Resource Economics

Reforms to the Resource Management System: *an analysis of potential impacts for Māori, the housing market and the natural environment*

Report for the Ministry for the Environment

by Resource Economics Ltd, in collaboration with Principal Economics and Sapere

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Introduction

Background

This report examines the expected costs and benefits of proposed changes to New Zealand's resource management (RM) system. The analysis includes the effects on Māori, the housing market and the natural environment.

The reform proposals examined stem from the report of a Resource Management Review Panel ('the Panel') appointed by the Minister for the Environment in 2019 to undertake a comprehensive review of the RM system, with specific aims of identifying ways to improve environmental outcomes and better enable urban and other development within environmental limits. The Panel reported back in June 2020.[1]

The Government has considered the Panel's recommendations and, consistent with it, has decided to reform the Resource Management Act 1991 and replace it with three new pieces of legislation:

- A Natural and Built Environments Act (NBA)[2] to replace the RMA;
- A Strategic Planning Act (SPA) to provide a framework for regional spatial planning throughout New Zealand; and
- A Climate Adaptation Act (CAA) to address powers and funding for managed retreat.

The details of these pieces of legislation are still being developed, building on the Panel's report and additional work by Ministers and officials, including the recent publication of an 'exposure draft' of the NBA.[3]

The Analytical Task

Our task in this analysis is to examine the expected costs and benefits of the reforms. This is challenging because the changes are currently articulated mainly as broad principles and high-level descriptions of the institutional arrangements. Much of the detail is still to be developed, and the benefits of the reforms will depend on the physical outcomes that result, eg how much will pollutant emissions reduce, housing affordability improve, or Māori engagement increase?

Our approach is therefore focussed on understanding the nature of costs and benefits under the different domains and how these are expected to change at the margin, eg whether increased environmental quality will yield positive net benefits. This approach provides an indication of the potential for benefits in different domains. The realisation of

[1] Resource Management Review Panel (2020)
[2] Or NBEA as abbreviated by the Panel
[3] NZ Government (2021)

these potential benefits is dependent on the final design and implementation of the reforms.

Interpretation and Analysis

The Government has set five reform objectives, summarised in Table ES1.

Table ES1 Reform objectives agreed by the Government

Domains/ Problem areas	Reform Objectives
Natural environment	Protect and where necessary restore the natural environment, including its capacity to provide for the well-being of present and future generations
Development	Better enable development within environmental biophysical limits including a significant improvement in housing supply, affordability
Te Tiriti	Give effect to the principles of Te Tiriti o Waitangi and provide greater recognition of te ao Māori, including mātauranga Māori
Climate and risk	Better prepare for adapting to climate change and risks from natural hazards, and better mitigate emissions contributing to climate change
System performance	Improve system efficiency and effectiveness, and reduce complexity, while retaining appropriate local democratic input

Source: NZ Government (2021)

The natural environment objective retains the emphasis of the Panel on obtaining positive outcomes. The RMA includes the requirement to "*avoid, remedy, or mitigate any adverse effect on the environment arising from an activity*" (Section 17) but the context is that the intervention is driven by the need to manage the effects rather than in identifying desirable environmental outcomes.

Development is to be enabled, particularly to increase housing supply and associated infrastructure, but only within defined environmental limits. This raises the potential for conflict between development that might be constrained by limits versus environmental goals that seek to go beyond and above limits, although this is no different from the need currently to assess the costs and benefits of developments.

The Treaty clause is strengthened significantly both in terms of giving effect to the principles and introducing the concepts of te ao Māori[4] and mātauranga Māori.[5] Also recognised in the objectives are the risks of climate change reduced complexity and greater efficiency of the overall system.

To meet the reform objectives, a Ministerial Oversight Group (MOG) has identified and clarified the intended outcomes of the RM reform across the different domains (Table ES2).

Below we set out the problems and the results of a review of costs and benefits. Where possible this is in the form of formal cost benefit analysis (CBA) but in most cases there are too many uncertainties over outcomes in addition to a lack of data for valuation.

[4] Te Ao Māori (the Māori world) introduces the concept of interconnectedness of living and non-living things. It is consistent with the protection and enhancement of the environment for its own sake, as opposed to solely to support the needs of present and future generations, while not being explicit about how this might apply in situations that require trade-offs amongst different factors affecting wellbeing.

[5] Mātauranga Māori is Māori knowledge that adds to the understanding of the natural environment for the purposes of policy decisions.

Table ES2 Intended outcomes of RM reform

Domain	Intended outcomes from reform objectives
Natural environment	• the natural environment is protected and restored, and the health of New Zealand's fresh water, coastal water, air, soil, ecosystems and their ability to sustain life are maintained in line with *Te Oranga o te Taiao* • nationally and regionally significant landscapes, natural features, habitats for indigenous species, native biodiversity and the natural character of the coast, river and lakes are maintained or where appropriate enhanced • important indigenous species and their ecosystems are protected and where necessary restored
Development	• more flexibility for people to use resources and for places to change, while looking after the natural environment • the right infrastructure, in the right place at the right time, that provides adequate access to economic and social opportunities and enables people to maximise their wellbeing • housing supply is responsive to demand, with competitive land markets enabling more efficient land use and responsive development, which helps improve housing supply, affordability and better meets a range of housing needs (by type, size, location and price point)
Te Tiriti	• process and substance of the National Planning Framework (NPF) and plan-making decisions give effect to the principles of *Te Tiriti* and reflect *te ao Māori*, including *mātauranga Māori* • Māori have the opportunity to participate as Treaty partners across the RM system, including in national and regional strategic decisions, and are sufficiently resourced for duties or functions that are in the public interest • Māori customary rights, cultural values and Treaty settlements are protected, and equitable access to resources for Māori is ensured • improved central and local government capability to effectively work with Māori
Climate and risk	• costs, disruption and distress due to the impacts of climate change and natural hazards are minimised in the long term for society as a whole • long-term and predictable arrangements for risk sharing, and funding and financing of risk reduction and adaptation action are in place • new development and communities are located and designed to be resilient to and reduce the risks from natural hazards and long-term climate impacts • existing development and communities are proactively and equitably transitioned to reduce unacceptable risks from natural hazards and long-term climate impacts • the RM system supports national instruments and programmes to contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5 degrees Celsius above pre-industrial levels
System performance	• unnecessary costs removed and net benefits maximised • greater certainty, consistency, fewer plans, consents and appeals, faster plan preparation and faster approvals • external costs fall where they should and the burden of system processes shifts towards the public sector • decisions and decision-making provides reasonable opportunities for public participation, including by communities currently under-represented in the system, and better reflects communities of interest • greater public input into strategic decisions and less direct input into site-specific appeals, with the input of communities proportionate to the issues at stake

Source: Ministry for the Environment

System Efficiency

The current system has high costs for users, especially in consent processes. There are also inefficiencies in approaches to: (1) resource allocation, eg using first-in-first served for water permit allocation, with limited potential for subsequent transfers, and (2) policy instruments and the limited use to date of economic instruments.

