the package.



We think the following aspects of the benefits analysis require refinement:

- Environmental:
 - Estimating the value of improved ecosystem services provided by freshwater waterways and wetlands (including provision of water resource for consumption and industrial production, nutrient cycling, and flood protection)
 - Estimating the value of better protecting freshwater species and their habitats (beyond intrinsic and cultural values this may include harvested species like longfin eels, whitebait and sportsfish)
 - Estimating the co-benefit of reducing greenhouse gas emissions (and the monetised value of this).
- Social and cultural:
 - Estimating the physical and mental health benefits from increased use of waterways for recreation
 - Estimating the benefits of improved utility of waterways to support cultural activities (eg mahingā kai)
 - Estimating the benefits of improved community engagement in local democratic processes (ie plan setting).
- Economic:
 - Estimating the value of protecting our 100% Pure NZ brand (for tourism and consumers of our products)
 - Estimating the increased value of our products to consumers in international markets that could be realised by improving the sustainability and productivity of our agricultural industries
 - Estimating the value of access of clean water for consumption and industry processes
 - Estimating the amenity value of subdivision developments that incorporate streams and wetlands in the design (ie what is the likely impact of this on house prices?)
 - Estimating the benefits of the fair allocation of rights to discharge nutrients to water.



APPENDIX 1: REGULATORY TOOLS FOR FRESHWATER

Managing freshwater is complex — it reaches across legislation, regulations and rules that are implemented by central, regional and local government.

The proposals span legislative and regulatory tools to manage freshwater resources and include provisions for non-regulatory support.

Legislation, regulatory tools and non-regulatory support

The overarching legislative framework for managing freshwater is the Resource Management Act 1991 (RMA). Other pieces of legislation can also be relevant, such as the Local Government Act 2002, which directs councils to provide for the needs of communities now and into the future, and the Health Act 1957 that includes provisions to ensure water sources are safe for people.

The key regulatory instruments to give national direction at under the RMA are National Policy Statements (NPS) and National Environmental Standards (NES).

Rules and regulations are also set by regional councils as part of the Regional Policy Statement, Regional and District Plans. Investments and support are budgeted in the Long-term and Annual Plans.

In Table 3 we describe the legislation and regulatory tools in terms of how they work for managing freshwater quality and ecosystem health.

Table 3: Summary of legislative and regulatory instrument to manage freshwater

Instrument	Description
Resource Management Act 1991 Incl s360 regs	<p>The RMA is New Zealand's main piece of legislation that sets out how we should manage our environment. The RMA is based on the principle of sustainable management which involves considering effects of activities on the environment now and in the future when making resource management decisions.</p> <p>As well as managing air, soil, freshwater and coastal marine areas, the RMA regulates land use and the provision of infrastructure which are integral components of New Zealand's planning system.</p>
Local Government Act 2002	<p>The Act is designed to provide democratic and effective local government that recognises the diversity of New Zealand communities. It provides a framework and powers for local authorities to decide which activities they undertake and the manner in which they will undertake them.</p> <p>To balance this empowerment, the legislation promotes local accountability, with local authorities accountable to their communities for decisions taken.</p> <p>The Act also enables local authorities to play a broad role in promoting community well-being, taking a sustainable development approach.</p> <p>Councils can set up targeted rates to cover or contribute towards costs of investing in assets or processes</p>



Instrument	Description
National Policy Statement for Freshwater Management 2014	<p>National policy statements are instruments issued under section 52(2) of the Resource Management Act 1991. They state objectives and policies for matters of national significance.</p> <p>The National Policy Statement for Freshwater Management (Freshwater NPS) provides direction on how local authorities should carry out their responsibilities under the Resource Management Act 1991 for managing freshwater.</p>
National Environmental Standards (NES)	<p>National environmental standards (NES) are regulations issued under section 43 of the Resource Management Act and can apply regionally or nationally (although all current national Environmental Standards apply nationally).</p> <p>National environmental standards (NES) are regulations that prescribe standards for environmental matters. The government sets standards where appropriate to ensure a consistent standard for an activity or resource use.</p> <p>They can prescribe technical and non-technical standards, methods, or other requirements for land use and subdivision, use of the coastal marine area and beds of lakes and rivers, water take and use, discharges, or noise. Each regional, city or district council must enforce the same standard. In some circumstances where specified in the NES, councils can impose stricter or more lenient standards.</p> <p>An example is the NES for Sources of Human Drinking Water (2008) is a regulation that sets requirements for protecting sources of human drinking water from becoming contaminated. It came into effect on 20 June 2008.</p> <p>For the purpose of this NES, a human drinking water source is a natural water body such as a lake, river or groundwater that is used to supply a community with drinking water. The standard applies to source water before it is treated and only sources used to supply human drinking water i.e. not stock or other animals</p> <p>This NES complements Ministry of Health legislation for improving drinking water supply and delivery. This ensures a comprehensive approach to managing drinking water from source to tap.</p>
Regional Policy Statement	<p>Regional Policy Statements: Regional councils are obliged to prepare a regional policy statement (often referred to as an RPS). RPSs provide an overview of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the region.</p>
Regional Plan	<p>Regional plans give effect to national policy statements, national planning standards and regional policy statements. They must also not be inconsistent with water conservation orders or other regional plans for the region. In terms of freshwater, regional plans can cover issues within the functions of the regional council, including soil conservation, water quality and quantity, aquatic ecosystems, biodiversity, discharge of contaminants, and allocation of natural resources.</p>
District plans	<p>A territorial authority (city or district council) must prepare a district plan for its district to achieve sustainable management. It must give effect to national policy statements and regional policy statements and must not be inconsistent with regional plans and any applicable water conservation orders.</p> <p>District plans cover issues related to the functions of territorial authorities, including the effects of land use and the control of impacts from activities on biodiversity, rivers and lakes.</p>
Long-term and annual plans	<p>Long-term plans (LTP) and Annual Plans are key planning tool for councils.</p> <p>Their purpose is to describe the council's activities and the community outcomes it aims to achieve and provide information on activities, goods or services provided by a council, and specific funding and financial management policies and information.</p> <p>LTPs outline all things a council does and how they fit together. They show what will be done over the plan's 10-year period, why the council is doing things and their costs.</p> <p>The annual plan process focuses on year-to-year budgets.</p> <p>This is where targeted rates to fund priority initiatives for sectors of the community can be set.</p>



Investment and support

Non-regulatory support and investments can be instrumental in helping bring about outcomes. While the regulatory settings provide the framework for rules and what is allowed, support through investment like targeted incentives can help get there faster. This support can be delivered in various forms. Examples include:

- Centralised support for processes
- Development of guidance and tools
- Targeted funding for key initiatives and projects
- Incentives for desired activities.

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Essential Freshwater 42: Seeking agreement to national direction proposals (paper 1 of 3)

			
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Date Submitted:	12 April 2019	MfE Tracking #: 2019-B-05474	MPI Tracking #: B19-0186
Security Level	UNCLASSIFIED	MfE Priority:	Urgent

	Action sought:	Response by:
To Hon David Parker, Minister for the Environment	Agree to policy proposals for inclusion in a Cabinet package seeking agreement to consult.	26 April 2019
To Hon Damien O'Connor, Minister of Agriculture	Agree to policy proposals for inclusion in a Cabinet package seeking agreement to consult.	26 April 2019
CC Hon Nanaia Mahuta, Associate Minister for the Environment	Note	

Actions for Minister's Office Staff	Return the signed report to MfE.
Number of appendices and attachments	Nil
Note any feedback on the quality of the report	

Ministry for the Environment contacts

Position	Name	Cell phone	1 st contact
Principal Author	Nik Andic		
Responsible Manager	Jo Burton		
Director	Martin Workman		✓

Essential Freshwater 42: Seeking agreement to national direction proposals (paper 1 of 3)

1. The purpose of this briefing is to seek your agreement to consult on amendments to national direction under the Resource Management Act 1991 (RMA), aimed at stopping further degradation and loss of freshwater resources, and resolving known issues with the National Policy Statement for Freshwater Management (NPSFM).
2. Subject to your agreement, officials will begin developing a Cabinet package seeking agreement to consult (including a redrafted NPSFM, consultation material, regulatory impact statements and Cabinet paper).

This is the first of three briefings

3. This is the first of three briefings. This briefing focusses on proposals to clarify or amend existing policies, which are likely to have marginal impacts compared to the status quo. Proposals largely relate to the NPSFM and the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.
4. The second briefing will focus on proposals to introduce new policies that are likely to have more significant impacts (to be provided by 18 April 2019). Proposals will relate to changes to the NPSFM as well as a new national environmental standard for freshwater management (the NESFM).
5. You will receive a third briefing that will focus on regulating on-farm practices and intensification (to be provided by 18 April 2019). Proposals will largely relate to a new NESFM.
6. In many cases, proposals here will overlap with those described in later briefings – i.e. requirements to maintain or improve water quality are closely related to new controls on intensification. All proposals form part of a single package of regulatory interventions to halt declines in water quality and its impacts on ecosystem health.

How this briefing is structured

7. This briefing is structured as a series of short papers on discrete topics, each setting out the problem being addressed and seeking agreement to specific proposals to do this, which will be included in public consultation material.

Recommendations are included within each section, indicated by the green boxes.

8. Advice relating to each topic can be found on the following pages:
 - a. Requirements to maintain or improve water quality in the NPSFM – Page 4
 - b. Policy direction on setting limits in the NPSFM – Page 7
 - c. Restructuring the NPSFM – Page 10
 - d. Implementation requirements in Part E of the NPSFM – Page 12
 - e. Remove redundant term “minimum acceptable state” in the NPSFM – Page 13
 - f. Providing for renewable electricity generation in the NPSFM – Page 14
 - g. Amending the 2010 water measurement regulations to mandate real-time reporting of water use – Page 17

Additional information can be provided as needed

9. Please indicate if the level of information contained is insufficient to make decisions. We acknowledge that the format of this advice is brief, and are able to provide additional information or meet with you to discuss proposals in more detail.
10. Alternatively, you will be able to make further changes when considering the draft Cabinet package prior to consultation. We expect to have drafts prepared by mid-May.

Advisory groups and stakeholder input

11. Proposals in this briefing have been developed with varying levels of input from the Essential Freshwater advisory groups.
12. At minimum, all proposals have been tested with the Freshwater Leaders Group (the FLG), and their responses have been factored into our advice. We understand the FLG is preparing its own advice for Ministers, and this will provide detailed feedback on all proposals. This briefing has been shared with the FLG to enable them to do this.
13. The Science and Technical Advisory Group (the STAG) has provided detailed input on NPSFM requirements to maintain or improve water quality. This has shaped proposals, and will continue to inform detailed drafting. The STAG has largely focussed on more substantive proposals to be included in the second briefing (e.g. new water quality attributes).
14. We have made Kahui Wai Māori aware of all proposals. We understand they are focussing their efforts on areas of overlap with their own work programme. They have indicated they will review all proposals and provide their views at a later date.
15. We have also tested proposals with the Regional Sector Advisory Group and Electricity Generators.

Signature

Martin Workman
Director, Water

Hon David Parker
Minister for the Environment

Date

Hon Damien O'Connor
Minister of Agriculture

Date

Requirements to maintain or improve water quality in the NPSFM

Problem: Regional planning may permit water quality to decline, and it is unclear how regional councils should assess whether water quality has been maintained

1. Objective A2 of the NPSFM directs that the “overall quality of fresh water within a freshwater management unit is maintained or improved...” while protecting or improving other specified matters. Policy CA2(e)(iia) provides further direction when setting freshwater objectives to maintain, requiring that they be set within the same band as existing freshwater quality. “Existing freshwater quality” is further defined as the quality of water at the time freshwater objectives are set, including future planning processes.
2. Currently, regional plans can permit freshwater quality to decline by:
 - a. Setting freshwater objectives that allow for declines within band ranges (which are currently defined for all compulsory attributes); and
 - b. Allowing water quality to decline prior to setting freshwater objectives in their regional plan. Any declines prior to setting freshwater objectives can be locked in by maintaining from a future state that is more degraded.
3. It is also unclear how regional councils are expected to demonstrate whether water quality has been maintained over time. This may cause debate and litigation when they review their plans.
4. Feedback from the Science and Technical Advisory Group indicates that declines within attribute bands would represent real harm for ecosystem health. This is consistent with feedback from the New Zealand Freshwater Sciences Society and NIWA during 2017 amendments to the NPSFM.
5. We have not identified specific instances of regional plans setting freshwater objectives to deliberately degrade water quality, although we are aware the issue has been considered by the Environment Court.¹ Doing so is likely inconsistent with the purpose of the Resource Management Act 1991, and it is doubtful whether regional council functions would allow them to include such an objective in a regional plan.
6. However, we still consider there is a risk water quality can be allowed to decline if regional councils set less specific objectives for water quality to stay within a band, and as a consequence, do not identify or respond to declines within that band. For example, if water quality is at the top of the C band, it could decline to the national bottom line (generally defined as the threshold between C and D bands). This is not the intended function of a national bottom line, and risks undermining confidence in the NPSFM as a whole.

Proposals

7. We recommend the following changes to the NPSFM in terms of maintaining freshwater quality:
 - a. Requiring regional plans to set specific, measurable and time-bound freshwater objectives to maintain water quality at its current state (rather than within attribute bands).
 - b. Defining “existing freshwater quality” as the quality of fresh water on the date the amended NPSFM is proposed (anticipated to be July 2019), unless councils have already set freshwater objectives to implement the NPSFM.

¹ In *Ngati Kahungunu Iwi Inc v The Hawkes Bay Regional Council* [2015] NZEnvC 50, the regional council was prevented from making changes to its regional plan that would allow degradation of water quality in part of its region – this was seen as inconsistent with its functions under the Resource Management Act 1991.

- c. Setting clearer reporting requirements that specify what information should be used to assess whether water quality has been maintained (including accounting of takes and sources of contaminants, implementation progress, predicted changes in quality, climate influences, and information needed to assess the overall state values like ecosystem health), recognising this is complex and will involve interpretation and the exercise of judgment by regional councils.
 - d. Delete the word “overall” from Objective A2, to avoid situations where this is interpreted to mean something other than the above.
8. These changes will mean that regional plans cannot allow water quality to decline, and will provide regional councils with clearer direction about how they should assess whether water quality has been maintained.

Agree to consult on amendments to the NPSFM, to ensure water quality is not allowed to decline and provide additional direction on assessing whether it has been maintained.

YES / NO / DISCUSS

Additional advice

- 9. The second briefing (to be provided by 18 April 2019) will propose that you include additional direction in the NPSFM on how councils should report on overall ecosystem health. This will form part of how regional councils assess whether water quality has been maintained.
- 10. The third briefing (also to be provided by 18 April 2019) will propose new controls on the ability to intensify land use, and take immediate effect. These controls will make a significant contribution to maintaining water quality. NPSFM requirements to maintain or improve water quality are complementary in that, over a longer term, they will drive regional planning that controls the full range of resource uses (e.g. including discharges) to maintain or improve water quality.
- 11. The proposals here increase opportunity costs associated with existing requirements to maintain water quality. They reduce scope for additional discharges or intensification of land use that might be possible if water quality could decline within attribute bands. To test this impact, we have modelled potential increases to existing contaminant loads (headroom) while maintaining water quality within a band, versus maintaining water quality at current state. At the national scale, this results in a 0.8-6.4% reduction in headroom for most attributes. This means there is a reduced ability to increase farm revenue (e.g. through dairy conversion from a less intensive land use). Additional discharges and intensification of land use are still possible with mitigations that mean in-stream concentrations of contaminants do not increase.²
- 12. Opportunity costs associated with the proposals must also be discounted for the following:
 - a. In some situations freshwater quality is already below the national bottom line and must improve – and maintaining water quality is not an option.
 - b. Maintaining *E. coli* concentrations is not an option and the NPSFM already requires continuous improvement in *E. coli* concentrations over time.

² Modelling national land-use capacity: Exploring bottom lines and headroom under the NPS-FM 2014:

<http://www.mfe.govt.nz/publications/fresh-water/modelling-national-land-use-capacity-exploring-bottom-lines-and-headroom>

- c. Proposals will have limited impact in the Waikato and Waipa catchment, where Treaty settlement legislation and the resulting Vision and Strategy for the catchment take precedence over the NPSFM and already requires improvement.
 - d. Headroom does not imply that individuals can, or will, intensify land use. Land use change is the result of many drivers and barriers, including biophysical constraints, economics, societal pressures, and personal factors – all of which interact in complex ways.³
 - e. Other proposals will also constrain intensification of land use, and opportunity costs should not be double-counted.
13. Other cost impacts include the administrative costs imposed on regional councils to amend existing plans, and fulfil reporting requirements over time. We have limited information to test these impacts, and intend to work with councils through consultation.
14. More detailed description of the anticipated impacts will be included in the regulatory impact statement, which will accompany the Cabinet paper seeking agreement to consult.

³ Analysis of drivers and barriers to land use change: <https://www.mpi.govt.nz/news-and-resources/science-and-research/land-use-change-report/>

Policy direction on setting limits in the NPSFM

Problem: The NPSFM provides insufficient direction on what a limit is, and how it should be set

15. The NPSFM requires councils to set freshwater objectives, and limits to achieve these, in order to provide for the values a community holds for their freshwater – which must include the compulsory values of ecosystem health and human health for recreation.
16. Previous amendments to the NPSFM have focused on giving councils direction on how to identify values and set freshwater objectives through the inclusion of the national objectives framework. However, even with the benefit of this framework, implementing the NPSFM is a complex undertaking.
17. Limits are defined as the maximum amount of resource use available, which allows a freshwater objective to be met. The NPSFM provides little other direction on what the purpose of a limit is, what a limit might be, and how to approach setting one. Feedback from councils and practitioners indicates there is uncertainty about NPSFM requirements for limit setting, and this may be contributing to planning inertia.
18. We consider there is an opportunity to assist councils in setting limits by providing greater specificity within the NPSFM. We recommend amending the NPSFM to include policies specifying what a limit seeks to achieve and the types of resource use that may be captured by limit setting.
19. Note we have briefed you on the policy intent of limit setting, and the issues associated with interpretation and implementation of the limit setting requirements [Essential Freshwater paper #7 refers]. As agreed by you, we have continued to work on proposals to clarify policy and have tested these with the Essential Freshwater advisory groups.
20. All groups agree that the current policy intent is sound and the words “resource use” to define a limit should be retained, that the limit should be a restriction on resource use – not the instream measure, and that the policy needs to be clearer.

Proposal: Amend the definition of a limit

21. We propose to amend the definition of a limit to remove the qualifier “maximum amount of resource use” as this implies limits must be quantifiable, which may not be possible for all attributes, e.g. *E. coli*. For example:

“Limit” is the maximum amount of resource use available means a restriction on resource use which allows a freshwater objective to be met.

22. Note actual drafting may differ, and the above is only intended to clarify policy intent.

Agree to consult on amendments to the definition of a limit within the NPSFM.

YES / NO / DISCUSS

Proposal: Clarify policy intent through additional direction on limit setting

23. We propose to insert the following policy directions and clarifications to ensure implementation of limits achieves policy intent. Actual drafting may differ and the following proposals describe policy intent.

Proposed policy direction/clarification	Agree to amend the NPSFM to include policy direction
Regional councils must set a limit (or limits) on resource use to achieve freshwater objectives for water quality and quantity.	YES / NO / DISCUSS
Limits may be expressed as an input or output control on resource use, including restrictions and conditions on: <ul style="list-style-type: none"> • activities or land use practices which affect freshwater quality or quantity; • the volume/rate of discharges and circumstances within which they can occur; and • the volume/rate of water takes and circumstances within which they can occur. 	YES / NO / DISCUSS
Limits may apply at any scale, including a freshwater management unit, part of a unit, and/or individual property.	YES / NO / DISCUSS
Limits may be based on measured, modelled, or estimated data.	YES / NO / DISCUSS
Limits must be expressed as rules with appropriate activity status. [This will signal what resource use is possible and (if appropriate) when it will cease (e.g. by prohibited status once a limit threshold is met). Note that methods (in addition to limits) may also be used to achieve freshwater objectives.]	YES / NO / DISCUSS
Limits to achieve freshwater objectives for quantity, state: <ul style="list-style-type: none"> • the quantity or flow of water that may be abstracted or diverted from entering, or dammed in, a water body over any specified time period (i.e. the allocable quantum); and • the level, rate and variability of flow that must be maintained in a water body to ensure the environmental flow and/or level is maintained (i.e. the ecological flows and levels). 	YES / NO / DISCUSS

Proposal: Additional direction on uncertainty and setting limits

24. We acknowledge that limit setting can be technically difficult and the limits needed to achieve water quality outcomes can be difficult to quantify with certainty. It is likely this uncertainty will continue to be a feature of limit setting, and may contribute to delays (e.g. to collect additional data and improve modelling/estimates).
25. We consider that is preferable to avoid actual and potential effects of resource use in the first instance, rather than seeking to reverse harm as this will be more costly and, in some cases, the harm may be irreversible.
26. We propose to include policies directing regional councils that:
- uncertainty should not prevent or delay limit setting; and
 - decisions must be made using available information.
27. This will give councils and communities a clear signal that limits need to be set in a timely manner, even if information is currently imperfect.

Agree to consult on amendments to the NPSFM, to insert additional policy direction on uncertainty and setting limits.

YES / NO / DISCUSS

28. On its own, this will not reduce the uncertainty faced by regional councils, and should not be considered in isolation. A wider range of measures are being progressed that can significantly reduce uncertainty and mitigate its impacts on regional planning:
- Continued investment in science and information** to support limit setting (i.e. overcoming evidentiary difficulties). Budget 2018 committed \$5m over the next four years to improve OVERSEER. The Our Land and Water science challenge currently has \$96.9m allocated over ten years.
 - More substantive RMA reforms** to address systemic issues that create opportunities for excessive debate and litigation (e.g. processes affecting plan agility, role of appeals, etc). We are currently advising you on a new freshwater planning process, to be progressed through amendments to the RMA later this year.
 - Restricting resource use at the national level** can avoid difficulties setting specific limits through planning processes. The second and third briefings (to be provided by 18 April 2019) will include proposals to regulate a range of inputs/activities through a national environmental standard on freshwater management (e.g. preventing drainage of wetlands, etc).

Restructuring the NPSFM

Problem: Substantive policy direction is contained within the interpretation section

29. Several terms defined in the NPSFM contain substantive policy direction within their definitions. For example the freshwater quantity accounting system definition describes what accounting is, but also has detail about the information councils are expected to collect as part of setting up an accounting system.
30. We know from working with councils that NPSFM content which is not contained in either an objective or policy can be easily overlooked, and risks poor implementation.

Proposal: Move substantive policy direction into the relevant parts of the NPSFM

31. To avoid this we suggest that where substantive policy direction is included in a definition, it be moved into the relevant part of the NPSFM. We do not propose changing the policy intent or what is required to give effect to the NPSFM – just the location of policy direction to aid implementation.

Agree to consult on amendments to the NPSFM, to move substantive policy direction from the interpretation section into the relevant parts of the NPSFM

YES / NO / DISCUSS

Problem: The structure of the NPSFM is unnecessarily complex and contains repetition

32. Regional councils and stakeholders have consistently criticised the structure of the NPSFM as unnecessarily complex, difficult to read, and containing repetition. For example, the numbering of objectives and policies has become increasingly peculiar after multiple amendments – for example, Policy CA2(f) (ab). Objectives and policies are also repeated in separate sections on water quality and water quantity (Parts A and B).
33. Objectives and policies relating to economic well-being are also repeated within Parts A and B, and do not materially add to (and cannot change) what is already required under the Resource Management Act 1991 – i.e. to enable communities to provide for their economic well-being and consider how to do this when giving effect to the NPSFM.
34. We agree that this unnecessarily adds complexity, and that drafting should be clear and succinct wherever possible. We are working with an ex-Parliamentary Counsel Office drafter to look at how the NPSFM could be restructured to do this.

Proposal: Restructure existing parts, objectives and policies

35. We propose to:
 - a. Combine parts relating to water quality and quantity, and integrated management, (Parts A, B and C) to reduce repetition between their objectives and policies, and reinforce the need for integrated catchment management and protection of sensitive receiving environments.
 - b. Move policies relating to identification of values, the setting of freshwater objectives to provide for those values, and setting limits to achieve those freshwater objectives, into a single part. This would likely form a single process, similar to the current national objectives framework (Part CA).
 - c. Move policies relating to economic well-being into the above process, as a single policy that clearly communicates it should be considered when setting freshwater objectives and limits (while retaining the objective within the combined Part described in a. above).

- d. Clearly illustrate how councils are giving effect to Te Mana o te Wai as part of the above process (e.g. through explicit wording within policies or explanatory notes). For example, when setting limits, establishing an environmental flow aligns with the concept of putting the river first.
36. Following your agreement to other policy proposals, it may also be desirable to restructure the NPSFM in other ways – this will be reflected in a redrafted NPSFM for public consultation.

Agree to consult on amendments to the NPSFM, to restructure existing parts, objectives and policies so they are as clear and succinct as possible.

YES / NO / DISCUSS

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Implementation requirements in Part E of the NPSFM

38. Part E requires regional councils to implement the NPSFM as promptly as is reasonable in the circumstances, and no later than 2025 (or 2030, if the council considers this is impractical or would result in lower quality planning).
39. In practice, this means making or changing a regional plan, and ensuring its contents give effect to all of the objectives and policies of the NPSFM.

Problem: Plan changes needed to halt declines in water quality may not be in place by 2025

40. Regional councils are able to implement the NPSFM through a programme of defined time-limited stages. All councils have formally adopted, and published on their websites, such programmes to implement the NPSFM by 2025. However, some regional councils have indicated this may not be practicable and there is a risk implementation will take until 2030.
41. We recently updated you on implementation progress and risks [Essential Freshwater paper #40], and are currently advising you on a new freshwater planning process to be progressed through amendments to the RMA later this year [Essential Freshwater paper #41].

Proposal: Remove the ability to implement the NPSFM by 2030

42. To capitalise on a new freshwater planning process, and ensure regional plans are in place to halt declines in water quality as soon as possible, we recommend removing the ability for regional councils to implement the NPSFM by 2030.

Agree to consult on amendments to the NPSFM, to require full implementation by 2025 (removing the ability to delay implementation until 2030).

YES / NO / DISCUSS

Problem: Drafting is leading to an incorrect interpretation of Part E

43. Wording within Part E consistently refers to policies, but not objectives. Some commentators have suggested that this means regional councils are able to implement NPSFM *policies* by 2025 (or 2030 if applicable), while *objectives* must be implemented sooner.
44. This interpretation does not reflect the original policy intent. Implementation timeframes should not differ for objectives and policies, and any distinction is unintentional.

Proposal: Clarify implementation requirements apply to both objectives and policies in the same way

45. We recommend amending Part E to clarify implementation requirements to not differ for objectives and policies. This can be achieved by minor drafting changes – e.g. replacing all instances of the phrase, “implementation of a policy”, with “implementation of this national policy statement”.

Agree to consult on amendments to the NPSFM, to clarify that regional councils must implement the whole of the NPSFM (including objectives and policies) within the timeframes specified in Part E.

YES / NO / DISCUSS

Remove redundant term “minimum acceptable state” in the NPSFM

46. The term ‘minimum acceptable state’ was incorporated into the NPSFM along with the national objectives framework in 2014. The framework sets out the process that councils must use to identify values and set freshwater objectives for freshwater management units in their plans.
47. A range of values are listed in Appendix 1 of the NPSFM – including two compulsory values (ecosystem health and human health for recreation), and others that councils and communities may choose to provide for.
48. Appendix 2 of the NPSFM contains attributes that provide for values – currently these all provide for the two compulsory values and have ‘national bottom lines’ associated with them. When the framework was introduced, it was anticipated that Appendix 2 could also be populated with attributes for non-compulsory values. At the time, it was thought necessary to differentiate between these attributes so different phrases were coined to denote the lower end of their ranges - ‘national bottom lines’ for attributes associated with the compulsory values and ‘minimum acceptable state’ for attributes associated only with ‘other’ values. Development of these ‘other’ attributes however, has not occurred.

Problem: The NPSFM contains redundant policy

49. The NPSFM currently states that councils cannot set freshwater objectives below national bottom lines for a compulsory value, or below a minimum acceptable state for any other value. However there are currently no attributes linked to these ‘other’ values and this makes the term “minimum acceptable state” redundant.

Proposal: Remove references to “minimum acceptable state”

50. We consider that if attributes are introduced in the future which are linked solely to ‘other’ values there would be no harm in also calling the lower end of those ranges a national bottom line.
51. We therefore recommend removing the direction around ‘minimum acceptable state’.

Agree to consult on amendments to the NPSFM, to remove the term “minimum acceptable state”.

YES / NO / DISCUSS

Providing for renewable electricity generation in the NPSFM

Problem: In some cases, achieving national bottom lines may reduce renewable energy generation output

52. Some regional councils will not be able to achieve the national bottom lines in the National Objectives Framework of the NPSFM without potentially reducing the amount of renewable electricity produced by a hydroelectric scheme (or possibly other renewable electricity generation infrastructure).
53. Policy CA3 allows for a regional council to set an objective below a national bottom line in Freshwater Management Units (FMUs) containing infrastructure listed in Appendix 3 of the NPSFM. Appendix 3 is currently empty, and therefore, no regional council is able to set a freshwater objective below a national bottom line in an FMU containing renewable electricity generation infrastructure; even if it is in the national interest for a regional council to do this.
54. New Zealand has ambitious targets for renewable electricity generation and greenhouse gas emissions. Electricity demand is expected to grow significantly. This means that the continued operation of New Zealand's hydropower baseload will be important in meeting these goals (as under most likely scenarios it will operate in conjunction with increased wind production). For this reason, there is an expectation that storage flexibility will become more important and not less.
55. Generators have also expressed concerns that their infrastructure may effectively be used to mitigate water quality issues they consider are caused by other parties.
56. We recommend an amended regime that will overcome some of the shortcomings of relying upon a requirement to have infrastructure listed in Appendix 3 – the population of Appendix 3 has proved problematic due to both not wanting to allow for too many exceptions and also not wanting to distort the electricity market.

Proposal: Deletion of Appendix 3 and amendment of Policy CA3 to rely on council decision making

57. We propose to amend Policy CA3 to enable a regional council to set freshwater objectives for a particular FMU below a national bottom line where setting it at or above the bottom line would detrimentally affect the benefits provided by any existing renewable electricity generation infrastructure present in the FMU. Regional Councils would be expected to set their FMUs to only include the areas affected by the infrastructure. Under this approach Appendix 3 would be superfluous and be removed. Note the change here from hydro infrastructure to include all renewable electricity generation infrastructure (this is the definition used in the National Policy Statement for Renewable Electricity Generation and includes other renewables); this change has been made so as to treat all generators equally and not interfere with the market.
58. Importantly, a revised Policy CA3 will not provide a blanket exemption for FMUs containing renewable electricity generation infrastructure. It would increase the range of acceptable objectives that a Regional Council may use to also include the D band. A regional council would still be required to 'maintain or improve' water quality and to undertake a full NPSFM process with their stakeholders and communities and decide where to set their objective (at any level within all of bands A-D). We consider that this approach would provide regional councils with sufficient flexibility to undertake their obligations under the National Policy Statement for Renewable Electricity Generation (the NPSREG). This is the most appropriate vehicle for national direction on the national importance of renewable electricity generation infrastructure.

Agree to consult on amendments to the NPSFM, to remove the Appendix 3 exceptions mechanism and enable regional councils to maintain water quality below a national bottom line if necessary to retain the benefits provided by any existing renewable electricity generation infrastructure.

YES / NO / DISCUSS

Proposal: Include explicit reference to the National Policy Statement for Renewable Electricity Generation and the need to consider the benefits of renewable electricity generation

59. We propose including explicit references to regional council obligations to give effect to the NPSREG when setting freshwater objectives for FMUs that contain renewable electricity generation infrastructure. This will not change the legal obligations faced by a regional council, and does not imply priority for the NPSREG.
60. Additionally, we recommend including reference to the benefits of renewable electricity generation under Policy CA2(f) as a matter that regional councils must consider when developing freshwater objectives for FMUs.

Agree to consult on amendments to the NPSFM, to include explicit reference to the NPSREG and the need to give effect to it when setting freshwater objectives.

YES / NO / DISCUSS

Proposal: Ensure that regional councils are still encouraged to improve water quality where possible

61. Setting an objective in accordance with the revised policy CA3 would still require water quality to be maintained. We think it is important to include a mechanism to encourage water quality to still be improved. We consider that this could be done through a new policy that indicates that, if an objective is set below a national bottom line in accordance with policy CA3, a Regional Council must consider whether it is possible to still improve water quality, while having regard to the objectives of this, and other, national policy statements.

Agree to consult on amendments to the NPSFM, to ensure regional councils still improve water quality where possible.

YES / NO / DISCUSS

Additional advice

62. We have arrived at our current policy position through a series of workshops with the major generators (Meridian Energy, Mercury, Contact Energy, Genesis Energy & Trustpower). They are supportive of our current approach.
63. This approach received mixed feedback from the Freshwater Leaders Group. Some members of the group were opposed to introducing a policy that would prioritise particular industries. However, other members of the group were more supportive and thought that the policy was justifiable on the basis of New Zealand's climate change commitments.

64. Regional Councils recognise the need for exceptions, though they have preferred to describe these in the language of 'offsetting'. They have requested the ability to offset for other kinds of infrastructure such as flood protection. We consider a formalised offsetting framework would be complex and unnecessary in this context. We recognise that offsetting-like provisions might beneficially be included as consent conditions. We are also concerned is that if the category of exceptions is too broad, there is a risk of undermining the effectiveness of the national bottom lines in the NPSFM. We think that there is a policy justification to extend the category of exceptions to include renewable electricity generation infrastructure on the basis of ensuring New Zealand's security of electricity supply as it attempts to meet its climate change targets.

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Amending the 2010 water measurement regulations to mandate real-time reporting of water use

65. The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 (the Regulations) established a nationally consistent regime for measuring water use.
66. As of November 2016, water permit holders for every consented water take over 5 litres per second are required to:
- Have an appropriate measuring device (almost always a water meter) installed;
 - Have the measuring device independently verified by an accredited company (usually an irrigation engineering firm) to ensure the water meter is calibrated to meet the accuracy requirements in the Regulations; and
 - Provide a continuous record of water use data to their regional council. This data must be provided at least annually in hard copy or electronic formats.

Problem

67. The Regulations are relatively permissive in terms of reporting water use to the relevant regional council. While they require a continuous record of water use (which is usually a daily total), they only require this data to be reported to the council at minimum once a year.
68. In addition, the Regulations allow for a range of methods of reporting, and records can be in either hard copy or electronic formats. In practice, reporting has ranged from hand-written records being posted to the council, to excel spreadsheets being e-mailed, to real-time time data being sent electronically directly to councils.
69. Experience from councils show that data quality and timeliness is now the key concern for implementing the Regulations. Missing water use records, suspicious looking totals (e.g. exactly the same amount of water being taken every day) and tardiness of reporting from some users have all been identified as issues. These issues reduce the ability of councils to use this data effectively, most notably for compliance, monitoring and enforcement (CME) work and NPSFM implementation.
70. In their May 2018 report *Monitoring how water is used for irrigation*, the Auditor General made four recommendations relating to the implementation of the Regulations, the first of which refers directly to the data quality and timeliness issues identified above⁴.

Proposals

71. We propose therefore to consult on making real-time electronic reporting of water use to councils (usually called telemetry) mandatory under the regulations. This would require water permit holders to install a telemetry unit on their water meters to electronically record water use, and then electronically transmit this data directly to councils. Data transmission would usually occur over the cellular network. Where cellular coverage is insufficient, other transmission methods are also available, such as using data repeaters to send data back to a broadband connection, or using radio data transmission from more remote water takes.
72. Most councils already have some water takes using telemetry, but practice varies from Horizons (with almost all consented water takes over 5l/s telemetered) to Northland (currently with less than five takes telemetered).

⁴ The OAG Recommendation 1 is as follows: “the Ministry for the Environment review the part of the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 that allows for manual data collection and annual data provision, and work with councils that have oversight of water metering, to ensure that people and organisations holding water permits regularly submit accurate data using automated processes” <https://www.oag.govt.nz/2018/irrigation/our-recommendations>

Agree to consult on amending Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 to make real-time electronic provision of water use data directly to councils mandatory.

YES / NO / DISCUSS

Additional advice

73. Good quality, timely water take data has a wide range of uses. Primarily, it helps manage an increasingly scarce resource as water demand rises from agricultural and municipal users.
74. In addition, real-time water use data allows for:
- a. bolstered compliance, monitoring and engagement by enabling real-time compliance monitoring of water users;
 - b. better NPSFM implementation, most notably for the setting of resource use limits and water use restriction policies in regional plans, and for freshwater quantity accounting;
 - c. significantly improved water use data for regional and national policy development and environmental reporting;
 - d. future policy options for water management to be tested further, such as water charges, water management groups and water trading; and
 - e. a more effective farm environment plan regime for both the farmer, who would be able to show real time water use records and accurately demonstrate efficiency, and for auditors or certifiers, who would be able to have confidence in water use records.
75. We are assessing the costs to councils and water users as part of our Regulatory Impact Assessment. At this stage, we estimate that up to 14,000 water consents could be impacted by these changes, at a cost of \$600-\$1800 per telemetry unit. Ongoing data transmission costs are currently \$20-\$30 a month over the cellular network.
76. The major risk to be managed are the costs to water users with insufficient cellular coverage, and costs to councils in having to directly manage live data feeds. As part of our work with Horizons, we are assessing the costs on water users where there is insufficient cellular coverage, and the costs of establishing and maintaining council data infrastructure to receive, store and analyse water use data over time.



Essential Freshwater 44: Seeking agreement to national direction proposals

Date Submitted:	18 April 2019	MFE Tracking #: 2019-B-05475	MPI Tracking #: B19-0187
Security Level	UNCLASSIFIED	MFE Priority:	Urgent

	Action sought:	Response by:
To Hon David Parker, Minister for the Environment	Agree to progress further work	26 April 2019
To Hon Damien O'Connor, Minister of Agriculture	Agree to progress further work	26 April 2019
To Hon Nanaia Mahuta, Associate Minister for the Environment	Agree to progress further work	26 April 2019

Actions for Minister's Office Staff	Return the signed report to MFE.
Number of appendices and attachments	Nil
Note any feedback on the quality of the report	

Ministry for the Environment contacts

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Essential Freshwater 44: Seeking agreement to national direction proposals

1. The purpose of this briefing is to seek your feedback on amendments to national direction under the Resource Management Act 1991 (RMA), aimed at stopping further degradation and loss of freshwater resources.
2. Subject to your feedback, officials will begin developing a Cabinet package seeking agreement to consult. The package will include a redrafted National Policy Statement for Freshwater Management (NPSFM), draft national environmental standard (NESFM), consultation material, regulatory impact statement and Cabinet paper.

This is the second of three briefings

3. You have already received the first briefing [Essential Freshwater 42]. It contained proposals to clarify or amend existing policies, which are likely to have marginal impacts compared to the status quo. These proposals largely relate to the NPSFM, and the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.
4. This is the second briefing, and focusses on proposals to introduce new policies, some of which are likely to have substantial impacts. We will provide you with a draft regulatory impact statement and talking points on these impacts to support you in the Cabinet process.
5. You will also receive a third briefing that will focus on regulating on-farm practices and intensification (also to be provided by 18 April 2019), with proposals largely relating to the NESFM.

How this briefing is structured

6. This briefing is structured as a series of short papers on discrete but interrelated topics, each setting out the problem being addressed and seeking feedback on specific proposals to do this.

Recommendations are included within each section, indicated by the green boxes.