There are expected to be net cost reductions for RM system users, including business and householders. This includes annual net process cost reductions for users of $149 million in

addition to average process cost reductions of $83 million, balanced by expected increases in net costs for central and local government. In aggregate there are expected to be annual cost reductions of approximately $168 million or close to $2.6 billion as a present value (PV) over 30 years.

Changes to resource allocation will enable resources, including water, to be allocated to the users that most value the resource. Greater use of economic instruments is expected to yield benefits from increased flexibility in compliance.

Natural Environment

The analysis of the natural environment issues is summarised in Table ES3, with the individual components set out below.

Table ES3: Expected impacts of the RM reforms on the natural environment

Natural Environment Domain	Existing National Direction and Limits	Expected changes	Potential benefits
Freshwater	Essential Freshwater programme, including NPS-FM 2020, NES-FW, stock exclusion regulations	Potentially faster implementation	Bringing compliance forward by 10 years estimated to yield PV of $92 million
Coastal / Marine	NZCPS	NZCPS extended into the wider coastal environment. Potentially additional MPAs and greater flexibility in aquaculture permits.	Net benefits not quantified, but an example wastewater investment to improve water quality suggests positive net benefits.
Air Quality	NES-AQ introduced in 2004 and amended in 2011. Further amendments proposed in 2019	Tighter standards with greater national direction to councils.	CBAs of air quality improvements suggest significant positive net benefit. In practice this will depend on the policy instruments used.
Soils	NES-CS and NES-STO. Proposed NPS-HPL	More integrated national direction covering all aspects of soil quality. This will include the use of Regional Spatial Strategies.	Net benefits highly uncertain and are not quantified.
Biodiversity, habitats, ecosystems	ANZBS and proposed NPS-IB	Implementation of the NPS-IB	A draft CBA of the proposed NPS-IB suggests, but does not quantify, positive net benefits.

Freshwater environments

Many of New Zealand's native freshwater fish species and ecosystems are under threat. Freshwater quality has deteriorated in New Zealand from factors that include run-off or leaching of nitrogen, phosphorus, sediment and pathogens (particularly *E coli*). Changes to the physical form of waterbodies and their flows can make places unsuitable for some species to live, while climate change is expected to exacerbate the pressures currently facing our freshwater species and ecosystems.

Current national direction includes the National Policy Statement for Freshwater Management (NPS-FM), the National Environmental Standards for Freshwater (NES-FW) and Section 360 stock exclusion regulations. In combination these constitute the Essential Freshwater (EFW) programme. It follows an approach similar to that envisaged under the reforms; it is led by central government to produce national direction, and involved extensive consultation with a wide range of stakeholders resulting in significant changes to take account of sectoral concerns.

To analyse the potential effects of the reforms, we assume there is greater national input to the timing of response such that implementation is brought forward. As an example, bringing forward the changes by ten years would be expected to produce annual net benefits of $6 million; the PV over 30 years at 5% is $92 million.

Coastal and Estuarine Environments

An estimated 30% of New Zealand's biodiversity is in the sea but many species are at risk. In addition, there are problems with water quality in many locations close to towns and cities, with impacts on recreational use and ecosystems. aquaculture permits have been fixed in space and duration, which has limited their value compared with a mopre flexible system of permitting.

National direction is provided currently via the New Zealand Coastal Policy Statement (NZCPS); it covers the coastal marine area (CMA) but not the wider coastal environment that affects the CMA. It is expected that revised national direction will take a more integrated approach that includes the whole environment affecting the marine area.

For analysis, we have assumed that the reforms will lead to greater integration of planning and controls on this wider area, with potential improvements in marine water quality. In addition, we have examined the potential net benefits of greater national direction leading to increases in marine protected areas (MPAs)[6] and more flexibility in aquaculture permits.

- A significant increase in MPAs is widely proposed internationally and by New Zealand scientists. They have costs to existing users of marine space, including commercial and recreational fishers, who are expected to have increased costs for fishing elsewhere. This would be balanced by the improvements in marine biodiversity in the MPAs, potential for more high value recreation (eg diving), existence benefits and potential positive spillovers to fished areas.

- Flexible aquaculture permits would provide greater scope for changes in location, however the net benefits are highly uncertain and would need to be further researched in New Zealand.

- Improvements in marine water quality are expected to be high cost and may be driven significantly by changes already underway as part of the widescale three waters reforms, but improvements in water quality are expected to yield positive net benefits.

[6] This is consistent with assumptions in biodiversity protection that national direction will include steps towards the Global Deal for Nature target of 30% of land and sea areas being protected.

Air Quality

Air quality problems include human health effects, reduced visibility and discolouration of air, and nuisance and amenity effects, including dust, smoke, materials damage and odour.

Currently national direction consists of the National Environmental Standards for Air Quality (NES-AQ). These were originally introduced in 2004, amended in 2011, with further amendments proposed in 2019.

The impacts of the reforms on air quality are uncertain. However, we assume that the reforms would result in tighter air quality standards and potentially in the introduction of national level instruments, including economic instruments.

For analysis of the costs and benefits we have assessed existing CBAs of air quality standards and policies. These suggest significant positive net benefits from improvements, although this depends on the policy instruments adopted. Air quality may be a domain where economic instruments could be used to yield net benefits at least cost.

Soils

Environmental issues that are affected by the quality of soil resources include:

- Impacts on the ecosystem services that rely on soil quality;
- Hazardous substances and contaminated sites; and
- Loss of highly productive soils.

Currently national direction includes the National Environmental Standard for assessing and managing contaminants in soil to protect human health (NES-CS) and the National Environmental Standards for Storing Tyres Outdoors (NES-STO). In addition, there is a proposed National Policy Statement for Highly Productive Land (NPS-HPL). The requirements are somewhat piecemeal, especially the inclusion of a NES for outdoor tyres rather than a more comprehensive set of hazards and contaminants.

The exposure draft of the NBA requires environmental limits to be set for soils. For analysis we assume that limits are set, and that national direction is provided more comprehensively covering all aspects of soil quality. This will include the use of Regional Spatial Strategies.