7. Advice relating to each topic can be found on the following pages:
 - a. Value-based direction and support for planning (NPSFM):
 - i. Te Mana o te Wai – page 6
 - ii. Maori values for freshwater system health and Mātauranga Māori – page 8
 - iii. Providing for all aspects of ecosystem health – page 10
 - iv. Including a threatened species value – page 12
 - b. Restrictions on specific resource uses threatening ecosystem health (NPSFM and NESFM):
 - i. Preventing further loss of streams – page 14
 - ii. Preventing further loss and degradation of wetlands – page 16
 - iii. Providing for fish passage – page 19
 - c. Attributes and direction to manage specific pressures through planning (NPSFM):
 - i. Setting freshwater objectives and limits for flows and levels – page 23
 - ii. Wider application of the dissolved oxygen attribute – page 25
 - iii. Managing nutrients – page 27

- iv. Managing sediment – page 28
- v. Higher water quality for swimming – page 31
- d. Monitoring and direction to respond to change through planning (NPSFM):
 - i. Reporting on ecosystem health – page 34
 - ii. Monitoring and responding to metrics for ecosystem health – page 36
- e. Improving integration of planning (NPSFM):
 - i. Direction to territorial authorities to support integrated management – page 37

The Essential Freshwater package is working towards healthy freshwater, fairly allocated

8. Te Mana o te Wai is the first objective of the NPSFM. How this is reflected in the future freshwater management system is discussed in detail in the following section.
9. Our overall objectives for the Essential Freshwater package are to:
 - a. improve New Zealand's freshwater management system so that it promotes healthy freshwater ecosystems
 - b. improve our land use to support a productive and sustainable economy; and
 - c. support a just transition to a lower emissions economy.
10. The drive toward healthy water and sustainable production is driven by society's collective expectations, improving scientific knowledge, technological change, consumer preferences, and progressive businesses taking action. The Government can play a crucial role in proactively supporting and managing this process of change. Recognising this crucial role, the approach to freshwater management should:
 - a. provide for the health of freshwater ecosystems for current and future generations
 - b. ensure water quality promotes the health and wellbeing of individuals and communities
 - c. support efficient and effective functioning of rural and urban economies and communities
 - d. maintain flexibility in decision making to respond to local communities' values, and future technological and scientific change
 - e. provide certainty on the direction and extent of change required to support well-informed investment and land use decisions
 - f. share the impacts and costs of change equitably between sectors, communities and current and future land users
 - g. avoid a proliferation of different rules, approaches and bureaucracy across the country, while recognising that local decision-making is important when responding to local conditions
 - h. support New Zealand's economic security and prosperity, especially in the regions, by front-footing change and having a great story to tell to our customers around the world
 - i. be collaborative, working with business, Maori, local Government, sectors and communities; and
 - j. ensure costs of implementation, administration and compliance are fair and reasonable.

11. To achieve these objectives the Essential Freshwater package includes:
- a. New regulatory interventions focused on immediately halting declining water quality by directly regulating activities we know are polluting water and damaging ecosystem health (e.g. intensive winter grazing, draining wetlands).
 - b. Whole-of-government investment including: supporting on the ground action in critical catchments to demonstrate the value of community-led activity in improving water quality; supporting land owners to build the skills, knowledge and confidence to make change; and investment to accelerate change through initiative like One Billion Trees, restoring freshwater ecosystems and expanding wetlands.
 - c. Stronger and faster regulatory and decision making processes to get regional plans that manage all aspects of ecosystem health in place faster.
 - d. Discussion on an enduring, fair and efficient allocation system for the future.
12. Proposals in this briefing focus on (a) above, and will help support existing provisions around Te Mana o te Wai in the NPSFM. They will focus regional planning on providing for the needs of the water first, enabling broader components of freshwater health to be managed and cared for, as well as adopting a holistic and integrated approach to freshwater management. We acknowledge that proposals to better provide for ecosystem health are not sufficient, on their own, for Te Mana o te Wai, as they largely focus on biophysical aspects. Upholding Te Mana o te Wai in freshwater management also relies on support from other components of the *Essential Freshwater* work programme, such as enabling Mātauranga Māori to be reflected and enabling a wider range of values to freshwater to be incorporated.
- Discussion on an enduring, fair and efficient allocation system for the future Additional information can be provided as needed*
13. Please indicate if the level of information contained is insufficient to make decisions. The format of this advice is brief, and we can provide additional information. We plan to meet with you on 30 April to discuss proposals in more detail if needed.
14. You can also make further changes when considering the draft Cabinet package and impact analysis prior to consultation. We expect to have drafts prepared by mid-May.
- Advisory groups and stakeholder input*
15. Proposals in this briefing have been developed with varying levels of input from the Essential Freshwater advisory groups.
16. At minimum, all proposals have been tested with the Freshwater Leaders Group (FLG), and their responses have been factored into our advice. We understand the FLG is preparing its own advice for Ministers, and this will provide detailed feedback on all proposals. This briefing has been shared with the FLG to enable them to do this.
17. The Science and Technical Advisory Group (STAG) has provided technical input on all proposals to better provide for ecosystem health (eg, new attributes, fish passage, etc). This has shaped proposals, and will continue to inform detailed drafting.
18. We have discussed all proposals with Kahui Wai Māori to various levels of detail. We understand they are focussing their efforts on areas of overlap with their own work programme. They have indicated they will review all proposals and provide their views to you directly.
19. Unless it is critical for the advice, this briefing does not the present the feedback or views of the FLG and Kahui Wai Māori.
20. We have also tested proposals with the Regional Sector Advisory Group.

Signatures

Martin Workman
Director, Ministry for the Environment

Hon David Parker
Minister for the Environment

Date

Hon Damien O'Connor
Minister of Agriculture

Date

Hon Nanaia Mahuta
Associate Minister for the Environment

Date

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Te Mana o te Wai in the NPSFM

Problem: Decision-making has focussed on providing for economic uses. Requirements for Te Mana o te Wai in the NPSFM are unclear

21. The state of freshwater across New Zealand is in serious decline, and current local government practice has not achieved the sustainable management of our freshwater resource. Regional council decision-making has focussed too much on providing for economic uses, and this is happening at the expense of the environment.
22. The NPSFM requires councils to consider and recognise Te Mana o te Wai, but there is ambiguity around expectations in practice from regional councils, iwi and communities.
23. There is an opportunity to clarify the process in the NPSFM for councils to give effect to Te Mana o te Wai, and to make the NPSFM more directive about the needs for councils to provide for the needs of the water first in order to sustainably provide for people and future generations.

Options: maintain status quo, clarify Te Mana o te Wai in the NPSFM, or strengthen direction for Te Mana o te Wai in the NPSFM

24. In collaboration with Kahui Wai Māori, and building on previous work of the Iwi Leaders Group (ILG), we have redeveloped the way Te Mana o te Wai as a concept is explained and applied within the NPSFM. Te Mana o te Wai is a framework comprising five underpinning elements: ensuring a values-based approach to freshwater care; enabling different systems of knowledge for freshwater care (such as Mātauranga Māori) and wider aspects of water health to be cared for; adopting a holistic and integrated approach to freshwater management; protecting and sustainably managing the needs of the water first; and, recognising Te Tiriti o Waitangi as the appropriate foundation for Te Mana o te Wai (which we understand to mean recognising the role of local tangata whenua in upholding Te Mana o te Wai and protecting freshwater taonga).
25. We are exploring three options for Te Mana o te Wai in freshwater management:
 - a. Maintain the status quo for Te Mana o te Wai in the NPSFM.
 - b. Clarify how regional councils are expected to 'consider and recognise' Te Mana o te Wai in freshwater management in the NPSFM.
 - c. Direct councils to implement Te Mana o te Wai in the NPSFM.
26. Regardless of the chosen option, we intend to develop new guidance for how Te Mana o te Wai is to be given effect to in freshwater management.
27. While we collaborated with Kahui Wai Māori on developing options for this work, this briefing and final options have not been reviewed by Kahui Wai Māori because of time constraints. We will continue working on finalising option three and provide you with more detailed information shortly. This section has not been reviewed by Te Puni Kōkiri, Te Arawhiti, Ministry for Primary Industries, or the Department of Conservation. We intend to work with these agencies for the next steps. At this stage, we seek your agreement on a way forward.

Option One: Maintain the status quo in the NPSFM

28. Maintaining the status quo will rely on the existing NPSFM and proposed changes through the Essential Freshwater package to give effect to Te Mana o te Wai.
29. Many of the proposals of the Essential Freshwater and existing requirements in the NPSFM are focused on ways to stop further degradation and reversing past damage of freshwater health. Notwithstanding other changes proposed to the NPSFM, the NPSFM will continue directing regional councils to work with their communities, including tangata whenua, to identify values for local water bodies. The NPSFM will also continue to require councils to

manage freshwater in a way that provides for the identified values, including mahinga kai and mauri. We have also prepared proposals for Essential Freshwater to direct regional councils to manage broader aspects of freshwater health, such as wider components of ecosystem health, and to enable Mātauranga Māori to be reflected in freshwater management.

30. Despite these recommended changes to the NPSFM, we do not believe they would be sufficient to address the problems identified with the direction for Te Mana o te Wai.

Option Two: Clarify how regional councils are expected to recognise and consider Te Mana o te Wai in the NPSFM

31. Currently, the first objective of the NPSFM requires regional councils to 'consider and recognise' Te Mana o te Wai in freshwater management. This is a bespoke legal test designed for the NPSFM in 2017 to enable greater flexibility for councils in implementing the objective and policy for Te Mana o te Wai and applying Te Mana o te Wai in implementing other objectives and policies in the NPSFM. However, flexibility also creates ambiguity, as councils are unclear exactly how they need to consider and recognise Te Mana o te Wai as a concept when giving effect to the rest of the NPSFM. This is not simply the fault of a legal test that allows flexibility, it is the result of an overall lack of integration of the Te Mana o te Wai concept throughout the NPSFM.

32. Therefore, this option would be a step to re-set the entire NPSFM framework and build it around Te Mana o te Wai, instead of putting Te Mana o te Wai as an overlay to an existing framework. To achieve this, option two comprises three parts:

- a. Including a non-regulatory 'key concepts section' to clarify Te Mana o te Wai conceptually and in the context of freshwater management.
- b. Providing clearer supporting policies for recognising and considering Te Mana o te Wai.
- c. Directing a process regional councils must follow as part of the overall NPSFM objective and limit setting process (ie, the national objectives framework).

33. In practice, parts (a) and (b) above would be effective in clarifying intent, but would not add new requirements. Supporting policies would clarify that to consider and recognise Te Mana o te Wai, regional councils must consider and recognise, for instance, values held by communities and tangata whenua, the role of mana whenua in upholding Te Mana o te Wai, and to protect the needs of the water first. Whether Te Mana o te Wai is visible in their regional policy statements or regional plans would be at the discretion of regional councils, although they would be expected to be able to demonstrate that Te Mana o te Wai as it applies in their regions had been recognised in their planning, and considered when the council has chosen objectives, policies and rules for their regional freshwater management approaches.

34. The process in part (c) above would direct a framework for upholding Te Mana o te Wai in practice. It would add clarity and reduce uncertainty and costs for councils. This process would be similar to the national objectives framework in the NPSFM, but would build on the requirements to set freshwater objectives and limits to ensure the needs of the water come first. This may result in more environmentally conservative limits and objectives for protecting these values.

35. We consider this option to be the minimum intervention needed to uphold Te Mana o te Wai.

Option Three: Further direct regional councils to implement Te Mana o te Wai

36. This option would be in addition to Option Two above (if you choose to progress it). It would require regional councils to 'give effect to' or 'provide for' Te Mana o te Wai as the decision-

making framework for freshwater management. This is in contrast to the current requirement to 'recognise and consider'. The change implies a specific outcome is required rather than simply considering the matter. In practice, a regional council would need to demonstrate how they 'gave effect to', or 'provided for', Te Mana o te Wai in the plan.

37. The impacts of this option are currently uncertain because it relies on local values for water. While values identified through Te Mana o te Wai could not result in more lenient limits set elsewhere, Te Mana o te Wai may result in limits that provide stronger protection to the water. This option would provide further legitimacy to a concept which is highly regarded or inherent to many Māori, and direct an approach to freshwater management based on protecting and caring for the needs of the water.
38. It is possible that this option may, however, increase the risks to councils of litigation if communities and tangata whenua debate the extent to which the mana of the water has been upheld. This risk may be reduced with clearer direction.
39. The above options have complex and interacting legal, substantive (in terms of limit setting) and Crown/Maori relationship implications. We need to explore all options further, and recommend discussing them with you in more detail at the next opportunity.

Discuss all options to provide further direction to regional councils on implementing Te Mana o te Wai.

YES / NO / DISCUSS

Māori values for freshwater system health and Mātauranga Māori in the NPSFM

Problem: Māori values and measures for freshwater health, and Mātauranga Māori are not adequately reflected or incorporated into planning or decision-making, limiting the ability of Māori to participate effectively in freshwater management

40. Overall Māori values and measures for freshwater system health and Mātauranga Māori are not always adequately reflected or incorporated by councils into freshwater management planning or decision-making processes. This hinders the ability of Māori to participate, which is contrary to Part D of the NPSFM, Te Mana o te Wai and broader RMA matters (because the recognition of values is critical to recognising and providing for Māori relationships with the environment). Key factors causing this overall problem are the lack of strong requirements on councils to ensure implementation, and councils having an unclear or limited understanding about how to reflect and incorporate Māori values, measures and Mātauranga Māori. There is also a significant lack of resourcing, guidance and central government support to articulate clear process requirements.
41. Further problems with the status quo are:
 - a. Councils invest in biophysical health monitoring to a much greater extent than broader measures of freshwater system health, despite broader measures being important.
 - b. The NPSFM does not explain the role of Mātauranga Māori overall in informing planning, decision-making or implementation. Navigating how to incorporate Mātauranga Māori into planning documents is difficult for both councils and Māori.
 - c. There is often confusion regarding roles and responsibilities, and processes for Māori engagement and participation in freshwater management.
 - d. There is little guidance to support the implementation of existing provisions relating to Māori values, or Mātauranga Māori monitoring.

- e. There are some examples of good practice in collaborative relationship models between councils and iwi and hapū in freshwater management, however good practice is not widespread.

Proposals

42. Officials have been working with the Kāhui Wai Māori to identify options to facilitate more effective incorporation of Māori values and measures of freshwater system health and Mātauranga Māori into freshwater planning and decision-making.
43. Our recommended policy approach is to amend the NPSFM to:
- Recognise the application of both Mātauranga Māori and biophysical science to all aspects of freshwater management by incorporating reference to it in the descriptor of Te Mana o te Wai and Part D of the NPSFM. This would extend the existing provisions for Mātauranga Māori in the monitoring section of the NPSFM, to being relevant to all aspects of freshwater management and planning.
 - Support the appropriate incorporation of Mātauranga Māori in planning and decision-making, alongside the biophysical science.
 - Provide further direction on how councils can include Māori values into freshwater management, planning and decision-making, consistent with Te Mana o te Wai.
 - Provide direction to councils and to support iwi and hapū to lead the development of Mātauranga Māori based tools/frameworks to develop, identify, prioritise, measure and implement freshwater management values and measures of health held by tangata whenua.
44. Longer term, a compulsory value that is consistent with Te Mana o te Wai and of relevance to Māori can be developed. The Kāhui have identified this as a key recommendation across the entire Essential Freshwater package. A compulsory value would create the appropriate level of obligation on councils, and provide impetus to work towards implementing the other recommendations in this paper. This option will be longer-term.

Agree to progress work on amending the NPSFM, to clarifying existing requirements and the role of Mātauranga Māori, and support implementation.

YES / NO / DISCUSS

Additional advice

45. This briefing reflects the Ministry's advice. Due to timing constraints the Kāhui have not reviewed the final options in this briefing.
46. The Department of Conservation, Ministry for Primary Industries, Te Puni Kōkiri, and Te Arawhiti have not reviewed this paper. We will engage with these agencies as we develop these policy proposals further.
47. Recognition of Mātauranga Māori across all aspects of freshwater management is critical to facilitating Māori participation. Māori values are holistic measures of freshwater system health and are informed by a paradigm that includes Mātauranga Māori, and this will benefit freshwater management.
48. There will be some costs on councils to upskill in order to incorporate Mātauranga Māori and Māori values more effectively. We will provide you with more details on the impacts in the regulatory impact statement.
49. Māori lack capacity to engage in resource management processes. s 9(2)(f)(iv)

s 9(2)(f)(iv)

Providing for all aspects of ecosystem health in the NPSFM

Problem: The NPSFM focuses on water quality and quantity when managing ecosystem health – to the exclusion of other factors that are necessary to provide for it

50. The management focus in the NPSFM has tended to be narrow, concentrating on water quality and quantity. It is not clear from the existing description of the ecosystem health value that freshwater ecosystems also depend on aquatic life, habitat and ecological processes.
51. In 2018, a Biophysical Ecosystem Health Framework¹ was prepared for the Ministry for the Environment by a multidisciplinary team of freshwater scientists to help practitioners understand biophysical ecosystem health overall [Essential Freshwater 31]. The framework has five core components: aquatic life, physical habitat, water quality, water quantity, and ecological processes. The STAG have endorsed the Framework.
52. There is now an opportunity to implement the framework by clarifying the description of the ecosystem health value, which currently reads:

“Ecosystem health – The freshwater management unit supports a healthy ecosystem appropriate to that freshwater body type (river, lake, wetland, or aquifer).

In a healthy freshwater ecosystem ecological processes are maintained, there is a range and diversity of indigenous flora and fauna, and there is resilience to change.

Matters to take into account for a healthy freshwater ecosystem include the management of adverse effects on flora and fauna of contaminants, changes in freshwater chemistry, excessive nutrients, algal blooms, high sediment levels, high temperatures, low oxygen, invasive species and changes in flow regime. Other matters to take into account include the essential habitat needs of flora and fauna and the connections between water bodies.”

Proposals: Amend the description of the ecosystem health value in the NPSFM, to include all aspects that need to be managed

53. We recommend amending the existing description of ecosystem health in the NPSFM, to clarify that:
- There are five specific components to ecosystem health that must all be managed: aquatic life, water quality, water quantity, habitat, and ecological processes.
 - The ecosystem needs to be managed in a way that is appropriate for the ecosystem type.
 - A healthy ecosystem is one that is appropriate to that type of freshwater body, when it is in a minimally disturbed condition. This avoids the possible interpretation that degraded or altered water bodies have ecosystems that are ‘appropriate’ to that state of degradation.
 - Councils need to account for a wide range of stressors and pressures that affect ecosystem health. If a wide range of examples is not provided, there is concern that the focus may be inappropriately narrow.

54. A draft description has been developed with the STAG as follows (note this description is indicative only, and is still subject to drafting and legal advice):

Ecosystem health – The extent to which a freshwater management unit supports an ecosystem appropriate to that freshwater body type (river, lake, wetland, or aquifer).

¹ <http://www.mfe.govt.nz/publications/fresh-water/freshwater-biophysical-ecosystem-health-framework>

“Five biophysical components contribute to freshwater ecosystem health, which are all necessary to manage:

Water quality – *the physical and chemical measures of the water, such as temperature, dissolved oxygen, pH, suspended sediment, nutrients and toxicants.*

Water quantity – *the extent and variability in the level or flow of water.*

Habitat – *the physical form, structure and extent of the waterbody, its bed, banks and margins, riparian vegetation and connections to the floodplain.*

Aquatic life – *the abundance and diversity of biota including microbes, invertebrates, plants, fish and birds.*

Ecological processes – *the interactions among biota and their physical and chemical environment such as primary production, decomposition, nutrient cycling and trophic connectivity.*

In a healthy freshwater ecosystem, water quality, quantity, habitat and processes are suitable to sustain appropriate indigenous aquatic life, as would be found in a minimally disturbed condition (before providing for other values).

Matters to take into account for a healthy freshwater ecosystem include the management of adverse effects on flora and fauna, the presence of toxicants, excessive nutrients, altered sediment levels, temperatures, pH, oxygen, algal blooms, invasive species, harvesting, altered riparian vegetation and changes in flow regime. Other matters to take into account include the essential habitat needs of flora and fauna and the connections between water bodies.

55. We also recommend amending Objectives A1 and B1 to safeguard “freshwater ecosystem health, its constituent components, and indigenous species”, rather than current references to “life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of freshwater”.
56. While the current wording reflects the purpose of the RMA, this does not materially add to national direction on freshwater management. At the same time, we consider the existing objectives refer to some (but not all) aspects of ecosystem health, and this is unintentional and potentially confusing – it predates the introduction of the national objectives framework and the ecosystem health value description, and did not benefit from the new ecosystem health framework and our improved understanding of components that must be managed.