Good quality soil has very high value but there are few studies of the costs and benefits of soil conservation. However, we would expect well-specified soil conservation policies to yield positive net benefits. A CBA of the NES-CS suggested benefits in the same order of magnitude as costs, but with many environmental benefits unquantified.

There appears to be a potential market failure resulting in building on highly productive land on urban fringes, but this needs further analysis and the case for intervention needs to be made from a revised assessment of costs and benefits, which are expected to vary widely by location.

Biodiversity, Habitats and Ecosystems

There are urgent calls for biodiversity protection internationally, recognising the fundamental dependence of humans on nature for services that include the significant loss of insects pollinating crops and of plants with potential for provision of medicines, in addition to the feedback effects on climate change and loss of species valued in their own right. The Review Panel suggested New Zealand's biodiversity (native plants, animals and ecosystems) is under significant threat. It is particularly vulnerable because of the percentage of indigenous species found nowhere else.

The Aotearoa New Zealand Biodiversity Strategy (ANZBS) is a government strategy that provides the basis for ambitious improvements in biodiversity conservation, achieved via a collaborative approach with widespread community participation. In addition, there is a proposed National Policy Statement on Indigenous Biodiversity (NPS-IB). It is intended to achieve more consistency in councils' monitoring and management approaches, and resulting in better outcomes for biodiversity.

The RM reforms are expected to reinforce rather than replace this approach, and in particular, to see the adoption of something similar to the NPS-IB. They may include additional direction to councils, particularly relating to the assessment and management of biodiversity on private land.

It is not possible to draw any domain-wide conclusions on the net benefits of biodiversity improvement as the benefits and costs are highly site, type or ecosystem specific. Nevertheless, the existing literature suggests the high value of biodiversity and provides examples of significant positive net benefits, even when many benefits cannot be quantified in monetary terms. The draft CBA of the NPS-IB speculates on positive net benefits.

Built Environment

In the built environment, problem identification is focused on the housing market and specifically the high costs of housing and its (perceived) unaffordability. House prices reflect supply and demand factors and many of these are beyond the scope of the RMA. The reforms, including the NBA, NPF and SPA, intend to lead to positive housing outcomes in terms of affordability, choice and timely provision of appropriate infrastructure.

We have examined the potential costs and benefits of RM reforms on the housing market by making a starting assumption that they will result in a regime in which many barriers to development would be removed and that this would be expressed as an increase in the elasticity of response to housing demand. This is the same approach as used in recent analyses of the NPS-UD. It is unclear at this stage whether the reforms would be beyond those in the NPS-UD and our analysis, to some extent uses the same assumptions, although we also assess benefits in the form of increases in producer surplus, ie benefits for developers in addition to consumers (households).

Obtaining the maximum benefits assumes the reforms maximise transparency, in the sense that RM system users have a much greater awareness of what consent applications will be successful and under what conditions, and councils are clear and consistent in the use of

urban boundaries. In addition, we assume national direction provides clarity around interactions with other legislation and inconsistencies are removed.

We estimate total annual benefits of increased affordability of $146 to $832 million. This results in a PV of $2.2 billion to $12.8 billion over 30 years at 5%.

We have examined whether there would be offsetting reductions in environmental quality resulting from the intensification of development. The analysis suggests this is uncertain. However, given the high-level nature of this analysis, we have not examined all the externalities that may result. This includes potential aesthetic impacts (which may be in either direction depending on the quality of design) and agglomeration benefits.

Māori Participation

Compared to pre-RMA days, Māori involvement in processes under the RMA has improved, though this was from an initial base of almost nil. Nevertheless, concerns remain around the 'strength' of the legislative requirement in respect of RMA decisions as they relate to Māori (ie current decisions do not consistently give effect to the principles of the Treaty). Moreover, the RM system as it stands, sees low rates of participation by Māori.

Further, even where consideration of a Māori perspective (and associated advice leading to best practice around such perspective) is included in the legislation, primacy seems to be given to other factors. For example, the requirement in the current Act to "have particular regard" to kaitiakitanga has been problematic in the sense that it must be considered alongside several other factors.

Thus, there are problems around Māori involvement *in* the RM system (ie at a 'governance' level) as well as Māori involvement *with* the RM system (ie at a 'management' level).

We have attempted to value the benefits of increased Māori participation in monetary terms. This has used a mix of reductions in costs, eg for disputes and occupations, and WTP for better processes and outcomes amongst Māori and others. Table ES4 summarises the estimates of benefits. The benefits that we have speculatively quantified add to a total of $120 to $474 million per annum. This would add to a present value of $1.8 to $7.3 billion over 30 years at 5%.

Table ES4 Potential net benefits of greater Māori participation

Element	Description	Estimated benefit ($ per annum)
Direct impact change	Avoided costs of disputes, occupations, and protests	$3.4 million (in range of $2.5 - $5 million)
	Surplus generated due to Māori having higher WTP for altered outcomes	ND
Cultural identity expression	Enhanced welfare from being able to protect and promulgate Māori culture and practice	$117 - $469 million
Trust	Greater level of trust, inclusivity and equity as well as better information for decision-making	ND
Total	Quantified benefits only	$120 - $474 million

The analysis in this section is novel in nature, based on limited available data and information. As such, it is somewhat speculative and caution should be exercised in relying on the precision of the estimates presented. The estimated values are best described as indicative approximations.

However, the estimates are based on mechanisms that are plausible, and extend somewhat the domain in which assessments of impact for RM-related reform take place. On that basis, they provide a basis to work from, rather than 'the final word' on such impact analysis.

Summary

Table ES5 summarises the overall expected impacts of the reforms for the issues covered in this report.