Agree to progress work on amending the NPSFM, to ensure that the ecosystem health value description covers all aspects that need to be managed, and reflect this in Objectives A1 and B1.

YES / NO / DISCUSS

Additional advice

57. While the amended description does not change the intended meaning of the existing description, it does make that intention clearer. Feedback from advisory groups has been mixed – while some members approved, others expressed concern over the reference to “minimally disturbed condition” in the indicative drafting above.
58. We do not recommend removing the reference to “minimally disturbed condition” because:
 - a. To support Te Mana o te Wai, the first obligation is to the needs of the water body, and this must be provided for before providing for other values. In other words, when deciding on freshwater management objectives for the waterbody, councils must first decide the share that goes to the waterbody.

- b. It offers transparency and objectivity about the trade-offs being made in providing for all the other values. The role of the twelve other national values is to express objectives for the environment in terms of providing for human values. Use of a state other than minimally disturbed confounds this transparency.
 - c. It avoids the possible interpretation that degraded water bodies have ecosystems that are 'appropriate' to that state of degradation. The concept avoids the problem of shifting baselines, and applies regardless of the biophysical component being measured.
 - d. It compares with the wording of intrinsic values described in the proposed NPSFM, as reported back by the Board of Inquiry in 2010. Intrinsic values were not to be subordinate to economic values for people and communities wellbeing. Intrinsic values relating to ecosystem health included:
 - i. The natural form, character, functioning and natural processes of water bodies and margins, including natural flows, velocities, levels, variability and connections.
 - ii. The natural conditions of freshwater, free from biological or chemical alterations resulting from human activity, so that it is fit for all aspects of its intrinsic values.
 - iii. Healthy ecosystem processes functioning naturally.
 - iv. Healthy ecosystems supporting the diversity of indigenous species in sustainable populations.
 - v. The interdependency of the elements of the freshwater cycle.
59. The weight of direction in the NPSFM and NESFM still focusses disproportionately on water quality, quantity, and now to some extent habitat. Over the longer term, an increased focus on aquatic life and ecosystem processes is desirable to ensure national direction provides for ecosystem health.

Including a threatened species value in the NPSFM

Problem: The NPSFM does not adequately protect threatened indigenous species

- 60. The NPSFM directs regional councils to manage freshwater for "ecosystem health" at the freshwater management unit scale. A freshwater management unit may be a water body or multiple water bodies (including both groundwater and surface water), or part of a water body. Regional plans must also include measures to safeguard indigenous species and their associated ecosystems.
- 61. Three quarters of New Zealand's native freshwater fish species are threatened or declining. The widespread migratory species, such as koaro and inanga, appear to be declining in both abundance and distribution. Fish habitat, including areas where populations are surviving in poor habitat, such as farm drains and urban streams, is not always identified and managed. While managing a freshwater management unit to a particular water quality or water quantity may achieve ecosystem health generally, it may not necessarily provide for the needs of fish populations, or populations of other species, that may be threatened in that unit.
- 62. Managing freshwater for ecosystem health is not sufficient to safeguard freshwater indigenous species and their associated ecosystems because of their specific habitat needs and current distribution. While sport fish such as trout and salmon receive some recognition through the existing fishing value in the NPSFM, there is no comparable value for threatened indigenous species.

63. While fish are the most high profile examples of threatened species, there are also other flora and fauna in decline.

Proposals: Introduce a new national value for threatened species in the NPSFM

64. We recommend including a new national value in the NPSFM, to ensure regional planning identifies and manages for threatened species. For example (drafting is indicative only):

- a. **Threatened species** – specified areas in the freshwater management unit support a population of indigenous freshwater species that are threatened or in decline nationally. The aquatic habitat, water quality, and flows or water levels in the freshwater management unit support the presence and survival of the identified species, and may include specialised habitat or conditions needed for only part of their life-cycle.

Threatened species are taxa that meet the criteria specified by Townsend et al. (2008) for the categories Nationally Critical, Nationally Endangered and Nationally Vulnerable.

65. Including a value for threatened species in the NPSFM means that regional councils will be required to consider whether the value applies to any area of any freshwater management unit in their region, and if so, set freshwater objectives to provide for it. It is intended that the threatened species value will complement the existing value for fishing, not replace it.

<p>Agree to progress work on amendments to the NPSFM, to include a new national value for threatened species.</p>	<p>YES / NO / DISCUSS</p>
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Additional advice

66. Our recommendation takes into account the views of the advisory groups and Department of Conservation officials.

67. Areas where threatened species are identified as a value may overlap with areas identified for other values, including "fishing", where the freshwater management supports fisheries of species such as trout and salmon. In that case, councils will need to resolve the management needs of all species.

68. The value description needs sufficient detail for councils and communities to decide whether or not it applies, and guide what sort of objectives and methods they want to set to provide for the value.

69. s 9(2)(f)(iv) [Redacted]

70. Adding a value for threatened species is consistent with the 'rarity' criteria described by the Biodiversity Collaborative Group in their report to ministers in 2018 as including 'threatened' and 'at risk' (including 'naturally uncommon') species using publications (for plants, mammals, birds, and reptiles) prepared and regularly updated by the Department of Conservation.

71. Out of Scope [Redacted]

Released under the Official Information Act 1982

72. The main impacts of including a new value of threatened species in the NPSFM will be on instream users, for example, flood protection works. We will obtain information from regional councils about the kinds of mitigation practices flood protection works currently carry out (eg, not working in some seasons, removing fish, maintaining channel forms) but there are unlikely to be any costings for those impacts. There are unlikely to be any impacts required for improvements in water quality or water quantity beyond what is currently required or will be required by the other parts of the package.

Preventing further loss of streams in the NPSFM and NESFM

Problem: Cumulative loss of habitat, particularly in small streams, is adversely affecting freshwater ecosystems

73. Habitat loss in streams and rivers happens because the:

- a. cumulative effect on aquatic ecosystems of multiple instances of piping or reclaiming stream or river beds is not adequately recognised
- b. ecology of rivers and streams (particularly small contributing waters) is undervalued when compared to the economic value of maximising profits from developments and transporting runoff from rainfall as quickly as possible; and
- c. effects of piping or infilling a stream in one location are often not adequately offset by common compensation approaches, such as riparian planting, in another location.

74. Urban centres in New Zealand have less than 10% indigenous vegetation cover remaining.² In these modified environments, rivers and streams often represent one of the last refuges for biodiversity. However, urban streams have been piped, straightened and channelised to a large extent. Rural streams are also at risk of modification through diversion and piping. This is continuing, resulting in continuing habitat loss for aquatic animals and plants.

75. Greenfield development can result in stream loss through piping and infilling to increase the amount of useable land, and can increase impervious surfaces like roads and roofs. 'Urban stream syndrome' is when piping cuts off the stream from its surroundings and interrupts natural functions and processes. The range of species that can live in the piped stream is reduced, as is food availability (macroinvertebrates and leaf litter), and fish passage up or downstream. Piping streams also affects the flow patterns in their downstream sections. Diverting or relocating streams is less damaging than piping but can result in a net loss of habitat, particularly when streams are straightened.

Proposals: Introduce measures to avoid and minimise habitat loss through a combination of the NPSFM and NESFM

76. We recommend restricting piping, infilling and permanent diversions of rivers through a combination of activity status and consenting requirements.³

² Clarkson, Bruce & L Kirby, Catherine & Wallace, Kiri. (2018). Restoration targets for biodiversity depleted environments in New Zealand.

³ Note we propose to use the RMA definition of a river in this policy; the RMA does not specifically define a stream although it captured by the definition of a river. A 'river' is defined in the RMA as "a continually or intermittently flowing body of freshwater; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation or farm drainage canal)".

- a. Non-complying activity – “significant loss of habitat” (piping or reclaiming the bed of a lake, or any river, where the piping or reclamation is greater than 20 m in length, or permanently diverting any river that results in a net loss of river length).
- b. Discretionary activity – any other piping, reclamation or diversion of a river.

Agree to progress work on a proposed NESFM, to restrict piping, infilling and permanent diversions of rivers that results in a net loss of river length.

YES / NO / DISCUSS

77. We also recommend amending the NPSFM to introduce policy direction on:

- a. the circumstances in which councils should:
 - i. require offsetting of a particular adverse effect where the effect cannot be avoided, remedied, or mitigated, and require compensation where offsetting is not possible
 - ii. give special consideration when considering a resource consent application to pipe or reclaim a river bed, or permanently divert a river, causing significant loss of habitat (to be inserted directly in regional plans using section 55 of the RMA); and
- b. collecting and reporting on information from new resource consents on gains and losses in river habitat from each consent, and the causes of the gains and losses (eg, as part of existing accounting requirements).

Agree to progress work on amending the NPSFM, to provide policy direction aimed at better managing and minimising habitat loss.

YES / NO / DISCUSS

78. To support the above national direction, we intend to review the Stream Ecological Valuation⁴ (SEV) technique and prepare new technical guidance about calculating the amount of mitigation or offsetting required to compensate the adverse effects of human activities on rivers and streams.

Additional advice

- 79. These proposals are consistent with recommendations made by the Biodiversity Collaborative Group to maintain certain ecological attributes, for example, species occupancy across their natural range. The proposals will also complement work in the urban package to promote quality urban design.
- 80. The reporting requirement would also complement the accounting requirements for water quality and water quantity already required by the NPSFM.
- 81. We anticipate these proposals will have limited impact on rural land uses. Specific planning restrictions would also provide greater certainty to farmers about how to undertake future farm development. However, preventing urban stream loss is likely to have some impact on the economic feasibility of new urban developments and benefits to wider communities.

⁴ The SEV technique is the most widely used technique to determine the effects of stream habitat loss and the necessary measures to mitigate, remedy or offset that loss. It does not account for non-ecological values of stream habitats (such as cultural values, amenity or natural character), and does not take into account the rarity of species in the habitat.

82. A case study in the Greater Wellington region indicates that protecting urban streams from piping and reclamation would be likely to reduce the number and/or the size of lots available in a new urban development, which can reduce income for developers. The case study found that increased costs to developers would be partly offset by reduced earthworks costs and increased values of properties close to streams, but could still be substantial (around \$26,700 per 500m² section). Costs to developers may be able to be reduced through the way urban developments are designed.
83. Protecting urban streams from loss has a range of social, cultural and environmental benefits including increased public awareness of urban stream ecosystems, corridors for cycling, walking, and traffic-free routes, improved water quality and habitat, reduced run-off velocities through natural stream channels, retention of fish passage and wildlife movement. These benefits are largely experienced by the whole community, rather than developers or house purchasers, and can be difficult to quantify. Using the cost of restoring a piped stream as a proxy for the ecosystem services provided, the Greater Wellington Regional Council study found around a 31 per cent probability that social benefits to the community would outweigh the lost income of the developer.
84. The cost to developers suggests that market forces on their own would be unlikely to provide sufficient incentive to protect urban streams. It also suggests that regulation that strongly discouraged stream loss, but didn't prohibit it entirely, would be appropriate.

Preventing further loss and degradation of wetlands in the NPSFM and NESFM

Problem: The extensive historic and ongoing loss and degradation of New Zealand's wetlands has resulted in the loss of unique biodiversity and ecosystem services.

85. Today less than 10% of New Zealand's original wetlands remain. Recent studies have shown that contemporary loss and degradation continues despite national direction encouraging their protection.
86. The NPSFM directs regional councils to "protect the significant values of wetlands" for both water quality and water quantity. NPSFM policies include having regard to the adverse effects of discharges and the taking, damming, diverting of freshwater or draining wetlands on life supporting capacity of freshwater and associated ecosystems.
87. The problem with the status quo can be summarised as:
- a. The NPSFM objectives are unclear and ill-defined with many councils focusing on what they have defined as significant wetlands only, and often limited to a subset of wetlands.
 - b. The NPSFM policies are relatively weak and relate to only a few activities that affect wetlands.
 - c. Regional councils give highly variable levels of protection to wetlands in their plans and they have varying capacity for monitoring, compliance and enforcement.

Proposals: Introduce measures to avoid wetland loss and degradation through a combination of the NPSFM and NESFM

88. We recommend amending the NPSFM to:
- a. include a clear objective to protect wetlands from loss and degradation
 - b. provide directive policies on avoiding the loss or degradation of the extent, function, values, or quality of any natural wetland; and
 - c. include other policies to help manage wetlands, for example:

- i. require wetland identification, providing a standard method to define and delineate wetlands for cases of uncertainty or dispute
- ii. provide for activities necessary to allow for the intended purpose of artificial wetlands to be met, and the sensitive management for significant indigenous biodiversity and other values that may establish in these artificial wetlands where possible
- iii. require wetland health monitoring
- iv. promote enhancement and restoration to improve wetland functions and values (other than indigenous biodiversity).

Agree to progress work on amending the NPSFM, to include national direction on avoiding wetland loss and degradation.

YES / NO / DISCUSS

89. We also recommend regulating the most destructive activities through the proposed NESFM. In particular, we propose prohibited or non-complying activity status for these activities in the first instance, while some form of exception or allowing regional councils to be more lenient may be appropriate in specified circumstances.⁵ These activities include:

- a. drainage
- b. alterations of wetland water levels through damming, diversion, and water takes
- c. reclamation or disturbance of the bed; and
- d. clearance of indigenous vegetation

90. Stock access to wetlands will be addressed through proposals to regulate on-farm activities [Essential Freshwater 45].

91. The above restrictions represent a 'no loss' approach to preserving natural wetlands regardless of the wetland's ecological state because: critically few remain; it is difficult to recreate the function and value of lost wetlands; and wetlands that appear degraded often retain some level of value and ecosystem services.

92. This approach is very restrictive, and potentially in conflict with other government priorities eg, nationally significant infrastructure and renewable electricity generation. Therefore, we recommend a 'net gain' offsetting approach be allowed for nationally significant infrastructure and some form of exception for water level changes and operational requirements for wetlands associated with existing hydro-generation schemes.

93. Similarly, proposals are not intended to inhibit activities necessary for wetland restoration and enhancement, gathering of traditional materials and kai, conducting cultural ceremonies, and an appropriate level of recreation and education in the wetland (ie, boardwalks, bird watching and/or hunting).

Agree to progress work on a proposed NESFM, to restrict specific activities contributing to wetland loss and degradation, while providing for nationally significant infrastructure, renewable energy, and restoration activities.

YES / NO / DISCUSS

⁵ This is a similar approach to the NES on Air Quality.

94. The above proposals would apply to natural inland wetlands only⁶. This does not include geothermal wetlands and tidally influenced coastal wetlands because:
- geothermal systems are complex and dynamic, and it does not make sense to separate the aquatic from terrestrial components; more work is required to identify better suited options [2019-B-005482]; also geothermal waters are not freshwaters under the RMA so they are not in scope of NPSFM provisions
 - coastal wetlands are managed under the New Zealand Coastal Policy Statement; time and resource constraints prevent policy and impact analyses of NES rules to include these environments.
95. All proposals are based on a common definition of natural wetlands, which is: permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions but not including wet pasture, or where water temporarily ponds after rain or pasture containing patches of rushes.⁷

Additional advice

96. s 9(2)(f)(iv)

Wetland policy intent within the NPSFM and NESFM, and the BCG's draft NPSFM is closely aligned. Most policies recommended by the BCG should be included within the NPSFM because:

- NPSFM policies will be more stringent with a no loss approach for all natural wetlands (regardless of their ecological state and without the need to assess significance on a case by case basis) and are further supported by NESFM rules.
- NPSFM policies cover a wider range of wetland values and indigenous biodiversity is a component of ecosystem health.

97. s 9(2)(f)(iv)

98. Prohibited status may be appropriate for some activities (eg, new wetland drainage) but we consider non-complying is appropriate as it leaves room for situations that we cannot anticipate or regulate for nationally, provided policies to protect wetlands and definitions of adverse effects are sufficiently clear. We do not think that 'no loss' approach is pragmatic for nationally significant infrastructure where government priorities clash, we would prefer a 'net gain' approach.

99. We consider regional council implementation and monitoring efforts will require additional support from central government. Assistance with mapping wetlands to a higher resolution, technical guidance on ecological risk associated with wetland water level variation, training

⁶ ie, lacustrine, riverine, palustrine, and inland saline wetlands. Councils and communities can choose to be more inclusive in the scope (ie, wetlands created for conservation purposes or other artificial wetlands that have value, or coastal wetlands).

⁷ This is the definition that LAWF agreed to in the 2017 Clean Water proposal for stock exclusion.

in methods for wetland identification and health monitoring, and other non-regulatory approaches and support are likely to be required, subject to budget availability.

100. Costs for this policy package would fall on councils in terms of plan changes and implementation, and land owners as opportunity costs for restricted activities and mitigation requirements. Substantial co-benefits from wetland protection and enhancing their ecosystem services will be felt throughout the wider catchments. Some of the costs and benefits may be unbalanced across landowners and the wider community and some regions. Those regions with the most unprotected wetlands⁸ remaining on fertile land include: Northland, Waikato, Horizons, West Coast, Canterbury, Otago, and Southland.
101. These proposals potentially conflict with the Plantation Forestry NES, which allows the disturbance of a wetland (including vegetation and bed) if the activity is harvesting and it does not adversely affect mudfish. We are working with Te Uru Rakau on the contents of their review of that NES, and how best to deal with this. There is also a potential conflict around rules for wetland sizes and activity setbacks in that NES.

Providing for fish passage in the NPSFM and NESFM

Problem: Barriers to fish passage reduce available habitat and negatively impact on freshwater ecosystems

102. At present, three quarters of indigenous fish species are considered under threat of extinction.⁹ Lost habitat connectivity is one contributor to a reduction in the abundance and distribution of valued freshwater species.
103. Around one third of New Zealand's native freshwater fish species need access to the sea, and both native and sports fish require access between and within freshwater habitats to complete their life cycles. Unless provided for by infrastructure design and maintenance, structures such as culverts, dams, and tide gates can delay or prevent fish movement and stop them from accessing critical habitats.
104. To understand the size of this problem, start to reverse the impact of instream structures on all our freshwater fish, and develop effective solutions, councils and infrastructure owners need to:
- a. know where existing structures are on our rivers, and how much they restrict fish movements; and
 - b. plan and design new structures, or prioritise and rehabilitate existing structures, so as to provide for habitat connectivity.
105. The NZ Fish Passage Advisory Group (formed in 2014) represents the various groups involved in fish passage management in NZ. The group has been developing, communicating, promoting, enhancing and advocating improved guidance and policy to support fish passage and connectivity of our waterways. There is now an opportunity for policy to drive implementation of good practice fish passage management, give effect to their NZ Fish Passage Guidelines for structures up to four metres high,¹⁰ and take advantage of the new Fish Passage Assessment Tool.¹¹

⁸ Non protected wetlands are outside PCL, QEII covenants, vested reserves and Nga Whenua Rahui.

⁹ Department of Conservation (2017). *Conservation status of New Zealand freshwater fishes*

¹⁰ <https://www.niwa.co.nz/sites/niwa.co.nz/files/NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf>

¹¹ <https://www.niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool>

Proposals: Direct regional councils to provide for fish passage, and manage new and existing structures for fish passage, through a combination of the NPSFM and NESFM

106. We recommend including the following policy direction through a combination of the NPSFM and NESFM (noting that the appropriate instrument is subject to legal and drafting advice):

- a. Require regional plans to describe objectives to provide for the diversity and abundance of fish within an FMU, water body, catchment, or sub-catchment. These objectives must:
 - i. Be sufficient for assessing the biological performance of structures necessary to achieve the objectives.
 - ii. Take into account any Freshwater Fisheries Management Plans and Sports Fish and Game Management Plans approved by the Minister of Conservation pursuant to the Conservation Act 1987.
 - iii. Where appropriate, safeguard key threatened and at-risk native fish and significant habitats which may benefit from natural or built barriers to exclude invasive fish.
- b. Require that the biological performance of *new structures* achieves the objectives, and ensure that:
 - i. When considering any application for an in-stream structure the consent authority must have regard to the following:
 1. The extent it achieves no greater natural impediment to fish movements than in adjacent stream reaches.
 2. The extent that it provides efficient and safe passage of all organisms and life stages with minimal delay, except where there are specific requirements to limit the movement of undesirable species in order to meet objectives.
 3. The extent it provides a diversity of physical and hydraulic conditions leading to a high diversity of passage opportunities for aquatic organisms.
 4. Biological performance necessary to achieve objectives for the foreseeable life of the structure (durability), and any proposed monitoring and maintenance plan to the extent necessary to achieve this.
 - ii. New culverts, weirs and fords less than four metres high meet minimum design standards (specific parts of Appendix G of the Guidelines), or otherwise demonstrate that their effects would be no more than minor.
 - iii. New passive tide and flood gates are strongly discouraged, in favour of structures that provide fish passage.¹² This could potentially be achieved by defining passive gates as non-complying activities through the NESFM.
- c. Require regional councils to collect and maintain records of fish passage performance for new and (known) existing structures. To help compile records, we propose setting conditions for permitted and consented activities that will require

¹² Passive tide gates are most common, and are typically closed during the incoming tide when most fish migrate upstream. More fish friendly active or self-regulating gate designs help to keep the gates open for longer during the incoming tide, allowing more fish to pass.

infrastructure owners to provide information directly to regional councils. This could be facilitated by the inclusion of structures in the national database.

- d. In giving effect to ecological objectives, require regional councils to establish methods for assessing biological performance, and prioritise and achieve mitigation of existing structures.

Agree to progress work on amendments to the NPSFM, and a proposed NESFM, to provide policy direction on fish passage.

YES / NO / DISCUSS

Additional advice

107. There are overlapping statutory responsibilities between consenting authorities under the Resource Management Act 1991, and fisheries managers under the Conservation Act 1987. In the latter, the Minister for Conservation may approve a Freshwater Fisheries Management Plan prepared by the Department of Conservation on a regional basis, and a Sports Fish and Game Management Plan prepared by Fish and Game. Our proposed policy would direct regional councils to create objectives for fish passage that consider these plans.

108. Out of Scope

109. As a result of a \$166,750 investment from MBIE (through an Envirolink Grant)¹³ a tool has been produced to help councils and others to efficiently collect and store information on fish barriers in a nationally standardised way, and provide an indication of risk and priority for rehabilitation. An initial assessment takes approximately 5-15 minutes at each structure for entry into an app-based database. Once prioritised, confirming the actual impact may require a further assessment of fish communities above and below each structure.

110. Costs are likely to be largest in attempting to rehabilitate existing structures. Rough estimates from DCC and NIWA suggest there are at least 20,000 instream structures in our waterways, and that upon assessment possibly between a quarter to a half will be found to present a possible or likely barrier to fish passage. The approximate cost of remediation on small (less than four metre high) structures ranges from \$200 to install a spat rope in a small culvert, to up to \$100,000 for simple dam removal.

111. Large hydro-electric dams represent major barriers to migration in some river networks, though many operators have a trap and transfer programme to provide for limited upstream passage. A more difficult problem is allowing for downstream migration as built solutions can still lead to fish being seriously injured or killed. At a national scale, however, smaller-scale obstructions, such as weirs and culverts, are the most problematic artificial barriers because there are many of them.

112. Hydro-electric generation scheme operators say there is pressure on them to address fish passage, particularly from iwi. Operators describe substantial challenges in modifying large structures that were designed at a time when less weight was given to the consequences of impeded fish passage. They consider that often their options are limited

¹³ <https://www.niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool>

by the (effectively) irreversible decisions that have already been made in deciding to build the infrastructure. Sometimes offsetting (ie, restoring another site) can be used as mitigation and would be addressed through consenting processes for such infrastructure.

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Setting freshwater objectives and limits for quantity in the NPSFM

Problem: Regional plans are not setting freshwater objectives for flows in terms of the compulsory values

113. The NPSFM directs regional councils to set freshwater objectives for water quality *and water quantity*. As a minimum, regional plans must include freshwater objectives for the compulsory values “ecosystem health” and “human health for recreation”. All rivers must have “environmental flows and/or levels” to achieve those objectives (including an allocable limit and minimum flows).
114. The problem with the status quo can be summarised as:
- a. Freshwater quantity objectives in regional plans do not set out a desired state in terms of the two compulsory values in the NPSFM (ecosystem health and human health for recreation), reducing the effectiveness and transparency of what the minimum flows and allocation limits are intended to achieve.
 - b. Some minimum flow regimes do not safeguard the compulsory values throughout the freshwater management unit, or do not adequately recognise connections between water bodies, including between surface water and groundwater, meaning that parts of the catchment become stressed.
 - c. Updated minimum flows and limits in regional plans are generally not applied to existing permit holders and this is an impediment to addressing over-allocated water bodies.

Proposals: Include additional policy direction on setting freshwater objectives for flows and levels in the NPSFM

115. We have provided you with advice on preliminary options to address these problems [Essential Freshwater paper #6]. Over the last four months we have sought the views of the advisory groups, hydrological modellers, and some of the hydro-electric power generators on the possible policy approaches.
116. Taking into account their feedback, our recommendation is to amend the NPSFM to:
- a. Specify that freshwater objectives for surface water quantity must:
 - i. set out one or more environmental outcomes to be achieved throughout the freshwater management unit; and
 - ii. for ecosystem health objectives, set out the intended critical habitat retention and flow variability in the freshwater management unit.
 - b. Specify that councils set or change minimum flows or water level regimes, and allocation limits to achieve the ecosystem health freshwater objective by:
 - i. providing for flow or level variability that meets the needs of the ecosystem
 - ii. safeguarding ecosystem health from the effects of the allocation limit on the frequency and duration of lowered flows; and
 - iii. providing for the life-cycle needs of aquatic life, including food production.
 - c. Specify that for aquifers connected to surface water, councils set water levels and allocation limits so that the freshwater objectives for the groundwater and the surface water bodies are achieved.
 - d. Encourage councils to review existing water permits to comply with minimum flows and allocation limits that are set in a regional plan after 2020, and encourage the plan to set out how and when new rules would affect permit holders.

Agree to progress work on amendments to the NPSFM, to ensure appropriate freshwater objectives and limits are set for quantity and flows (focussed on providing for ecosystem health).

YES / NO / DISCUSS

Additional advice

117. The proposals would be supported by extending the measurement and reporting requirements in the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 to require real-time electronic reporting of water use to councils [Essential Freshwater 42]. This will mean that councils will be better able to enforce compliance with allocation limits and minimum flow restrictions, and evaluate the effectiveness of the flow regimes set in their regional plans as affected by the actual water takes, rather than by the consented water take.
118. The STAG agreed that managing flows and water levels in rivers is critical to safeguarding ecosystem health, and that this is not always achieved in rivers under existing regulatory regimes. The preference of some members is to direct a flow regime methodology via the NPSFM and this would influence the outcome of revising minimum flows and limits in regional plans during regional plan reviews. This option was not progressed because of the difficulty in directing when a methodology in the NPSFM should override choices about the appropriateness of other methodologies made at the local level. Instead, we will work with a group comprising people with expertise in ecosystem health, hydrology and climate change to develop technical guidance that may be able to be incorporated into the NPSFM later.
119. In regions where minimum flows and allocation limits are yet to be set (some rivers in Otago, West Coast, Tasman and Hawke's Bay), the clearer process requirements should help them develop robust plan provisions. Permit holders in those regions would be affected if councils choose to require them to comply with updated regional rules about flows and limits.
120. Hawke's Bay Regional Council has reviewed permits in the Tukituki catchment to comply with regional rules, and intends to review permits in other catchments when new limits are introduced in plan changes. West Coast has no over-allocated rivers and is unlikely to need to review any existing water permits.
121. The possible costs to councils (estimated from the total number of water permits and the scheduled consent application fees) of reviewing water permits in Tasman and Otago when they set rules about minimum flows and water allocation are Tasman: \$442,000; and Otago: \$1,348,000. These figures over-estimate the likely costs because not all consents would need to be reviewed.
122. If those councils decide to review water permits to bring faster compliance with updated rules, the costs of the review, and any appeal, will fall on the council. The consent holder will bear their own costs in participating in this process. Once reviewed, the total allowable take (allocation) on their permit may be reduced, and/or the frequency of abstraction restrictions increased – either of which may lead to costs for the user (eg, building storage). The significance of these costs depend entirely on the minimum flows and allocation limits that councils set. Faster compliance with water quantity limits set in regional plans is necessary and desirable because the current situation (where updated minimum flows or allocation limits are usually not applied to existing water permit holders) is an impediment to addressing over-allocated water bodies.

123. As part of the RMA reform, you are considering changing the circumstances where a resource consent can be reviewed. The proposed RMA amendments would not resolve the problem where updated regional plans do not require consents to be reviewed to comply with revised rules on minimum flows or allocation. Nor can this problem be resolved through the NPSFM because national policy statements cannot override council discretion about whether rules in a regional plan affect the exercise of existing resource consents. This problem can be addressed through future RMA reform or any legislative reform needed to progress water allocation in future.

Wider application of the dissolved oxygen attribute in the NPSFM

Problem: Dissolved oxygen is not universally managed, and is a critical measure of ecosystem health

124. Dissolved oxygen is a key determinant of habitat quality for fish and other aquatic life and is essential for providing for the needs of the biology in a water body. Reduced dissolved oxygen levels (hypoxia) can impair the growth and/or reproduction of aquatic organisms and very low or zero dissolved oxygen levels (anoxia) will kill organisms.

125. Currently, the dissolved oxygen attribute for rivers in the NPSFM applies only below point sources. This is because the knowledge at the time the attribute was developed was insufficient to justify applying the attribute more widely. Since then, we have developed a better understanding of the state of dissolved oxygen, and more continuous monitoring of dissolved oxygen now takes place.

126. Applying the dissolved oxygen attribute only below point sources provides no direction for the management of the dissolved oxygen in the wider catchment, where it will still impact on ecosystem health.

Proposal: Apply the existing dissolved oxygen attribute more widely

127. We recommend amending the NPSFM to delete the qualifier “below point sources” in the dissolved oxygen attribute, so that it applies to all rivers. This acknowledges the status of dissolved oxygen as a key determinant of ecosystem health that is influenced by both point source and non-point source discharges, and means regional councils would set freshwater objectives for dissolved oxygen in all rivers (not just below point source discharges), and monitor progress towards achieving them over time.

128. Wider monitoring of dissolved oxygen would allow us to gain a better understanding of current state and trends around the country. This information is important to inform future management and restoration actions to help prevent further decline of ecosystem health.

Agree to progress work on amendments to the NPSFM, to apply the dissolved oxygen attribute and national bottom line to all freshwater (not just below point sources).

YES / NO / DISCUSS

129. In addition, we intend to develop guidance on the management of dissolved oxygen. This would aim to quantify the relative importance of the critical drivers influencing the dissolved oxygen regime, and advice on potential management actions to improve dissolved oxygen. Guidance should also be provided on monitoring methods and site selection.

130. We consider this will assist councils, land owners and communities to improve dissolved oxygen concentrations, and will increase the likelihood that management actions will be cost-effective and achieve the intended outcomes.

Additional advice

131. The STAG supports the proposed change and guidance. The Regional Sector Advisory Group agrees that dissolved oxygen is an important water quality parameter but has recommended that more time is needed to address significant gaps in our understanding of dissolved oxygen patterns in some waterway types and major challenges in how we might restore highly-modified waterways. They have also recommended that the attribute should account for ecosystems with naturally low dissolved oxygen and for existing infrastructure, such as flood protection schemes.
132. Dissolved oxygen can vary due to natural causes. During floods, a river in its natural state flows out onto its floodplain, where there is breakdown of plant material and organic matter. This process consumes oxygen and can lead to deoxygenation and in extreme cases, "black water events." This process may be exacerbated by flood protection schemes that hold flood waters back for longer than would naturally occur. Streams and rivers receiving the bulk of their flow from groundwater seeps and wetlands may also be naturally low in dissolved oxygen.
133. Concentrations of dissolved oxygen vary widely in rivers on a 24-hour cycle, and is therefore best characterised by continuous measurements, using loggers that are deployed in the waterbody of interest for a period of several days or weeks.
134. We have limited information on the current state of dissolved oxygen, but, based on data collated in 2015, estimate 15% of streams and rivers may be below the national bottom line. Councils tend to measure dissolved oxygen continuously at a limited number of "problem" sites. Spot measurements are taken at a wider range of sites, usually monthly. However, spot measurements are not adequate for assessing effects on ecosystem health. We will provide a more detailed analysis of impacts through the regulatory impact statement as part of the Cabinet package seeking agreement to consult.
135. Long-term trends in dissolved oxygen have not yet been assessed; therefore we do not know whether dissolved oxygen concentrations are improving or declining. Additional continuous monitoring data would be needed to address this.
136. The management options for improving dissolved oxygen concentrations include reduction of aquatic plants (eg, by increasing riparian shade or removal of plant material), reduction of organic matter inputs, management of flows especially provision of flushing flows, reduction of nutrient loads, and improving reaeration. There is a great deal of overlap between the measures to improve dissolved oxygen and measures to improve other aspects of ecosystem health.
137. The effectiveness of interventions to raise low dissolved oxygen levels in New Zealand rivers and streams are still not well understood. Without continuous data at a catchment scale, opportunities to better safeguard aquatic life by improving dissolved oxygen levels may be being lost.

Managing nutrients in the NPSFM

Problem: The Periphyton attribute may not be sufficient to protect ecosystem health from high nutrient concentrations

138. The NPSFM currently manages nutrients in rivers by requiring regional councils to set freshwater objectives for periphyton, and specifying the concentrations of dissolved inorganic nitrogen and dissolved reactive phosphorus to achieve them.

139. The periphyton attribute was initially developed because high biomass causes a range of effects including dissolved oxygen and pH fluctuations, a reduction in the diversity and productivity of invertebrates and fish, as well as affecting recreational values. Periphyton abundance is influenced by a range of factors that can be managed, including nutrient concentrations, flow regimes, and light. These factors can be used to define limits on resource use relating to nutrient discharges, water use, and land uses impacting on riparian vegetation.

140. Members of the advisory groups have raised concerns that the periphyton attribute in the NPSFM could be inappropriately applied and result in inappropriate nutrient concentration that fail to provide for ecosystem health, particularly in rivers that do not support conspicuous periphyton growth (ie, soft-bottomed rivers).

141. In addition, some advisory group members are concerned the nitrate toxicity attribute and national bottom line are being misinterpreted as sufficient to provide for ecosystem health – this is only intended to delineate the point at which nitrate concentrations become toxic. This contributes to the risk of regional councils managing to inappropriate nutrient concentrations, undermining public confidence in NPSFM overall.

Proposals: Investigate attribute tables for dissolved inorganic nitrogen and dissolved reactive phosphorus

142. We recommend further investigating amending the NPSFM to include dedicated attribute tables and national bottom lines for dissolved inorganic nitrogen and dissolved reactive phosphorus in rivers, and remove the nitrate toxicity attribute (which would be redundant as a result). The periphyton attribute and ammonia toxicity attributes would remain unchanged.

143. Attribute tables have been developed using national-level relationships between nitrogen and phosphorus and ecosystem health components (macroinvertebrates, fish, ecosystem metabolism and periphyton).

144. In addition to these proposals, we intend to set up a dedicated team of experts to assist councils in setting freshwater objectives for periphyton, and the concentration of nutrients needed to achieve them. Provision of these services will help improve consistency among councils, ensure that objectives and limits are appropriate, and address concerns about the quality of council decision making.

145. The proposal will have significant impacts on rural land use and officials will conduct further analyses to quantify the land use change that would be required to meet the proposed bottom lines.

Agree to progress work on amendments to the NPSFM, to include new attributes and national bottom lines for dissolved inorganic nitrogen and dissolved reactive phosphorus in rivers.

YES / NO / DISCUSS

Additional advice

146. The Essential Freshwater work programme did not initially include new attributes to manage nutrients. However, advisory groups have raised concerns with the existing periphyton attribute and whether it is sufficient.
147. STAG members supported keeping the periphyton attribute in its current form and noted the importance of developing nutrient criteria to support nutrient sensitive receiving environments, as is the current process in the NPSFM.
148. STAG has recommended inserting attribute tables for dissolved inorganic nitrogen and dissolved reactive phosphorus into the NPSFM. They recommended that the nitrate toxicity attribute would no longer be required, but that the ammonia toxicity attribute should remain.
149. Dedicated attributes for dissolved inorganic nitrogen and dissolved reactive phosphorus have the advantage of providing greater protection than the existing nitrate toxicity attributes. However, there is risk that dedicated national bottom lines will be under-protective or over-protective in different environments.
150. Compared to the existing attributes in the NPSFM, the proposed dissolved inorganic nitrogen attribute would introduce stricter objectives in lowland agriculturally-dominated areas. The most affected regions would be Waikato, Canterbury and Southland. Almost all impacted locations are soft-bottomed rivers that are unlikely to support conspicuous periphyton – these locations could maintain relatively high concentrations of nutrients.
151. Based on modelled concentrations of DIN and DRP needed to achieve periphyton outcomes, we estimate existing attributes are stricter than the new nitrogen attribute in 56% of river segments. Existing attributes are stricter than the new phosphorus attribute in all river segments, however, this is based on national models of periphyton and councils may set different objectives based on regional modelling approaches.
152. Officials will conduct further analysis to quantify the proposal's impacts on land use change and benefits for ecosystem health.

Managing sediment in the NPSFM

Problem: Regional planning is not addressing sediment, which is a critical pressure on ecosystem health

153. Excessive suspended and deposited sediment levels are among the most severe stressors facing New Zealand's freshwater and coastal ecosystems.¹⁴ Resource management policy has been inadequate to prevent ecosystem health degradation from elevated in-stream sediment. Most regional plans do not have region-wide in-stream sediment thresholds to maintain ecosystem health.
154. To address this gap, the Ministry has undertaken a 4-year research programme to develop potential sediment thresholds for inclusion in the NPSFM. These thresholds can serve as the basis for policy direction (ie, attributes or monitoring requirements) to ensure sediment is managed through regional planning. Our policy proposals are based on this work as well as ongoing research to test the impacts of the proposals.

¹⁴ Suspended sediment is fine matter in the water column, whereas deposited sediment is on the river bed. They are measured differently and are often not correlated. They also affect macroinvertebrates and fish in different ways (eg, deposited sediment affects habitat availability whereas suspended sediment affects feeding) and both need to be managed to provide for ecosystem health.

Proposals: Introduce a suspended sediment attribute in the NPSFM

155. We recommend adding a suspended sediment attribute in the NPSFM with the following technical components:
- Attribute unit: Turbidity (FNU/NTU). Turbidity is a proxy measure of visual clarity in water and generally represents the murkiness of water. Low turbidity values indicate clear water and high values represent murky water. We are recommending the inclusion of turbidity rather than visual clarity because turbidity is more widely used and monitored, can provide continuous monitoring data, and is commonly used in conjunction with river flow data to determine total suspended sediment loads. Therefore, it is a relevant measure of freshwater ecosystem health and also useful for long-term development of estuarine sediment load limits.
 - A spatial classification system with up to 12 distinct classes, each of which has a distinct attribute state bottom line and band thresholds. These classes reflect natural variation of in-stream suspended sediment.
156. The attribute will apply in all rivers and streams with the exception of those affected by glacial flour, natural colouration, and natural phytoplankton production.
157. Specific drafting, including band thresholds and a national bottom line, will be included in a redrafted NPSFM as part of the Cabinet package seeking agreement to consult. See additional advice below for more detail.

Agree to progress work on amendments to the NPSFM, to introduce a suspended sediment attribute.

YES / NO / DISCUSS

Proposals: Introduce a requirement to monitor deposited sediment and develop action plans to respond to declining trends or low indicator scores

158. We recommend adding a deposited sediment monitoring requirement. This will be structured similarly to the macroinvertebrate communities monitoring requirement in the NPSFM. It will include requirements for councils to establish methods for responding to particular indicator scores or declining trends. The monitoring requirements will have the following components:
- The indicator is in-stream areal coverage of deposited fine sediment (particles under 2mm in size) assessed using in-stream visual estimate of percent fine sediment cover.
 - A spatial classification system with 12 distinct classes, each of which has a distinct indicator score that will trigger response methods. The 12 classes reflect natural variation of in-stream deposited sediment.
159. We will provide recommendations on the specific indicator score thresholds through the redrafted NPSFM and Cabinet package seeking agreement to consult.
160. Predictive modelling shows there are likely to be breaches of the indicator score threshold in lowland areas and large parts of Northland, Auckland, Waikato, Canterbury, Otago and Southland. Where there are breaches, regional councils would have to develop an action plan to address deposited sediment – however we cannot predict the management interventions needed to improve the indicator score (see below).