Table ES5 Summary of Impacts

Domain	Comment	Impact *($million)*[1]	Evidence certainty[2]
System Efficiency			
Process and Compliance costs			
RM system users	Ongoing reduction in process and compliance costs: average annual benefit over 30 years, and Present value (PV)	Average annual net benefit: Process costs: $149 m Compliance costs: $83 m Total: $232m PV $3,573m	Medium
Regulators: central government	Net increase in process costs:	Average annual net cost: $19m PV $292m	High
Regulators: local government	Net increase in process costs:	Average annual net cost: $43m PV $661m	Medium
Total	Net reduction in process and compliance costs	Average annual net benefit: $168m PV $2,589m	Medium
Other efficiency improvements			
Resource allocation	Potential for efficiency gains (reduced costs and allocation to highest value uses)		High
Economic instruments	Wider use of economic instruments has potential for minimising costs of environmental improvements through flexibility in response.		High
Natural environment			
	Positive net benefits assumed where this is accompanied by CBA to justify additional intervention. Significant scope for beneficial improvements.		
Freshwater	Expected improvements in water quality from full implementation of EFW programme.	Brought forward 10 years: Average annual benefit: $6m PV: $92m	Low (uncertain whether changes would

Domain	Comment	Impact ($million)[1]	Evidence certainty[2]
	Increased net benefits if implementation brought forward or if standards tightened.		be made to existing EFW)
Marine & estuaries	Improved water quality expected to have benefits for active water users (eg swimmers) and existence values		Low
Air quality	Existing CBAs suggest positive net benefits if air quality improves.		Low
Soils	Net benefits expected from comprehensive set of limits covering all aspects of soil quality. Improvements assumed to soil conservation, contaminated soil and protection of highly productive land.		Low
Biodiversity	Significant benefits expected via national direction under the NPS-IB. Reforms expected to reinforce this.		Low
Housing supply	Increased land supply through spatial planning can better enable the market to respond to housing demand. Reforms are expected to reduce the barriers to consenting and to development, and to make housing supply more responsive to demand.	Benefits: conservative scenario: $146m pa PV: $2.2 billion Optimistic scenario: $832m pa PV: $12.8 billion	Low
Māori Participation	Iwi/Māori would have increased participation in decision making, greater control over outcomes and wider promulgation of ideas and culture.	Benefits of $120m to $474m pa PV: $1.8 to $7.2 billion	Low

[1] 30 years @5%;

[2] "Evidence certainty" refers to our assessment of the evidence base for the magnitude of each impact category.

1 Introduction

1.1 Background

This report examines the expected costs and benefits of proposed changes to New Zealand's resource management (RM) system. The analysis includes the effects on Māori, the housing market and the natural environment.

The reform proposals examined stem from the report of a Resource Management Review Panel ('the Panel') appointed by the Minister for the Environment in 2019 to undertake a comprehensive review of the RM system, with specific aims of identifying ways to improve environmental outcomes and better enable urban and other development within environmental limits. The Panel reported back in June 2020 when it summarised the current problem as including:[7]

- the increasing pressure on and declining state of New Zealand's natural environment;
- urban areas struggling to keep pace with population growth, with a lack of coordination between infrastructure investment and development, increasing road congestion and declining housing affordability;
- an urgent need to adapt to climate change and for an RM system that is consistent with and supports commitments to reduce greenhouse gas (GHG) emissions;
- the need to ensure that Māori have an effective role in the system, consistent with the principles of Te Tiriti o Waitangi; and
- the need to improve system efficiency and effectiveness.

The Panel noted that the Resource Management Act 1991 (RMA) contains valuable principles, particularly that of sustainability to ensure the needs of future generations are provided for. However, they suggest the many amendments to the RMA since its introduction have increased its length and complexity such that it is no longer fit for purpose. Rather than amend it further, the Panel concluded that the RMA should be repealed and replaced with three new pieces of legislation.[8] These were subsequently agreed to by Cabinet with small modifications as:[9]

- A Natural and Built Environment Act (NBA)[10] to replace the RMA;
- A Strategic Planning Act (SPA) to provide a framework for regional spatial planning throughout New Zealand; and

[7] Resource Management Review Panel (2020)
[8] Resource Management Review Panel (2020)
[9] NZ Government (2021)
[10] Or NBEA as abbreviated by the Panel

- A Climate Adaptation Act (CAA) to address powers and funding for managed retreat.

The details of these pieces of legislation are still being developed, building on the Panel's report and additional work by Ministers and officials, including the recent publication of an 'exposure draft' of the NBA.[11] Our task in this analysis is to examine the expected costs and benefits of the reforms, including the Government amendments. This is a challenging task because the changes are currently articulated mainly as broad principles and high-level descriptions of the institutional arrangements. Much of the detail is still to be developed, and the benefits of the reforms will depend on the physical outcomes that result, eg how much will pollutant emissions reduce, housing affordability improve, or Māori engagement increase?

Our approach is therefore focussed on understanding the nature of costs and benefits under the different domains and how these are expected to change at the margin, eg whether increased environmental quality will yield positive net benefits. To make this more tangible, we have made some assumptions about how the reforms might change practical outcomes. These are both speculative and somewhat hypothetical, but are made in the absence of additional and necessary information for a full CBA. We make this clear in the analysis.

1.2 Overview of Panel's Proposed Changes

The Panel proposed changes to the legislative approach are summarised below, starting with changes to system efficiency and effectiveness that underly the changes expected in the individual domains.

1.2.1 System efficiency and effectiveness

Changes were proposed to address current perceived complexity and inefficient processes leading to unnecessary expense and delay. The Panel also suggested the RMA tends to favour the status quo (or even lower environmental quality) by its focus on managing the effects of proposed developments, rather than facilitating changes to an improved environment.

To address these issues, the Panel proposed the following.

- Greater use of **mandatory national direction** by the Minister for the Environment to guide local government.

- **Improvements to local plans**, including:
    - the use of mandatory combined (regional/local) plans;
    - a more streamlined process for the preparation and change of plans; and
    - greater focus on the quality of plans to provide clearer guidance and a reduction in resource consent process costs.

- **Improvements to resource consents** and consent processes, including:
    - providing greater clarity about notification of consent applications;

[11] NZ Government (2021)

    - an alternative process to deal with consents for small, localised issues;
    - an improved ability to have more serious disputes over consents referred directly to the Environment Court;
    - better enabling regional councils to modify or extinguish resource consents where environmental limits are threatened; and
    - enabling territorial authorities to change land use consents to implement a managed retreat process as part of adapting to climate change.

- **Improvements in the designation** process[12] including extending the default lapse period to better protect opportunities for the provision of public infrastructure.

- **Improvements to policy instruments**, including:
    - a wider range of mechanisms to allocate resources such as freshwater and coastal space; and
    - more focus on the use of economic instruments to complement regulatory land use controls.

- **Better monitoring and enforcement** including:
    - regional hubs to coordinate enforcement effort in each region and introducing stronger penalties for offences; and
    - improving monitoring and oversight of the RM system, including through a new national environmental monitoring system and an enhanced audit and reporting function for the Parliamentary Commissioner for the Environment (PCE).

The Panel suggests the most significant change is the proposal for mandatory combined plans in each region, reducing the number nationally from over 100 to just 14. Combined plans would be prepared by a joint committee with representatives of the regional council, constituent territorial authorities and representatives of mana whenua. The Ministry for the Environment (MfE) would have an auditing role to ensure quality and consistency. An independent panel, chaired by a sitting Environment Judge, would hear submissions, review the combined plan and make recommendations on its provisions. Decisions would then be made by the joint committee, and a streamlined appeal process would follow.

The proposals for plan making are expected to have significant beneficial results:

- a simplified and more efficient process;
- better quality plans;
- the resolution of uncertainty arising from overlapping functions of regional councils and territorial authorities;
- greater clarity in plans including by minimising potential conflicts between the outcomes specified in the purpose and principles of the NBA; and
- fewer resource consent applications as a result of clearer guidance in plans.

[12] Designations enable a requiring authority (eg Ministers of the Crown, local authorities and network utility operators) to obtain authorisation in a specified area for public works (eg roads and other infrastructure) and to protect land for future public works.

1.2.2 Natural Environment

The proposed changes to the natural environment include:

- raising objectives for environmental protection to the level of **purpose, and requiring promotion of outcomes for the** protection of coastal environment, wetlands, lakes and rivers, outstanding natural landscapes, improving the health of ecosystems and avoiding further loss of biological diversity;

- **a national planning framework** to provide integrated direction on matters of national significance, or matters for which national or sub-national consistency is desirable; and

- setting of **mandatory environmental limits** (or bottom lines) for freshwater, coastal water, air, soil and habitats for indigenous species.

The changes are expected to provide a greater level of protection for highly valued features of the natural environment and, over time, for the restoration of resources such as waterbodies which have become degraded.

1.2.3 Built Environment

The proposed changes relating to the built environment include:

- revised **purpose and principles** to include objectives such as the availability of development capacity for housing and business purposes to meet expected demands, and the strategic integration of infrastructure with land use;

- **national policy statements** (NPSs) such as those currently in use (see Section 2.2.3);

- greater use of **economic instruments**; and

- **regional spatial strategies** (RSSs) under the SPA would identify areas suitable for urban growth (and those not suitable) and facilitate the provision of infrastructure to support growth, and better coordinate land use and infrastructure planning.

The changes are expected to improve certainty in the RM system by requiring the resolution of any potential conflicts between the identified outcomes through national direction or in the combined plans.

1.2.4 Climate Change Effects

The Panel concluded that the RM system should:

- complement the Climate Change Response Act 2002 (CCRA) and the emissions trading scheme (ETS) to help achieve GHG emission reduction targets; and

- enable adaptation to the impacts of climate change and reduction of risk from natural hazards.

It has recommended these issues be addressed by:

- providing **outcomes in the purpose and principles** of the NBA designed to reduce risks from natural hazards, improve resilience, reduce GHG emissions, promote activities that mitigate emissions or sequestrate carbon and to increase the use of renewable energy;

- addressing adaptation and mitigation via **mandatory national direction, combined plans** and **RSSs** under the proposed SPA; and

- separate legislation (now proposed as the CAA) which would establish an adaptation fund to support managed retreat.

1.2.5 Improving engagement with Māori

The Panel's consultation processes identified the need for a significantly greater role for Māori in the RM system and for the legislation to shift from *taking account* of the principles of Te Tiriti o Waitangi to *giving effect* to them. This would include:

- **national direction** on how the principles of Te Tiriti will be given effect;

- mana whenua to participate in decision-making for the proposed **regional spatial strategies** and in the making of **combined plans**;

- the creation of a **National Māori Advisory Board** to advise central and local government on resource management from the perspective of mana whenua; and

- an **integrated partnership process** between mana whenua and local government to address resource management issues at local government level.

1.3 Subsequent Decisions

The Government has made decisions in response to the Panel's proposals. It has set five reform objectives, summarised in Table 1 (see Annex 1 also).

Table 1 Reform objectives agreed by the Government

Domains/ Problem areas	Reform Objectives
Natural environment	Protect and where necessary restore the natural environment, including its capacity to provide for the well-being of present and future generations
Development	Better enable development within environmental biophysical limits including a significant improvement in housing supply, affordability
Te Tiriti	Give effect to the principles of Te Tiriti o Waitangi and provide greater recognition of te ao Māori, including mātauranga Māori
Climate and risk	Better prepare for adapting to climate change and risks from natural hazards, and better mitigate emissions contributing to climate change
System performance	Improve system efficiency and effectiveness, and reduce complexity, while retaining appropriate local democratic input

Source: NZ Government (2021)

The natural environment objective retains the emphasis of the Panel on obtaining positive outcomes. The RMA includes the requirement to "*avoid, remedy, or mitigate any adverse effect on the environment arising from an activity*" (Section 17) but the context is that the intervention is driven by the need to manage the effects rather than in identifying desirable environmental outcomes.

Development is to be enabled, particularly to increase housing supply and associated infrastructure, but only within defined environmental limits. This raises the potential for conflict between development that might be constrained by limits versus environmental goals that seek to go beyond and above limits, although this is no different from the need currently to assess the costs and benefits of developments.

The Treaty clause is strengthened significantly both in terms of giving effect to the principles and introducing the concepts of te ao Māori and mātauranga Māori.

- Te Ao Māori (the Māori world) introduces the concept of interconnectedness of living and non-living things. It is consistent with the protection and enhancement of the environment for its own sake, as opposed to solely to support the needs of present and future generations, while not being explicit about how this might apply in situations that require trade-offs amongst different factors affecting wellbeing.

- Mātauranga Māori is Māori knowledge that adds to the understanding of the natural environment for the purposes of policy decisions.

Also recognised in the objectives are the risks of climate change reduced complexity and greater efficiency of the overall system.

To meet the reform objectives, a Ministerial Oversight Group (MOG) has identified and clarified the intended outcomes of the RM reform across the different domains (Table 2).

The MOG has also identified direction on key policy questions.

- **Who should pay?** Although a general principle is that those who benefit should pay, an intention of the reform is that processes and their costs shift towards the public sector. Currently significant costs arise through the consent process, but better planning (with costs for central and local government) can reduce the requirement for consents.
- **How should the public be involved?** The reforms propose that public input should be focused on strategic decisions (eg national direction and plan-making) and less on site-specific ones (eg consents), and should better provide for communities that are under-represented in the system.
- **How should appeals be provided for?** The expectation is of fewer appeals because of improved decision quality or increased use of arbitration, without removing avenues to appeal decisions.[13]

[13] It remains a general principle of legislative design that 'where a public body or agency makes a decision affecting a person's rights or interests, that person should generally be able to have the decision reviewed in some way (Legislation Design and Advisory Committee 2018) LDAC Legislation Guidelines 2018).