Additional advice: Rationale for recommending deposited sediment monitoring (as opposed to an attribute)

- 161. Despite having robust thresholds for protection of ecosystem health values, we do not recommend progressing attributes for deposited sediment in the NPSFM.
- 162. NPSFM attributes require limits to be set at the FMU-level. The strongest predictors of deposited sediment are reach-scale (local) river characteristics. We currently have inadequate knowledge of the interactions between manageable (such as riverbank vegetation) and unmanageable (such as catchment slope and climate) aspects of catchments. Therefore, we cannot expect regional councils to set effective limits to meet the desired ecosystem health outcomes. If central government were to require councils to set limits in the absence of adequate knowledge about the relationship between regulated actions and the intended outcome, we consider that it would introduce a significant barrier to action. In addition, it could become a major financial burden on councils when decisions are disputed.
- 163. We consider that the introduction of monitoring plans will spur action on the ground and provide councils with the information necessary to improve understanding of management actions for deposited sediment. Also, the inclusion of management trigger thresholds in the monitoring requirement addresses the fundamental policy gap identified. Many councils do not have regular deposited sediment monitoring programmes and they collect information on a range of deposited sediment indicators. Requiring regular monitoring using a standard approach will improve our ability to assess the linkages between management actions and in-stream outcomes.
- 164. We attempted to conduct broad impact testing of potential deposited sediment attribute bottom lines similar to that underway for the suspended sediment attribute. We were unable to progress the work due to inadequate scientific knowledge on the relationships between management actions and quantifiable changes in outcomes as described above.

Agree to progress work on amendments to the NSPFM, to introduce a requirement to monitor and respond to deposited sediment.

YES / NO / DISCUSS

Additional advice: Ongoing analysis and impact testing of suspended sediment attribute thresholds

- 165. We are currently testing the viability and impacts of the preferred suspended sediment attribute bottom lines. If the preferred bottom lines prove to be physically unviable in some locations (cannot be met by catchment reversion to forest) or otherwise economically unfeasible, the underlying research provides us numerous alternative bottom line thresholds to consider and progress.
- 166. We anticipate the preferred bottom lines will have breaches in all regions and in catchments throughout the North and South Islands. We are currently assessing the land use and management changes required to meet the preferred bottom lines. Impact testing includes the following components:
 - a. The scale of rural land use and management changes necessary to meet the preferred bottom lines as well as the associated sectoral distribution of their costs and benefits.
 - b. The contribution of urban development activities and urban form to breaches of the preferred bottom lines, and assessment of how changes could avoid or reduce those breaches.

167. Detailed maps and impacts (ie, location and proportion of the country below the national bottom line, and management interventions required) will be included in the regulatory impact statement as part of the Cabinet package seeking agreement to consult.
168. The anticipated costs of this regulation are likely to be very significant and are likely to fall on both hill country and lowland farm sectors given the distribution of breaches. In relation to urban development, we will provide information on the distribution and magnitude of development activities contributing to breaches of the bottom line, and will endeavour to provide a case study of the costs and benefits associated with meeting the bottom line in an Auckland development area.

Additional advice: Stakeholder feedback on proposals

169. The STAG supports progression of suspended and deposited sediment attributes. They preferred the bottom lines we are currently impact-testing for suspended sediment and that we propose to use as the indicator threshold for monitoring plans. Regional council stakeholders consider the suspended sediment attribute, including a spatially explicit classification system, as viable. However, they consider that implementation by 2025 will be difficult because objective and limit-setting will be complex. They consider deposited sediment is not viable to progress as an attribute at this stage because of the poor knowledge of its management mechanisms (described in brief above).

Higher water quality for swimming, taking into account seasonal differences

Problem: The NPSFM does not meet public expectations about what 'swimmable' water quality is

170. The risk to human health from contact recreation in rivers and lakes is based on an established relationship between campylobacter and the indicator bacteria *E. coli* in New Zealand freshwater.
171. The NPSFM requires the state of water quality in terms of *E. coli* to be improved everywhere, and for all regional councils to set a target for swimmable rivers and lakes in their regions. Nevertheless, there is public concern that people are at risk of getting sick from swimming in a river or lake, and there is also wide scale public confusion about what swimmable means and the actual risk to human health that contact with freshwater poses. There is concern that the threshold for "swimmable" water quality in the 2017 NPSFM is lower than what was the "minimum acceptable state" for swimming in the 2014 NPSFM, and lower than the C/D threshold in the 2003 Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (the 2003 guidelines).

Proposals: Include a new, higher, measure of swimmable water quality in the NPSFM

172. We recommend adding a new *E. coli* attribute table to the NPSFM and setting the national bottom line at the same level as the C/D threshold in the 2003 guidelines, with the "Excellent", "Good" and "Fair" classes in line with the A, B, and C, categories. The thresholds in the new attribute table would apply to primary contact sites during the bathing season, with the current attribute table applying throughout the year for all other rivers and lakes. The effect would be that regional councils would still be required to improve water quality everywhere in terms of *E. coli*, and set objectives and limits in their regional plans to achieve that improvement. The bar will be higher in places where people swim.
173. The following table is indicative only. Both the sites and the bathing season will be determined by regional councils during their regional planning process. If you agree, we will prepare a final version with Ministry of Health officials and expert input.

Value	Human health for recreation	
Freshwater Body Type	Primary contact sites in lakes and rivers (during the bathing season)	
Attribute	<i>Escherichia coli (E. coli)</i>	
Attribute Unit	95th percentile of E. coli/100 ml (number of E. coli per hundred millilitres)	
Attribute State	Numeric Attribute State	Narrative Attribute State
Excellent	≤ 130	Estimated risk of Campylobacter infection has a < 0.1% occurrence, 95% of the time
Good	131 - 260	Estimated risk of Campylobacter infection has a 0.1 – 1.0% occurrence, 95% of the time
Fair	261 - 550	Estimated risk of Campylobacter infection has a 1 – 5% occurrence, 95% of the time
National bottom line	550	
Poor	> 550	Estimated risk of Campylobacter infection has a > 5% occurrence, at least 5% of the time

174. If you agree to progress the recommended approach, we will prepare water quality information for the contact recreation sites on rivers and lakes currently identified by regional councils, and estimate the likely costs of reducing *E. coli* levels in those that are below the recommended national bottom line. The costs are likely to be incurred by increased need to exclude stock from streams and improving treatment for some wastewater plants that discharge to rivers.

175. Including two attribute tables for *E. coli* in the NPSFM might add confusion about what needs to be done to provide for human health for recreation. In practice, councils understand this already because they must set objective for *E. coli* everywhere, while reporting health risks at recreational river and lake sites weekly during the bathing season.

Agree to progress work on amending the NPSFM, to introduce a new *E. coli* attribute table and national bottom line for primary contact sites.

YES / NO / DISCUSS

Additional advice

176. The recommended approach is consistent with the 2003 guidelines, which apply to “well used” primary contact sites during the bathing season. It will also help achieve the goal of “higher water quality standards for urban and rural using measurements which take into account seasonal differences” agreed between Labour and New Zealand First in their coalition agreement.

177. The 2003 guidelines are based on the risk of campylobacteriosis infection from primary contact recreation, which in turn is based on data about pathogens and microbial indicators collected in 1998-2000. That 1998-2000 study is still the best estimate of health risk for New Zealand lakes and rivers, but may be underestimating or over-estimating the actual health risk, partly because of changes in the kinds of discharges containing disease-causing organisms to freshwater over the last two decades. To test how the pathogen/indicator relationship stands up today, the Water Taskforce intends commissioning a new microbiological risk assessment that is could be completed in 2023-2024.
178. Retaining the status quo would mean that councils set objectives for *E. coli* at a level that will contribute to a national target where 90% of large rivers and lakes are swimmable. Apart from Marlborough and West Coast councils, which have draft regional targets, all regional councils have published final targets for swimmable lakes and rivers. In combination, the regional targets will not achieve the national target by 2040.
179. Councils currently report on the suitability for swimming at 253 recreational river sites and 63 recreational lake sites on the web-based Land, Air, Water Aotearoa (LAWA) site. In 2017, the “Can I swim here?” module had around 300 visitors per day on average. Applying the national bottom line to contact recreation sites will require a greater improvement in water quality at many of those sites currently managed for contact recreation, and will complement the microbial forecasting some councils are using to communicate health risk at particular sites.
180. The recommended national bottom line threshold is similar to the A band for *E. coli* in the 2017 NPSFM. The main difference is that the *E. coli* attribute table in the 2017 NPSFM has four tests, including that for at least half the time *E. coli* is less than or equal to 130 *E. coli* per 100 ml, which represents the same low level of risk as the recommended “excellent” class.
181. In addition to the option recommended above, there are three alternative options to improve water quality for swimming. These are:
- apply the national bottom line for swimming to all rivers and lakes
 - apply the national bottom line for swimming to the bottom of the A band of the existing *E. coli* attribute table
 - replace the existing *E. coli* attribute table with the recommended attribute table
182. Achieving option a. may not be possible without significant changes in land use and de-stocking. Requiring significant changes in land use could cause large economic impacts without an assurance of reducing the health risk.
183. While option b. would provide councils with the option of managing contact recreation sites to any level above the bottom of that band, it would not provide the visibility that the high quality of the “excellent” and “good” classes provides.
184. With option c, councils will still be required to set objectives for *E. coli* in each freshwater management unit (because human health for recreation is a compulsory value), and improve water quality in sites that are not identified as bathing sites, and may have to set those objectives in the “poor” class.
185. The recommended option has the advantage of retaining the requirement for water quality to be improved everywhere, with visibility of the degree to which water quality is being improved, while requiring councils to set *E. coli* objectives for a higher quality in places where people swim.

Reporting on ecosystem health in the NPSFM

Problem: Current reporting on ecosystem health is inadequate to inform communities and planning decisions

186. The NPSFM requires councils to establish methods to monitor the extent that they are providing for ecosystem health. To date, there has been limited direction as to how this is to be achieved.
187. There is currently a bias in the types of information being collected and reported, with a focus on a subset of water quality metrics. Key ecological and physical components (aquatic life and biological diversity, ecosystem processes, habitat quality) are commonly missing from the overall assessment of ecosystem health.
188. There is broad recognition that measuring water quality alone is not enough to assess ecosystem health. If the fundamental state of ecosystem health is not adequately assessed or understood, it presents a problem for the policy and management cycle. Councils need to be able to communicate an accurate story of the state of freshwater environments to inform why, where, and how we need to take action to halt declines in ecosystem health. Ecosystem health monitoring and reporting will mean that:
- decisions about resourcing interventions are supported by meaningful evidence-based knowledge
 - effectiveness of policies to improve ecosystem health can be assessed; and
 - the public better understands the extent that the information represents the freshwater ecosystem, and where information gaps exist.

Proposals: Build on existing reporting requirements in the NPSFM, as they relate to ecosystem health

189. We recommend amending the NPSFM to expand on current reporting requirements as they relate to ecosystem health. This would require councils to annually report on information from existing monitoring programmes as follows:
- Report against all five components of ecosystem health (water quality, water quantity, habitat, aquatic life, ecological processes).¹⁵ Where there has been no data collected for a component this must also be indicated as such.
 - Produce annual summary report cards, including performance against all components of ecosystem health. Where there has been no data collected for a component, this must also be indicated in the summary.
 - Produce a synthesis report integrating the five components of ecosystem health as a single ecosystem health score, at intervals of no more than five years.

Agree to progress work on amending the NPSFM, to expand on existing reporting requirements as they relate to ecosystem health.

YES / NO / DISCUSS

¹⁵ As described in the proposal for an amended Ecosystem Health value, based on the Freshwater Ecosystem Health Framework: <http://www.mfe.govt.nz/publications/fresh-water/freshwater-biophysical-ecosystem-health-framework>

190. To support the above proposal, we intend to develop guidance for councils to implement nationally consistent data management and analysis protocols (including data aggregation, standardisation, harmonisation, integration and weightings), prioritisation of metrics; and incorporate multiple lines of evidence in reporting on ecosystem health.

Additional advice

191. The proposal is consistent with the Ecosystem Health Framework¹⁶ which is the approach recommended for New Zealand's freshwater environments by the STAG. We also consider this proposal is consistent with the reporting practices currently adopted by several regional councils that produce detailed annual reports and summary report card style assessments of the regional state of freshwater and/or whole of catchment quality.

192. The intent of the proposal is broadly supported by regional council freshwater experts; there is general agreement that biotic and abiotic factors are critical components that make up ecosystem health, but are not reported in a consistent and transparent way. In addition, the proposal is consistent with the current Ecosystem Health Report Card being prepared for the Office of the Prime Minister due in May 2019 [CAB-18-MIN-0593].

193. The proposal recognises that councils cannot monitor everywhere, and are required to meet a variety of monitoring and reporting objectives. Thus there needs to be a process by which data can be appropriately grouped and reported, and also that this is undertaken at meaningful time intervals. The proposal also recognises that it may not be appropriate or logistically possible to monitor all five components at a single site – monitoring effort may be spread across a wider spatial area depending on suitability for the particular metric of interest. Thus a process to identify the scale at which to appropriately group data is required to be set out.

194. The proposal also recognises that systems of data management have largely been developed internationally and nationally that can be adapted for NZ needs in data management.

195. A National Report Card prototype is currently being developed. Following completion, this process will be further assessed to determine at what scale it is feasible and appropriate to define a single integrated measure of ecosystem health.

196. The risk of not shifting to this transparent process is that current issues of data management and reporting inconsistencies will remain; there will be an inability to effectively determine whether ecosystem health has been maintained or improved, and it will impede resource investment decisions and impede further policy development processes.

197. Central and local government potentially have several avenues for funding efforts to co-develop practical and meaningful guidance and implementation, for example, the MBIE funded EnviroLink Tools process is a mechanism by which a data management protocol and technical guidance can be co-designed and co-developed with councils.

¹⁶ <http://www.mfe.govt.nz/publications/fresh-water/freshwater-biophysical-ecosystem-health-framework>

Monitoring and responding to metrics for ecosystem health in the NPSFM

Problem: There are a range of important indicators of ecosystem health that are currently not included in the NPSFM, and there is an opportunity to require their management.

198. The health of a freshwater ecosystem can be measured and monitored through a range of mechanisms, including the presence and health of fish species, the levels of dissolved oxygen, and the health of the macroinvertebrate community. Currently, only the last of these is included as a monitoring requirement in the NPSFM. Macroinvertebrate Community Index (MCI) must be monitored by councils, and an action plan put in place if the MCI score drops below 80, or there is a declining trend.
199. Freshwater fish are the highest-valued group of aquatic biota. They are valued as part of healthy ecosystems, their contribution to biodiversity and for their cultural value – particularly as mahinga kai, but also as game. Despite their importance, fish are not systematically monitored in most regions of New Zealand. Policy CB1 of the NPSFM requires that every council develops a monitoring plan that inter alia includes measures of the health of indigenous flora and fauna. Policy CB2 requires establishing methods to respond to monitoring that indicates freshwater values will not be met.
200. The only national scale indicator for freshwater fish health is their change in conservation status (as defined by Department of Conservation). Of the 39 species of native fish, 28 are threatened or at risk of extinction according to the Department of Conservation's Threat Classification System.¹⁷
201. Threats to native fish that are associated with land and water resource use include loss of access due to barriers, loss of wetlands, channelisation of waterways, increased sedimentation, loss of riparian margins, nutrient enrichment and prolonged low flows. Impacts on fish are also associated with pressures other than land and water resource use, including exotic fish introductions and harvesting.
202. In addition, STAG have identified that there are factors contributing to the ecosystem health of lakes that are not currently adequately provided for in the NPSFM. In particular, they have raised concerns about dissolved oxygen (the current attribute only applies to rivers, as dissolved oxygen in lakes is influenced by the stratification patterns in the lake and is considerably more difficult and expensive to monitor), and aquatic plants.

Proposals: Include requirements to monitor and respond to indicators of ecosystem health in the NPSFM

203. We recommend providing further policy direction in the NPSFM to require councils to monitor and respond to appropriate metrics for ecosystem health.
204. STAG is currently considering various metrics, including:
- a. A measure of fish abundance and/or health
 - b. Potential changes to the way the MCI is treated in the NPSFM, and/or changes to the point at which an action plan is required
 - c. Measures for monitoring aquatic plants and dissolved oxygen in lakes.
205. In addition, we will work with the Department of Conservation and regional councils to improve sampling and measures of the health of fish values.

¹⁷ Department of Conservation (2017). *Conservation status of New Zealand freshwater fishes*

Agree to progress work on amending the NPSFM, to include other metrics of ecosystem health.

YES / NO / DISCUSS

Additional advice

206. We consider the requirement to monitor fish is appropriate considering their value to ecosystems and people, extinction risk of some indigenous species, and the purpose of the RMA. To be effective, monitoring needs a level of coordination at the national level. This is because fish are mobile and pressure in one region may have impacts in another.
207. The Department of Conservation is responsible for the monitoring of flora and fauna on conservation land. There may be value in also considering how monitoring of commercially harvested species (eg, eels) is incorporated into monitoring effort.
208. STAG is meeting to consider this on 1 May. The Water Taskforce will work with STAG, and the Department of Conservation to identify potential metrics for ecosystem health that could be included in a monitoring regime and will provide further advice.
209. Monitoring fish communities is expensive for councils because it involves specialised skills (eg., electric fishing and identification in the field). It is also a complex and time-consuming task relative to other measures such as water quality. Cost estimates (including travel and time) are approximately \$1500 to \$2500 per reach, per visit. To address this problem, a cheaper and faster molecular tool for detecting fish species in freshwater is being developed, funded by a \$299,000 MBIE EnviroLink Tools Grant.

Direction to territorial authorities to support integrated management in the NPSFM

Problem: The NPSFM lacks clear direction on integrated catchment planning to territorial authorities (city or district councils), which are largely responsible for urban land use planning and its effects on water quality

210. This lack of integration between regional council and territorial authority functions under the RMA is the result of several factors:
- a. Although integrated management of natural and physical resources is part of the functions of both regional councils and territorial authorities under the RMA, the RMA does not provide any direction about how territorial authorities should provide for this integration in relation to water¹⁸.
 - b. Both have land use functions but regional councils rarely exercise this function in urban areas, for example, to limit impervious surfaces for the purpose of enhancing water quality.
 - c. The requirements of the NPSFM almost entirely focus on regional planning.
 - d. Regional councils can direct district plans through their RPS, but this isn't always reflected well in district plans because the time lag between an RPS becoming operative and the subsequent district plan change giving effect to it.
 - e. Many levers available to territorial authorities that could have a positive effect on freshwater management (eg, infrastructure provision, investment, and matters regulated under the building code) are not regulated under the RMA.

¹⁸ Other than a general requirement for district plans to give effect to regional policy statements, and not be inconsistent with regional plans in relation to functions under Section 30(1).

- f. Territorial authorities often have competing priorities, including providing for urban development, which create an incentive for them to deprioritise water in favour of those matters.

211. An outcome of this lack of integration is that territorial authorities generally view their role in freshwater management as limited to complying with water and discharge permits, leaving the bulk of the responsibility to plan for, and manage effects on, urban water with regional councils. City and district councils are however uniquely placed to promote better integrated catchment planning, particularly in urban areas, due to their role in managing infrastructure and land use activities.

212. We consider specific direction to territorial authorities is desirable to signal that they have a more general role in ensuring their own decision-making supports integrated management of land and freshwater.

Proposals: Amend the NPSFM to provide specific direction to territorial authorities on their role and responsibilities

213. We recommend adding a policy in the NPSFM to clarify that territorial authorities have a responsibility for contributing to the integrated management of freshwater and the use and development of land. The policy would direct those councils to manage the effects of land use for urban development on freshwater in their district plans.