Table 2 Intended outcomes of RM reform

Domain	Intended outcomes from reform objectives
Natural environment	• the natural environment is protected and restored, and the health of New Zealand's fresh water, coastal water, air, soil, ecosystems and their ability to sustain life are maintained in line with *Te Oranga o te Taiao* • nationally and regionally significant landscapes, natural features, habitats for indigenous species, native biodiversity and the natural character of the coast, river and lakes are maintained or where appropriate enhanced • important indigenous species and their ecosystems are protected and where necessary restored
Development	• more flexibility for people to use resources and for places to change, while looking after the natural environment • the right infrastructure, in the right place at the right time, that provides adequate access to economic and social opportunities and enables people to maximise their wellbeing • housing supply is responsive to demand, with competitive land markets enabling more efficient land use and responsive development, which helps improve housing supply, affordability and better meets a range of housing needs (by type, size, location and price point)
Te Tiriti	• process and substance of the National Planning Framework (NPF) and plan-making decisions give effect to the principles of *Te Tiriti* and reflect *te ao Māori*, including *mātauranga Māori* • Māori have the opportunity to participate as Treaty partners across the RM system, including in national and regional strategic decisions, and are sufficiently resourced for duties or functions that are in the public interest • Māori customary rights, cultural values and Treaty settlements are protected, and equitable access to resources for Māori is ensured • improved central and local government capability to effectively work with Māori
Climate and risk	• costs, disruption and distress due to the impacts of climate change and natural hazards are minimised in the long term for society as a whole • long-term and predictable arrangements for risk sharing, and funding and financing of risk reduction and adaptation action are in place • new development and communities are located and designed to be resilient to and reduce the risks from natural hazards and long-term climate impacts • existing development and communities are proactively and equitably transitioned to reduce unacceptable risks from natural hazards and long-term climate impacts • the RM system supports national instruments and programmes to contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5 degrees Celsius above pre-industrial levels
System performance	• unnecessary costs removed and net benefits maximised • greater certainty, consistency, fewer plans, consents and appeals, faster plan preparation and faster approvals • external costs fall where they should and the burden of system processes shifts towards the public sector • decisions and decision-making provides reasonable opportunities for public participation, including by communities currently under-represented in the system, and better reflects communities of interest • greater public input into strategic decisions and less direct input into site-specific appeals, with the input of communities proportionate to the issues at stake

Source: Ministry for the Environment

1.4 Structure of the Report

In the next section we set out our initial thoughts on how these changes will be interpreted for the objective of analysing the costs and benefits. We also set out the underlying principles of cost benefit analysis (CBA) as applied here.

In subsequent sections we work through the analysis of the different domains and draw overall conclusions in Section 7.

2 Interpretation and Analysis

2.1 The Analytical Task

Analysing the costs and benefits of the proposed RM system reform is challenging when much of the detail is still to be agreed or will only be understood after implementation. For example, the intention is to introduce limits and targets with the objective of protecting or improving environmental quality. From this we might understand the direction of change or at least the direction that it will not go, but we do not know how much change will result, or by when. The uncertainty includes the levels at which environmental standards might be set, the policy instruments that might be introduced and the environmental response.[14] The same levels of uncertainty apply to the built environment and Māori participation also.

In addition, in analysing the expected net benefits of the reforms, it is cautionary to note the risk of comparing an idealised pre-implementation version of legislation with the reality and problems of legislation as implemented in practice. And related to this, questions remain over whether much of what is being targeted via the reform could have been achieved under the existing RMA if it had been implemented differently or with greater use of national direction and economic instruments.

Some of these issues were noted by Castalia who produced a report that focussed on the expected change in process costs resulting from the reforms.[15] While noting the limited detail of the current reform proposals did not allow quantification of the benefits, they suggested the benefits might include avoided opportunity costs,[16] improved environmental outcomes, increased housing supply and improved affordability, and more responsive infrastructure provision.

In this section we explore these issues in more detail, including:

- our understanding and interpretation of the problem being addressed because this affects our understanding of the benefits;
- our simplification of the changes into a manageable set of issues that can be analysed; and
- the tasks of impact analysis.

2.2 The Problem

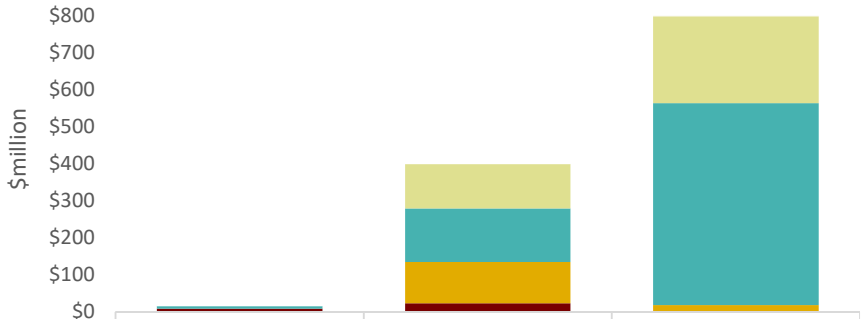
The perceived problem to address is summarised in Section 1.1 as including high system costs, declining environmental quality, inadequate housing supply, the need to adapt to climate change, and inadequate opportunities for participation by Māori. We address these in turn below.

[14] For example, freshwater quality improvements are delayed in some locations because of the slow movement of nutrients through soil, which depends on soil type, slope and so on (Graham *et al,* 2020). Because of historical activity, improvements may not be seen for many years.
[15] Castalia (2021)
[16] Development that will proceed but that would not have done under the RMA.

2.2.1 System Efficiency – Process Costs

Castalia estimates the most significant costs of the current system are for users in the form of compliance costs for industry and households, particularly for consenting and the associated monitoring and oversight (Figure 1). Local government faces the next major burden, paid for by household and business rates. The reforms aim to shift the distribution of the burden away from users, if nots its size. In practice, this will shift the costs from users to rate payers and tax payers.

Figure 1 Compliance costs of Current RM system (estimated annual costs $million)



	Central Government	Local Government	User Compliance costs
Total	$18	$401	$800
Monitoring and oversight	$0	$122	$236
Consenting system	$9	$144	$545
Regional and local plans	$0	$112	$18
RMA amendments and national direction	$9	$23	$1

Source: Data from Castalia (2021)

2.2.2 System Efficiency – Resource Allocation

One element of current system efficiency is the way in which rights to develop and use some resources are allocated. This includes:

- permissions to take, and discharge to, freshwater;
- occupation of coastal marine space;
- new capacity for development of urban land;
- the assimilative capacity of the environment more generally;
- navigation rights on the surface of rivers, lakes and in the sea; and
- river and coastal marine area materials (for example, gravel and sand).