Agree to progress work on amendments to the NPSFM to provide policy direction to territorial authorities to support integrated management.

YES / NO / DISCUSS

Additional advice

214. This proposal is intended to make it clear that territorial authorities have a role in managing resources that affect freshwater, beyond complying with consent conditions.

215. The policy would not specify how the effects of urban development on freshwater are to be managed, because the most appropriate actions could be site-specific. However, it would be intended to drive territorial authorities to look at a range of possible interventions, potentially including:

- a. water sensitive design at a site scale
- b. stream habitat protection; and
- c. site-specific solutions through structure planning processes.

216. The proposal would not address the wider issue of alignment between functions under the RMA and LGA. Although national policy statements may help to influence decision-making under the LGA, they cannot direct it. This is an area that would require further work as part of the Government's proposed RMA review programme. The emerging proposals in the Three Waters Review are considering options for ensuring the design, operation, and management of Three Waters infrastructure contributes to improved environmental outcomes for urban water. Officials will consider how to align these proposals with the proposed direction in the NPSFM.



217. Any proposals that seek to manage the environmental effects of urban development may result in increased costs for urban development, but would also provide a range of social, cultural, economic and environmental benefits to communities. The costs and benefits would be variable depending on the approaches councils chose to use.

218. This proposal also has the potential to add costs to district planning processes for territorial authorities, because there would be an increased expectation on them to carry out the necessary analysis to justify new plan provisions for managing effects on urban water, and analyse why these were more appropriately in a district plan than a regional plan.

Released under the Official Information Act 1982



Essential Freshwater 12: Proposed sediment policy package

 			
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	Action sought:	Response by:
To Hon David Parker, Minister for the Environment	Agree	30/11/2018
To Hon Damien O'Connor, Minister of Agriculture	Agree	30/11/2018
To Hon Nanaia Mahuta, Associate Minister for the Environment	Agree	30/11/2018

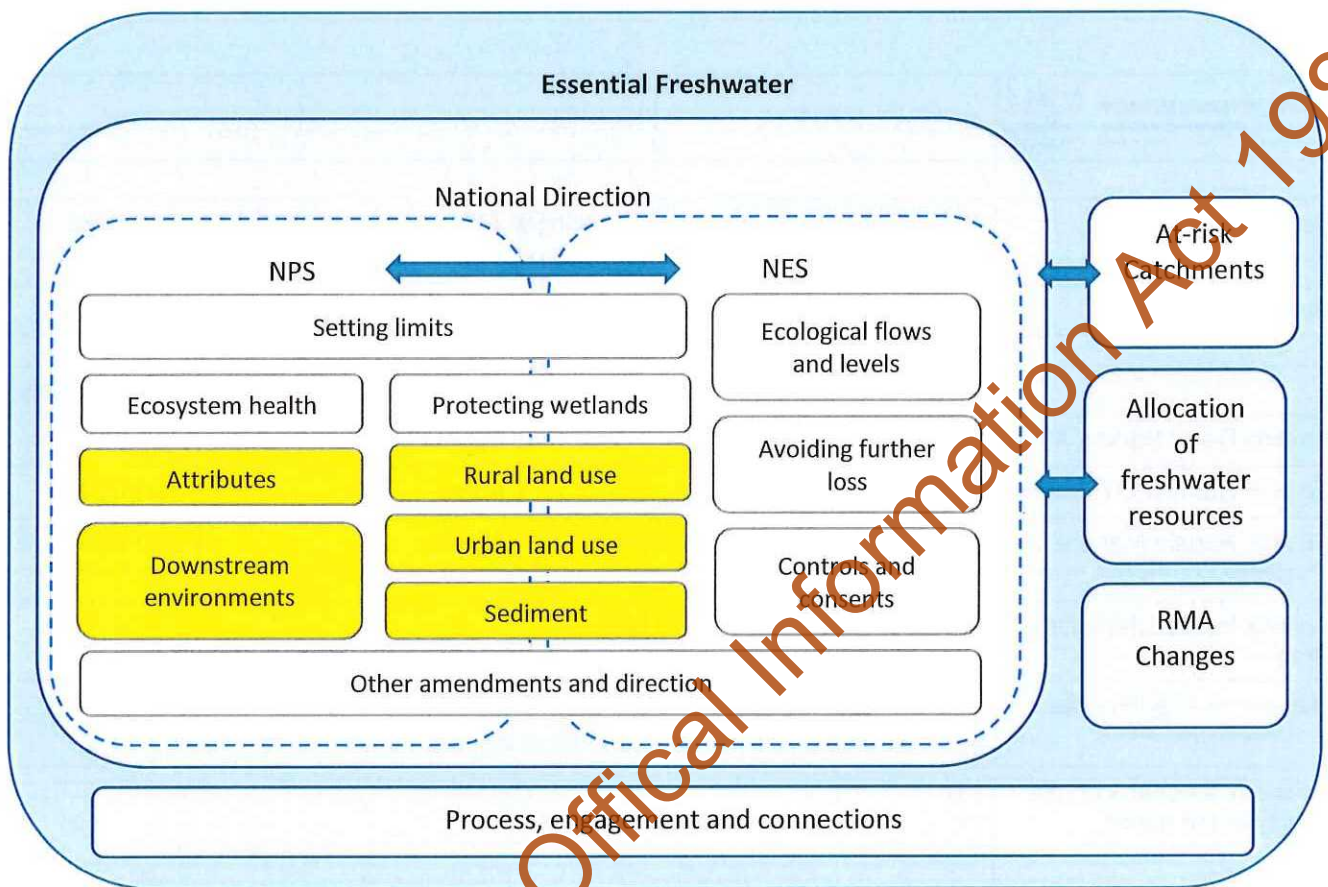
Actions for Minister's Office Staff	Return the signed report to MfE.
Number of Attachments 1	Titles of attachments: 1. Table of proposed policy development package
Note any feedback on the quality of the report	

Ministry for the Environment contacts

Position	Name	Cell phone	1 st contact
Principal Author	Stephen Fragaszy		
Responsible Manager	Jo Burton	022 045 8831	✓
Director	Martin Workman	022 517 3268	

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Essential Freshwater 12: Proposed sediment policy package



Key Messages

1. This briefing seeks Ministers' agreement on a package of preliminary policy options to address in-stream sediment problems through the National Policy Statement – Freshwater Management (NPS-FM) framework. Excessive sediment loading into freshwater and coastal ecosystems is one of the most severe environmental stressors facing New Zealand.
2. Drivers of excessive sediment loading are:
 - complexity of geological, climatic, land use and management factors
 - resource users and landowners whose activities increase erosion and sediment generation do not bear the costs of connected externalities
 - landowners, private individuals, and firms bear the cost of sediment/erosion mitigations, but in most cases, they do not directly realise their benefits
 - there is inadequate consideration of, and controls on, high-risk sediment generation activities and erosion-prone areas in resource management decisions
 - sediment modelling at the site and catchment scale is expensive and often has poor accuracy and precision both temporally and spatially.

3. This briefing focuses predominantly on options for planning systems interventions within the NPS-FM framework. It also describes other interventions that are:
- considered through other Essential Freshwater components
 - dependent on Budget Bid decisions
 - being addressed through funding programmes and climate policy
 - shown in Appendix A in a summary table.

4. We recommend developing all the options below to form a coherent package. Option A will have significant impacts on landowners and resource users as well as councils. Options B and C will support implementation of Option A.

Option A: NPS-FM suspended and deposited sediment attributes for inclusion in the National Objectives Framework (NOF)

- These are currently under development and include environmental classification systems to account for natural variability of sediment in streams.

Option B: NPS-FM monitoring requirements for in-stream sediment

- This will support implementation of sediment attributes and also estuary and coastal policy development.

Option C: NPS-FM direction on integrated catchment management for sediment purposes

- This will support implementation of sediment attributes and estuary management through planning processes.

5. If you approve further development of these options, we will undertake targeted engagement with stakeholders from the Freshwater Leaders Group, Kāhui Wai Māori, the Science and Technology Advisors Group, and others. Further advice will be provided to you in February 2019 so that consultation on proposed changes to the NPS-FM can then be undertaken in 2019.

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Recommendations

6. We recommend that you:

- **Agree** to officials developing options for NPS-FM suspended and deposited sediment attributes for inclusion in the National Objectives Framework.

Yes/No

- **Agree** to officials developing options for NPS-FM monitoring requirements for in-stream sediment.

Yes/No

- **Agree** to officials developing options for NPS-FM direction on integrated catchment management for sediment purposes.

Yes/No

- **Agree** to the Freshwater Taskforce undertaking targeted engagement with the Freshwater Leaders Group, Kāhui Wai Māori, the Science and Technology Advisors Group and others including regional councils and the primary sector to understand better the merits and consequences of the options proposed.

Yes/No

- **Agree** that the Freshwater Taskforce will provide further advice on these options in February 2019 so options involving NPS-FM provisions can be included in the 2019 consultation document.

Yes/No

Signature

Martin Workman
Director, MFE

Hon David Parker
Minister for the Environment

Date

Hon Nanaia Mahuta
Associate Minister for the Environment

Date

Hon Damien O'Connor
Minister of Agriculture

Date

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Essential Freshwater 12: Proposed sediment policy package

Problem definition

7. Erosion rates in parts of New Zealand are naturally among the highest in the world, and human activities have accelerated the physical processes that lead to erosion. Catchment sediment loading is more than ten times the natural baseline rates in many catchments.
8. Excessive suspended and deposited sediment levels are among the most severe stressors facing freshwater and coastal ecosystems in New Zealand.¹ Observed sediment levels are high enough to breach freshwater fauna “ecological tipping points” in river reaches in every region in New Zealand.² Several vulnerable receiving environments, such as the Kaipara Harbour, are at critical risk for irreversible damage due to sedimentation issues.
9. The legacy of historical primary sector subsidy and regulatory regimes, as well as urban development processes, frames modern erosion and sediment challenges. For example:
 - until the 1980s, subsidies incentivised land clearance and pasture expansion in highly erosion-prone areas
 - hill country farming historically has had minimal oversight and recent shifts to consenting and rules-based frameworks are a marked departure and still uncommon across New Zealand³
 - urban development and expansion have increased erosion and sediment problems.
10. Despite soil erosion being recognised as a significant problem over 100 years ago, natural resource management policy has not been adequate to prevent ecosystem degradation from excessive in-stream sediment. Core drivers of this problem are:
 - complexity of geological, climatic, land use and management factors
 - resource users and landowners whose activities increase erosion and sediment generation do not bear the costs of connected externalities
 - landowners, private individuals, and firms bear the cost of sediment/erosion mitigations, but in most cases, they do not directly realise their benefits
 - inadequate consideration of, and controls on, high-risk sediment generation activities and erosion-prone areas in resource management decisions
 - sediment modelling at the site and catchment scale is expensive and often has poor accuracy and precision both temporally and spatially.

Options

11. We identified several categories of options to address the specific problems:
 - planning systems interventions
 - activity controls
 - farm plan and soil management interventions

¹ Environmental reporting series: Our Marine Environment 2016, Our Freshwater 2017, Our Land 2018.

² Depree et al. (2018) Draft report – Development of ecosystem health bottom-line thresholds for suspended and deposited sediment in New Zealand rivers and streams. NIWA draft client report prepared for the Ministry for the Environment.

³ Ministry for the Environment. 2018. *Regional council perspectives on soil erosion management: Current trends and emerging opportunities*. Wellington: Ministry for the Environment.

- economic incentives and funding interventions
 - data and information tool interventions.
12. This briefing focuses primarily on planning systems interventions for several reasons.
- Essential Freshwater programme paper #18 “Improving Farming⁴ Practices and Managing Intensification of Rural Land Use” proposes options for further exploration that relate to activity controls as well as farm environment plan and soil management interventions.
 - Emissions Trading Scheme (ETS) and climate policy settings affect economic incentives for resource users’ land use and management practices, especially tree planting, that relate to sediment outcomes.
 - Government programmes such as 1 Billion Trees, the Hill Country Erosion Fund, the Freshwater Improvement Fund, and the Provincial Growth Fund will provide funding for improved land use and management components that will positively affect sediment outcomes.
 - s 9(2)(f)(iv)
13. We are considering the sediment management effects of these various policy development programmes or influencing sediment management objectives within them. Appendix A shows more detail on the interventions within these categories of options and how we, or other agencies, plan to progress them.
14. The National Policy Statement – Freshwater Management (NPS-FM) is the ideal instrument to implement the proposed options because it prescribes regional plan-making processes as they pertain to freshwater and connected resource use and activities. Sediment management fits squarely within this scope, and NPS-FM processes are appropriate for the implementation of the proposed options.

Option A: Development of NPS-FM sediment attributes

Addressing the problem – attributes and national direction

15. This option is to develop ecosystem health attributes for suspended and deposited fine sediment to be included in the NPS-FM.
16. At present the RMA and the NPS-FM do not explicitly guide planning related to sediment management other than connecting it to broad environmental issues and the national values of ecosystem health and human health for recreation.
17. Four pieces of national direction directly influence how councils develop and implement planning rules that affect sediment generation and management.
- The NPS-FM and the New Zealand Coastal Policy Statement (NZCPS) provide national direction on planning and consenting regimes for sediment-related ecosystem health and human health for recreation issues. However, they do not include quantitative thresholds for in-stream sediment indicators.
 - The National Environmental Standards for Plantation Forestry (NES-PF)

⁴ Farming is defined in that briefing as including horticulture, but excluding forestry.

introduced activity-specific regulations for the forestry sector. These regulations aim to avoid sediment discharges through erosion control standards and are backed up by sediment management controls where avoidance is impossible.

- The National Policy Statement for Urban Development Capacity (NPS-UDC) requires councils to identify land for development purposes.
18. Council staff note that the absence of explicit national direction on sediment management and quantitative thresholds for sediment indicators in most regions:⁵
- reduces councillors' willingness to tackle sediment problems
 - weakens councils' focus on sediment management given that other aspects of ecosystem health have numeric attributes and associated planning regimes
 - increases the difficulty of creating and defending sediment-related plan provisions including rules in court.
19. Regional councils approach erosion and sediment management in disparate ways. This reflects differences in resourcing and relationships between councils and resource users. In general, sediment point sources such as stormwater discharges, earthworks, and activities in river beds are regulated through consenting of specific activities and discharge and structural standards. Wider land use activities, if regulated at all, are controlled through catchment zoning and/or specific management conditions including farm plans. For agricultural erosion management, councils primarily rely on collaborative efforts with farmers, industry partnerships, and related non-regulatory methods.⁶

Addressing the problem – sediment attributes characteristics

20. Sediment attributes can be set nationally and consistently in reference to natural reference conditions and ecological responses. Attributes frame council limit-setting and operational programmes to address inadequate consideration of sediment in resource management decision-making as described in Essential Freshwater Briefing #7 on limit setting.
21. We have undertaken a research programme since 2015 to develop sediment attributes and link them to catchment sediment loading, which councils can control through policy levers.
22. We have already received proposed bottom lines in a draft report and have contracted further research to improve the robustness of the evidence. This will deliver final options for suspended and deposited sediment attribute bottom lines as well as information to support options for attribute bands or other policy mechanisms. It will be delivered in time for you to consider incorporating attributes and related policies in the planned 2019 Essential Freshwater consultation. Sediment bottom lines will require councils to put in place plans to show how these bottom lines will be met. The timeframe for meeting bottom lines is not set.
23. The attributes would have a spatial classification system to account for natural variability in sediment in freshwater systems and ecological responses to suspended and deposited fine sediment. The attribute indicator for suspended sediment would be clarity or turbidity and its timeframe of measurement would be long-term rolling mean. The attribute indicator for deposited fine sediment would be in-stream coverage and its timeframe of measurement would be long-term rolling medians.
24. The draft proposed bottom lines, which are unlikely to change drastically with the newly

⁵ National Policy Statement for Freshwater Management Implementation Review – National Themes Report (MFE); Review of the effect of the NZCPS 2010 on RMA decision-making (DOC)

⁶ Ministry for the Environment. 2018. *Regional council perspectives on soil erosion management: Current trends and emerging opportunities*. Wellington: Ministry for the Environment.

contracted work, give an indication of the areas with rivers below attribute bottom lines. Observation and predictive modelling data indicates there are parts of rivers in each region below the bottom line. Regions with the largest areas below bottom lines are Northland, Auckland, Waikato, Horizons, Canterbury and Southland.

Addressing the problem – sediment attributes implementation

25. Implementing this option will require significant land management changes where rivers are below bottom lines. Council staff from seven regions indicated they would increase resourcing to the following sets of council activities if we add sediment attributes to the NPS-FM:
- research and data collection
 - funding of erosion and sediment control works
 - land management advisory and extension services including farm planning
 - compliance monitoring and enforcement
 - changes in activity status/rules in plans.
26. If you agree to develop sediment attributes further, we will undertake scenario-planning exercises with council staff to understand in much finer detail the likely approaches they would take to implement attributes, and the potential outcomes of those approaches.

Holding the line

27. We anticipate that developing sediment attributes will contribute significantly to long-term protection of ecosystem health values in freshwater bodies and receiving environments through objective and limit setting processes. We intend to procure research that would assist councils with sediment objective setting for estuaries that ideally will be delivered prior to the gazettal of NPS-FM reforms.
28. Where sediment indicators are below bottom lines, inter-generational efforts may be required to restore water quality above the bottom line. For example, Waikato's Proposed Plan Change 1 has 80-year timeframes in some catchments to achieve visual clarity objectives that are roughly comparable to the draft proposed attribute bottom lines.
29. Incorporating sediment attributes in regional plans will take several years because plan-making is time-consuming and cyclical. The other types of interventions outlined in Appendix A that you are considering through Essential Freshwater and other policy programmes (for example, 1 Billion Trees funding regimes) will drive short-term action on the ground that will improve sediment outcomes.

Costs and benefits – summary

30. Reducing sediment loading requires significant changes in land management practices, infrastructure development and operation, and land use. If you approve further development of the attributes, we will undertake quantitative and qualitative impact testing of the proposed attributes. This will incorporate several components:
- sediment load reduction required to meet attribute bottom lines per catchment
 - land use and management change scenarios to achieve the required reduction
 - analysis of the various scenarios' costs and benefits and to whom they accrue.

31. We anticipate being able to describe broad scale economic impacts of the regulation by February 2019 and will endeavour to provide more specific and tailored economic impact testing by April 2019 to inform consultation.

Costs of business as usual

32. The economic, social, and cultural cost of doing nothing (the cost of environmental degradation through current business as usual policy regimes and resultant sediment discharges) is difficult to estimate comprehensively for two main reasons.
- Some costs of degradation cannot be quantified and/or should not be considered in monetary terms (e.g. species extinction or degradation of tapu sites).
 - For many of the costs that can be quantified and/or monetised, there is inadequate information to do so robustly. For example, attribution of specific or proportional ecosystem health decline due solely to sediment is usually impossible because ecosystem health responds to multiple stressors of which sediment is only one (though often a major) component.
33. *Our Land 2018* report cites that erosion costs New Zealand \$250-300 million/year, which is derived from a 2001 study⁷ that remains the most widely cited source on national costs of degradation from erosion and in-stream sediment. Academic work on the subject highlights the major difficulties and limitations of accounting for erosion and sediment's economic impacts as well as effects on social and cultural well-being.
34. Our economic impact testing of the regulation will include estimation and discussion of the cost of degradation associated with business as usual policy.

Costs of sediment discharge reductions

35. Implementing sediment attributes would have significant resource impacts on councils, landowners and resource users. As noted above, we are doing work to estimate public and private costs of implementing this regulation.
36. The Sustainable Land Use Initiative (SLUI) in the Horizons region provides a useful starting point for resource estimates. Over the past decade, SLUI has spent over \$65 million (~1/3 central government, 1/3 regional council, 1/3 landowner) resulting in, among other things, 660 farm plans, land use mapping of 500,000ha, and 30,000ha of on-farm erosion mitigations. These interventions cover about 12% of Horizons' total highly erodible land area. A recent review of SLUI's impact on water quality trends⁸ showed that:

" statistically significant associations between improving trends for all water quality variables [including suspended sediment indicators] and the proportion of catchment involved in SLUI farm plans. There were also significant associations between improving water quality and additional [Horizons Regional Council] initiatives associated with riparian planting and new fencing."