The Panel noted that, more broadly, all plans and regulations under the RMA allocate resources when they place constraints on their development and use. Permits to take and use resources are issued under the RMA, and in some cases allocation is governed by separate legislation, including that for minerals (Crown Minerals Act 1991), fisheries (Fisheries Act 1996), and rights to discharge greenhouse gas emissions (Climate Change Response Act 2002).

The Panel noted that the RMA includes some limited guiding principles for resource allocation in:

- the general principle of sustainable management of natural and physical resources, excluding minerals (section 5); and

- the requirement in relation to managing the use, development, and protection of natural and physical resources, decision makers shall have particular regard to, *inter alia*, the efficient use and development of natural and physical resources (section 7 (b)).

However, they regarded this as insufficient, noting how in practice, the approach used has been one of 'first-in, first-served' (FIFS); allocations are made to whoever first applies. This approach has been reinforced by subsequent case law which has meant that when two resource consent applications are processed for the same resource, the first application received by the local authority must be heard and decided first, without regard to any competing application.[17]

From a resource use efficiency perspective, FIFS allocation would not matter if the use rights were both well-defined and tradable in an efficient and liquid market.[18] Trading would ensure rights ended up with those who valued them most highly. The Panel's view was that the absence of a more detailed specification of principles in the RMA was consistent with an original view that "allocation would largely be determined by market forces", and by implication, in efficient markets. Under efficient market conditions, market prices provide signals of resource scarcity, and the RMA could concentrate on effects of resource use rather than concerning itself either with resource depletion[19] or the inefficiencies of initial allocation. This latter issue may have reflected an assumption that rights to use would be tradable so that initial allocation did not matter.

The RMA includes provisions allowing trading of coastal permits (s135) to another person at the same site and water allocation rights (s136), potentially to another person at another site, but such trading must be explicitly allowed in a regional plan.

In Sections 3.3 and 3.4 we examine how potential changes to resource allocation might provide economic efficiency improvements.

2.2.3 National Direction

Current National Direction

The intent of the RMA was consistent with a subsidiarity principle, ie that central government only undertakes functions that cannot be (better) fulfilled at a more local level. Decisions under the RMA were to be made close to those who are affected by the decisions. However, in practice local decision-making has often been limited by constraints to local resources and expertise, and there has been considerable overlap such that every council was analysing and addressing the same problems with considerable scope for efficiency.

[17] Makgill (2010)
[18] Coase (1960)
[19] The Panel argues, without evidence, that the RMA was written at a time of relative resource abundance and that this might have been a reason for the absence of clearer principles for allocation.

Currently national direction is provided using national policy statements, national environmental standards, national planning standards and section 360 regulations is limited. A summary is provided of the different instruments below.[20]

National policy statements

National policy statements (NPSs) are instruments issued under section 52(2) of the RMA. They enable the Government to prescribe objectives and policies for matters of national significance which are relevant to achieving the sustainable management purpose of the RMA. A NPS may also give particular direction to local authorities as to how they need to give effect to the policies and objectives of the NPS.

The only mandatory NPS is the New Zealand Coastal Policy Statement (NZCPS), which is prepared by the Minister of Conservation. Other NPSs are optional and are authorised by the Minister for the Environment. The current and proposed NPSs are listed in Table 3.

Table 3 Current and proposed NPSs

NPS and date	Description	Lead Agency
Electricity Transmission 2008	Sets out the objective and policies for managing the electricity transmission network.	MBIE
NZ Coastal Policy Statement (NZCPS) 2010	Guides councils in their day-to-day management of the coastal environment. The RMA requires there to be a NZCPS at all times.	Department of Conservation (DoC) with MfE support.
Renewable Electricity Generation 2011	provides guidance for local authorities on how renewable electricity generation should be dealt with in RMA planning documents, eg regional policy statements, regional plans and district plans.	Ministry of Business, Innovation & Employment (MBIE)
Urban Development 2020	It is about ensuring New Zealand's towns and cities are well-functioning urban environments that meet the changing needs of diverse communities.	MfE and Ministry of Housing and Urban Development
Freshwater Management 2020	Provides local authorities with direction on how they should manage freshwater under the RMA.	Cross-government water taskforce
Proposed		
Indigenous Biodiversity	Sets out objectives, policies and implementation requirements to manage natural and physical resources to maintain indigenous biological diversity under the RMA	MfE with DoC support
Highly Productive Land	To improve the way highly productive land is managed under the RMA.	Ministry for Primary Industries (MPI) with MfE support

Source: https://environment.govt.nz/acts-and-regulations/national-policy-statements/

National environmental standards

National environmental standards (NESs) are regulations issued under RMA section 43 that 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.

[20] https://environment.govt.nz/what-government-is-doing/areas-of-work/rma/about-national-direction-under-the-resource-management-act

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. Current and proposed NESs are listed in Table 4.

Table 4 Current and proposed NESs

NES and date	Description	Lead Agency
Air Quality 2004	Set a guaranteed minimum level of health protection for people living in New Zealand	MfE
Sources of Human Drinking Water 2007	Ssets requirements for protecting sources of human drinking water from becoming contaminated.	MfE with support from the Department of Internal Affairs (DIA) and the Ministry of Health (MoH)
Electricity Transmission Activities 2009	Set out which transmission activities are permitted, subject to conditions to control environmental effects. They apply only to existing high voltage electricity transmission lines.	MBIE
Telecommunication Facilities 2016	Provide national consistency in the rules on the deployment of telecommunications infrastructure, while ensuring the effects on the environment are minimised and managed appropriately	MBIE
Plantation Forestry 2017	Provide nationally consistent regulations to manage the environmental effects of forestry	MPI with MfE support
Marine Aquaculture 2020	Replace regional council rules for existing marine farms. In some instances they allow regional council rules to remain in force.	MPI with support from MfE and DoC
Proposed		
Outdoor Storage of Tyres	Nationally-consistent rules for the responsible storage of tyres.	MfE
Wastewater Discharges and Overflows	Proposed standard is part of the three waters regulatory reforms being progressed through the Three Waters Review	MfE with DIA support

Source: https://environment.govt.nz/acts-and-regulations/regulations

National planning standards

The purpose of national planning standards is to make council plans and policy statements easier to prepare, understand and comply with. They do this by improving the consistency of the format and content. For example, they provide national consistent standards for:[21]

- structure;
- format;
- definitions;
- noise and vibration metrics; and
- electronic functionality and accessibility.