37. Councils already spend ~\$14.5 million per annum on erosion-related goods and services: \$9.2 million for erosion management – farm plans, provision of trees, and implementation costs – and \$2.1 million for riparian management. They also employ, in aggregate, 107 FTE

⁷ Krause, M. et al. (2001) Muddied waters: Estimating the national economic cost of soil erosion and sedimentation in New Zealand. Lincoln, Landcare Research.

⁸ Snelder, T. (2017) Assessment of recent reductions in E. coli and sediment in rivers of the Manawatū-Whanganui Region Including associations between water quality trends and management interventions

directly related to sediment and erosion management.⁹ Councils anticipate they would need to expand this resourcing to implement sediment attributes.

38. MPI's Hill Country Erosion programme has a budget of \$34 million for the next four years. This will be used to increase councils' capacity to engage with landowners, develop farm plans in erosion-prone areas, and expand the area treated with erosion mitigations.

Co-benefits of sediment discharge reductions

39. Mitigations to reduce sediment loss virtually always carry co-benefits for reducing loss of nutrients, contaminants, and in some cases heavy metals. The specific mitigations (for example, afforestation) may also provide carbon sequestration and land productivity benefits through maintaining or improving soil health and quality.
40. More widely, as indicated above, reducing sediment loss can have numerous co-benefits including society-wide natural hazard and climate change risk reduction, increased productivity in aquaculture and fisheries, reduced costs for municipal water supply and treatment systems, hydropower operators, etc.

Risks

41. Councils are expecting Government to prescribe sediment attributes and have delayed developing their own in anticipation of national direction. There is therefore a risk that if we do not progress sediment attributes, councils will take several years to develop their own and they will be inconsistent between regions.
42. The inclusion of sediment attributes with bottom lines in the NPS-FM would significantly affect council planning around erosion and sediment management controls in relation to urban development and primary sector activities. We are managing this risk through early and frequent engagement with a range of stakeholders from councils and representative bodies.
43. In many areas, councils would have to set sediment objectives where there is no long-term monitoring data. We will manage this risk through:
- production of guidance on usage of modelled data for in-stream and receiving environments objective setting for sediment
 - monitoring requirements and guidance on network design, operation, and use for attribute implementation long-term
 - s 9(2)(f) iv, [REDACTED]
44. Council staff said the biggest barrier to attribute implementation would be council human resourcing capacity and capability and overall funding, which they described as linked issues. Second-tier barriers include timeframes for attribute implementation and information available to support plan-making provisions including appeals and court processes.

⁹ Robb, C. & Brown, I. (2018) Regional Sector Capacity and Capability - Erosion and sediment. Report commissioned by Resource Managers' Group

Option B: In-stream sediment monitoring requirements

Addressing the problem

45. This option is to develop defined in-stream sediment monitoring requirements beyond the generic NPS-FM Policy CB1 monitoring plan components related to attributes and NZCPS policy 22 connected to monitoring sediment deposition and its impacts on coastal environments.
46. This intervention would support councils' implementation of sediment attributes – how they undertake the regulatory processes and meet the requirements associated with NPS-FM attributes. It would also facilitate long-term policy development for estuaries and other receiving environments because it would fill critical data gaps around sediment loading.¹⁰ We will provide you a preliminary briefing on policy development for receiving environments (including estuaries) in the next month.

Holding the line

47. Implementing this option will underpin long-term sediment management efforts. It will provide the basic information necessary to set sediment objectives in regional plans and evaluate intervention effectiveness in a rigorous manner. Currently, sediment monitoring in many areas is inadequate to measure in-stream sediment and robustly link it to land use and activities at the catchment or Freshwater Management Unit (FMU) scale. Although modelling can provide helpful information, the level of detail required for plan-making processes will necessitate improved observed datasets.

Costs and co-benefits

48. Development and maintenance of representative in-stream sediment monitoring regimes that provide information on total loading can be expensive and the bulk of costs associated with this option would fall on councils.
49. There is a strong argument for central government financial support to councils to design and install monitoring networks that support national environmental monitoring needs in an optimal manner. s 9(2)(f)(iv)
50. As we develop this option further, we will assess its likely costs and council resourcing necessary to implement it.

Risks

51. The primary risk associated with this option is that a nationally adequate in-stream sediment monitoring system (to implement sediment attributes and support long-term policy development for receiving environments) may not align with regional capacity or capability.
52. We could mitigate this risk in the near-term by providing strong and specific direction on the needed monitoring systems and by providing financial and potentially administrative support for their construction. This would require active involvement of council technical staff to ensure the monitoring systems met regional and national needs and to obtain their buy-in to the whole process.

¹⁰ Hudson, N. et al. (2018) Managing upstream: estuaries state and values – methods and data review. Stage 1B report. NIWA client report, March 2018. Prepared for the Ministry for the Environment.

Option C: NPS-FM direction on integrated catchment management for sediment objectives

Addressing the problem

53. This option is to provide sediment-specific direction in NPS-FM Part C for integrated catchment management. Specifically, this option would require council plans to identify the following components and use them to support sediment objective and limit setting processes through the NPS-FM framework:
- high-risk sediment generating activities
 - high-risk erosion areas
 - sensitive receiving environments.
54. These are the basic components of a catchment-wide risk management framework for sediment issues. Incorporating these elements in planning processes would help councils:
- make explicit linkages between catchment characteristics, land use activities, and management of sediment from diffuse and point sources
 - improve consideration of seasonal differences and extreme events that can drive catchment sediment loading
 - sharpen focus onto the practical interventions to address the identified risks.

Holding the line

55. We consider that implementing this option will indirectly improve long-term sediment management through planning processes and will directly underpin the implementation of sediment attributes.

Costs and co-benefits

56. Council policy staff indicated that this requirement would not have significant resourcing impacts and would be relatively straightforward to implement.
57. The primary co-benefit of this option is that it would underpin the implementation of sediment attributes, the NZCPS integration policy, and generally promote wider integrated catchment planning.

Risks

58. The primary risk associated with this option is that it may become a “box-ticking” and “lip-service” exercise that does not robustly inform plan-making. We will mitigate this risk through engagement with council staff through various work programmes including the at-risk catchments project (Essential Freshwater Briefing #22 “Proposed Scope and approach to the at-risk catchments project”).

Interventions considered unviable for further development

59. We considered two other options comparable in scale of impacts on landowners and resource users to Option C but found them to be unviable. These options have not been analysed

further:

- s 9(2)(f)(iv)

- s 9(2)(f)(iv)

60. s 9(2)(f)(iv)

61. s 9(2)(f)(iv)
62.
63.

Recommendations

64. We recommend progressing further development of all of the provided options to form a coherent package.

Alignment of option with LAWF recommendations

65. Our recommended course of action generally aligns with LAWF's recommendations related to sediment issues.

- We propose developing sediment attributes for potential inclusion in the NOF, and we will be testing them through the Science and Technology Advisory Group and with a Regional Council sediment working group among other stakeholders if you approve (LAWF recommendation 19 – develop sediment attributes).
- We are aligning policy programmes connected to farm planning, high-risk activities and erosion-prone areas (Essential Freshwater Briefing #18), but we do not

presuppose solely regulatory responses per LAWF's recommendations (16a and 16b – farm plans and activity regulation).

- We propose developing monitoring requirements and guidance as well as other data acquisition dependent on Budget Bid processes. These address LAWF's recommendation (17, 18c – data, information tool, and guidance development).
- s 9(2)(f)(iv)

Issues relating to Māori rights and interests

66. s 9(2)(f)(iv)

Rural proofing

67. In future briefings we will provide details on the possible avenues councils may take to implement the sediment attributes and their financial and social implications. The financial implications on primary industry, especially in hill country areas, are likely to be significant and negative with linked impacts on rural communities. There will also be positive implications for the primary sector in relation to aquaculture and fisheries, reduced natural hazard risk, and improved functionality of water storage dams and linked infrastructure.

Next Steps

68. If you agree with the proposed policy development approach, we will provide advice on specific components in February 2019 following consultation with the advisory groups and other stakeholders as well as results from initial impact testing of the options.

Appendix A: Table of proposed policy development package related to sediment

Document 4

Planned policy development approach – bolded text indicates delivery mechanism

Planning system	Activity controls	Farm/soil management planning	Economic instruments	Data/tool support
Sediment attributes including bottom lines for in-stream suspended and deposited sediment (NPS-FM)	Activity status controls in erosion-prone areas (Essential Freshwater Briefing 18)	Soil conservation components in farm environment plan work (Essential Freshwater Briefing 18)	Target erosion treatment funding and sustainable farming transition funding through existing mechanisms (1 Billion Trees, HCEF, PGF, etc.)	Data acquisition and incorporation in information tools (Budget Bid 2018): <ul style="list-style-type: none"> Elevation (LINZ-led) Soils Sediment monitoring and modelling
Further direction on integrated catchment management (NPS-FM)	Activity controls for high-risk activities such as earthworks and hill country cropping, at least in at-risk catchments (Essential Freshwater Briefing 18; Essential Freshwater Briefing 22)	Address capacity and capability gaps in farm environment plan and soil management systems (Budget Bid 2018)	Out of Scope	Support development and use of information tools (Budget Bid 2018): <ul style="list-style-type: none"> farm environment plans Compliance and enforcement
Monitoring requirements for sediment (NPS-FM)	Continue investigation of options for high-risk activity controls and standards development, for example, related to earthworks or land disturbance	Support development of catchment groups (Budget Bid 2018)	s 9(2)(f)(iv)	Investigate further options to support councils by development of tools for farm planning and sediment management
Ensure NPS-FM and NES-PF align when changes are made to the NPS-FM and NES-PF is reviewed (MPI-led)		Collaborate with the Urban Water Working Group to address sediment management in urban development (Urban Water Working Group)		

Table Key

Green components	To be delivered through Essential Freshwater: farm environment planning, at-risk catchments, high-risk activities, and linked work programmes.
Yellow components	Led by other agencies. We are actively influencing advice.
Blue components	Under consideration by other entities. We are awaiting the outcomes.
White components	Will be explored in Phase 2 beyond mid-2019.

Proposal	Work to characterise impact	Possible phase 2 work by December
<p>Work across the Essential FreshWater Package</p>	<p>What: Martin Jenkins Report on initial qualitative assessment of package as a whole (June 2019). Social impact analysis of Essential Freshwater - Austin (May 2019)</p> <p>Results: The Martin Jenkins report provided an overview of the major costs and benefits of the Essential Freshwater policy package based on regulatory impact material provided to them. The report also provided some initial descriptive case studies of the way in which the package would affect different types of land owners</p> <p>The social impact analysis report summarised the main indicative social impacts across key well-being categories for five priority policy areas. The positive social impacts associated with improved water quality, ecosystem health and providing for Te Mana o te Wai are likely to include:</p> <ul style="list-style-type: none"> reduced risk to human health (through improved drinking water quality) improved environmental amenity increased opportunities for cultural purposes and recreation. <p>The report found that this would likely contribute to improved physical and mental wellbeing, particularly at the local scale, and contribute to New Zealanders' cultural identity associated with a high quality natural environment. These positive impacts are likely to be felt by New Zealanders at large, including Maori and local farming communities. Negative social impacts include reprioritisation of council resources away from providing other services. The number of proposed regulations facing the agricultural sector, is likely to have an immediate negative impact on farmers' wellbeing (anxiety/mental health).</p>	<p>Phase 2 work will be focused on assessing and quantifying the cumulative impact of the package as a whole. This will include assessment of the environment, social, economic and cultural impacts. Specific projects are being currently scoped but could include: cultural assessment of whole package, economy-wide CGE modelling, more comprehensive assessment of the implementation cost on councils of increased requirements, assessment of the impact on land values of restricting future activities, and assessment of avoided costs from taking action (eg preventing further contamination, remediation of waterways).</p> <p>Phase 2 work is also intended to assess (where possible) the cumulative (or offsetting) impact across related policy areas, including water, climate change, biodiversity, urban development, NPS-versatile soils programmes.</p>
<p>Agriculture package</p> <ul style="list-style-type: none"> - Mandatory Farm Environment Plans - Reducing Nitrogen - High risk Land Use Activities: Stock Holding Areas and Feed Lots - Intensive Winter Grazing of Forage Crops - Agricultural intensification - Stock Exclusion 	<p>What:</p> <p>Internal MfE Analysis LandCare Catchment Case Study for the Ruamahanga Macfarlane Rural Business (MRB) Farm Case Studies AgFirst Farm Case Studies National Stock Exclusion Study - July 2016 (MfE and MPI)</p> <p>Results:</p> <p>Mandatory Farm Environment Plans About 28,000 more farms will need a FEP by 2030, councils will need to monitor compliance. Estimate \$3,500 per farm plan - \$100m total. Mitigation costs of potentially \$750m over 10 years \$38m to audit farm plans Benefits: 10-25% reductions in some contaminant discharges from good management practice. In some cases FEP process may identify farm system changes that may improve profitability and provide environmental benefits (eg, soil testing could suggested less fertiliser is needed).</p> <p>Reducing Nitrogen Estimated cost: Same as FEPs above with additional auditing costs of \$1500 per year (additional audit required) for applicable farmers in high N-impacted catchments Benefits: Reductions in excess nitrogen entering water ways (may be cost savings to farmers), lower freshwater planning costs - modelling showed a potential 7% reduction</p> <p>High risk Land Use Activities: Stock Holding Areas and Feed Lots Estimated cost: Approximately \$3,000 per consent, and an estimated \$72 per cow to meet infrastructure costs. Will reduce discharges from stock holding areas. Good quality stock holding areas may improve productivity</p> <p>Intensive Winter Grazing of Forage Crops Number of consents that would need to be issued. \$3000 per consent, estimated about 2000 additional consents required Annual area of intensive winter grazing. Potential production benefits, water quality benefits from better managements</p> <p>Agricultural Intensification Costs include: Mostly opportunity costs - revenue foregone; \$3000 per consent + more for expert opinion for evidence to support consent application (possibly tens of thousands per consent). Benefits include reducing further contaminants entering waterbodies and (avoided costs).</p> <p>Stock Exclusion Spatial analyses of river lengths in low slope areas, number of private properties impacted, hectares involved. 2016 study had lowland fencing cost of ~\$367m but didn't include streams <1m. 2016 study had benefits of \$983m (didn't include streams <1m) - benefits of this proposal would be greater.</p>	<p>The focus of phase 2 work will be on the package as a whole (see above), but potential specific further work on the ag package could include:</p> <ul style="list-style-type: none"> - Determination of impact of N-thresholds - Calculate impact on soil loss if intensively winter-grazing land was in grassland. - Map lowlands and stream length to give max fencing - Investigate the improved mapping of waterways to better estimate the impacts of stock exclusion.
<p>Changes to the NPS</p>		

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Sediment	<p>What: Cost Benefit Assessment from LandCare Research focussed on hill country areas. Cost and erosion reduction of development mitigations - report from Morpum.</p> <p>Results: One-off intervention costs to achieve the new national bottom lines of approximately \$100 million. Costs will be borne by resource users, local and central government proportionally according to future policy choices (especially funding of works). Benefits: Approximately \$35 to \$40 million annually due to improvements in water clarity (aesthetics). More categories of benefit will be able to be described as work progresses.</p>	As above - phase 2 work will focus on the aggregate impact of the package as a whole
Wetlands	<p>What: Internal MfE Analysis including expert reports and journal articles</p> <p>Results: <28,933 ha impacted, most in Canterbury, West Coast, Otago, Southland and Waikato. The reports looked at the values of ecosystem services for wetlands; evidence of wetland loss; the estimated area of wetlands; the indicative costs of constructed wetlands; and the value of ecosystem services of remaining wetlands on fertile land. Non-protected Inland wetlands on fertile land provide \$1.4b a year of ecosystem services. These are the wetlands that are likely to be drained under the status quo.</p>	
E. coli for Swimming	<p>What: Internal MfE Analysis</p> <p>Results: The location and number (153) of non-compliant swimspots has been identified (approximately half of tested sites). Fencing required (if all unfenced) - cost of fencing (assuming all new fencing) up to \$714m (one-off cost, assume 25 year life for fences). Number of waste treatment plants upstream of non-compliant swimspots (26). Number of wastewater treatment plants needing new consents over next 10 years (using previously commissioned DIA case studies on waste water consenting). Avoided disease benefit being considered (could be up to \$186 million per year based on health costs of Havelock North outbreak)</p>	
Updating the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 to require real-time reporting of water use	<p>What: Internal MfE Analysis including consultation with regional councils</p> <p>Results: Cost estimated at \$14.3m annually (upper bound) Benefits include:</p> <ul style="list-style-type: none"> • water use efficiency • setting allocation and low flow restriction policies and operational practices. • efficient use of council resources, particularly regarding compliance, monitoring and enforcement. • greater ability for integrated surface and groundwater management. 	
Providing for Hydro-electricity Generation Infrastructure	<p>What: Assessment of the Impact of Flow Alterations on Electricity Generation - Halliburton (March 2015).</p> <p>Results: The report looked at the impact of reduced flows on hydro generation. It examined seven separate reduced flow scenarios in different catchments, as well as a further scenario which combined the effects of the seven separate scenarios. The impact was most visible in the combined scenario which significantly increased minimum flows across several catchments, and resulted in an average annual increase in short-run marginal cost of \$15 to \$31 per MWh.</p>	
Recognising all components of ecosystem health	<p>What: Internal MfE Analysis</p> <p>Results: One-off capital costs of \$2 million for councils for monitoring equipment, and ongoing monitoring costs which they may recoup via consents from resource users. Approximately \$20 million to mitigate the lack of fish passage through existing structures. Improved fish passage. Better, and more explicit, protection of freshwater ecosystems.</p>	
Directing clearer ecological outcomes for river flows and water levels	<p>What: Internal MfE Analysis</p> <p>Results: The major benefit is that all fauna in an ecosystem will be considered when setting minimum flow thresholds and allocation limits. It will also provide improved clarity of process. Costs include council assessments of the needs of the ecosystem for flows. The impacts that this clarification would have on users having reduced access to water has not been estimated.</p>	
Reporting on the five components of ecosystem health	<p>What: Internal MfE Analysis</p> <p>Results: Impacts limited to additional council resource for the additional monitoring burden. Better, and more explicit, recognition and understanding of freshwater ecosystems. Increased understanding of freshwater ecosystems leading to improved decision-making.</p>	
Maintaining or improving water quality	<p>What: Internal MfE Analysis</p> <p>Results: Low implementation costs, Scope for increasing contaminant loads removed (0.8-6.4% headroom removed). This policy will prevent regional councils reducing water quality, this will help to protect the ecosystem services provided by waterways.</p>	
Te Mana o te Wai in the Freshwater NPS	<p>What: Internal MfE Analysis</p> <p>Results: Costs to councils due to increased community engagement. Improved information, and clearly defined aspirations for ecosystem health are expected to lead to council decisions requiring higher freshwater objectives. The impacts of this would be considered by councils at the time that plan changes are made and has not been assessed here.</p>	

<p>Preventing further loss of streams</p>	<p>What: Internal MfE Analysis</p> <p>Results: Developers may face lost profits (though we expect that this will vary based on development design, topography of land, amount of streams present, and the ecological values that need to be offset). Will increase consenting, monitoring and compliance costs for some councils.</p> <p>In terms of benefits, it will encourage more efficient use of land and infrastructure, and strategic consideration of locations for housing intensification. Additionally, there will be benefits to ecosystem health of maintaining habitat and connectivity. There will be social and cultural benefits to general public including increased public awareness of urban stream ecosystems, corridors for cycling, walking, and traffic-free routes.</p>	
<p>Direction to Territorial Authorities to Support Integrated Management</p>	<p>What: Internal MfE Analysis</p> <p>Results: The impact is minimal and limited to staff resources at territorial authorities.</p>	
<p>The requirement to set 'limits' for water quality and quantity</p>	<p>What: Internal MfE Analysis</p> <p>Results: Low impacts, largely a clarification of existing policy.</p>	
<p>Improving Māori involvement in freshwater management: Better incorporation of Māori values and measures of freshwater health</p>	<p>Policy still being developed and will be assessed as part of assessment in phase 2</p>	

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