The planning standards were introduced as part of the 2017 amendments to the RMA. They support implementation of other national direction such as NPSs and help people to comply with the procedural principles of the RMA. They are issued by the Minister for the Environment. To the extent that a matter relates to the coastal marine area, the Minister of Conservation approves a planning standard.

[21] Ministry for the Environment (2019a)

Regulations under section 360

Regulations made under section 360 of the RMA generally deal with matters of:

- detail or implementation
- of a technical nature
- likely to require frequent alterations or updating.

Examples include stock exclusion from waterways to reduce pollution.[22]

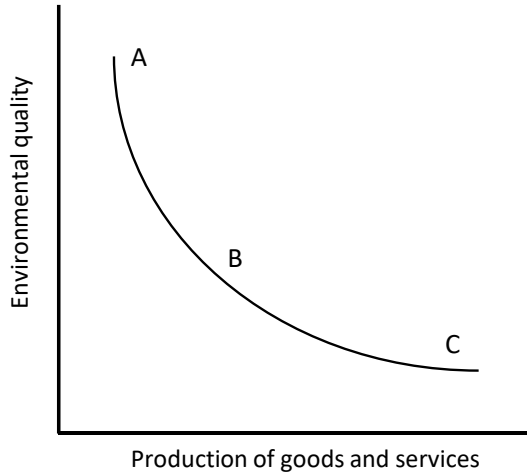
Changes to national direction, particularly its greater use, are relevant to all aspects of the analysis in this report, and it is addressed under the individual sections.

2.2.4 Declining Environmental Quality

The perception of the Panel is that the RMA has led to declining environmental quality partly because of the focus only on the management of effects. This can occur when local councils' environmental interventions are largely reactive to the proposed developments of companies and households. Under this assumption, there is under-provision of public goods, such as parks, or improved environmental quality more generally, because these changes usually do not have a private advocate or proposer. In contrast, developments that include buildings and resource extraction to provide financial returns have proceeded when their benefits exceed the costs to the environment.

One way to envisage the changes might be with reference to a utility or wellbeing indifference curve, as shown in Figure 2. This represents the mixes of (1) environmental quality and (2) production of goods and services at which the community, in aggregate, might be indifferent between one outcome and the other. The community would have the same level of aggregate wellbeing at point A, with high environmental quality and low production of goods and services, or C where the mix is weighted towards production of goods and services. The curve is depicted as convex because at some level of environmental quality no additional production of goods will compensate for the losses, and vice versa. If the RMA is used generally to manage effects of development projects, it may continually find outcomes closer to C than to A or even B.

Figure 2 Utility indifference curve



[22] Resource Management (Stock Exclusion) Regulations 2020

The RMA requires an analysis of costs and benefits to ensure positive net benefits accrue, or so the effects on the environment are avoided, remedied or mitigated. But it does not usually assess projects that would enhance the environment, because few arise. The decline of the environment under this decision framework is akin to decisions being made that continually raise the wellbeing of some parts of the community at the expense of others.

However, this is not a complete picture as environmental improvement also occurs in response to national direction and local plans that set objectives for environmental improvement. The view of the Panel appears to be that these are not sufficiently comprehensive and that the system needs to be more weighted towards environmental improvement.

The Problem of Biases

If only weighing up the costs and benefits of environmental outcomes when evaluating developments that adversely impact the environment, the winners are always those who benefit from development and the losers are always those who most value the environment. And if development is focussed in some geographical locations, this can result in some communities seeing ongoing environmental degradation. In some circumstances this may be consistent with local preferences over sources of wellbeing, but in others the wider community may simply be the recipients of the adverse outcomes of the effects of development.

Related issues have been raised in other countries, such as the environmental justice movement in the USA. This is focussed on the problem that, for example, industrial plants are often situated in or near low-income communities. In response, the US EPA has established an Office of Environmental Justice. It operates to ensure "*no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.*"[23]

In other countries, issues of environmental justice have been the subject of research,[24] eg relating to the relationship between income levels and flooding risk,[25] but it has not been formalised as regulatory requirement. In the UK some efforts to address these have included different approaches to project and policy analysis. The UK Treasury guidance on policy analysis suggests and describes a methodology in which the effects on people in the lowest income quintile are given greater weight in CBAs.[26]

NZ Treasury does not recommend that; rather it recommends that where projects or options have significant favourable or unfavourable distributional consequences, that they be analysed separately in terms of their relationship to wider government distributional policies and drawn to decision-makers' attention.[27] Despite this, some recent analyses in

[23] https://www.epa.gov/environmentaljustice/learn-about-environmental-justice
[24] Lejeune Z and Teller J (2016); Poussard et al (2021)
[25] Walker et al (2003); Fielding and Burningham (2005)
[26] HM Treasury (2020, Annex 3). See Adler (2019) for detailed discussion of the issues and approaches.
[27] New Zealand Treasury (2015)

New Zealand have included distributional effects, eg impacts of freshwater reforms[28] and of congestion pricing.[29]

The Institute for Public Policy Research (IPPR) established an Environmental Justice Commission in the UK focussed on how a shift to a low carbon future also addressed issues of economic and social injustice.[30] It included recommendations for greater public participation in decisions, eg using citizen juries.

Environmental justice issues are addressed in the RM reforms only to the extent that there is some shift to greater Māori participation in decision making. But otherwise, to some extent there is a shift in the other direction away from decisions being made closer to those affected and relying more on national direction. Time will tell whether this adversely affects environmental justice issues more widely.

2.2.5 Inadequate Housing Supply

In the built environment, problem identification is focused on the housing market and specifically the high costs of housing and its (perceived) unaffordability.

House prices reflect supply and demand factors and many of these are beyond the scope of the RMA. The reforms, including the NBA, NPF and SPA, intend to improve affordability, choice and timely provision of appropriate infrastructure. We assess the potential impact of the outcomes of the reforms compared to the status quo, particularly the intended outcomes of the National Policy Statement on Urban Development (NPS-UD). The reforms may have effects on both housing supply and demand.

- On the supply side, factors affecting prices include the costs of building materials and labour. Both affect the costs of new builds, in particular, but as they are the marginal additions to supply, costs for new builds are expected to influence prices throughout the housing market in locations where it is growing.

  The factors affected by the RMA include the supply vailability of development land, that includes land zoned for housing and with access to infrastructure (roads, three waters, telecommunications and energy supply). This is affected, in turn, by local council policies relating to the Rural Urban Boundary (RUB), housing density, height restrictions and other limits.

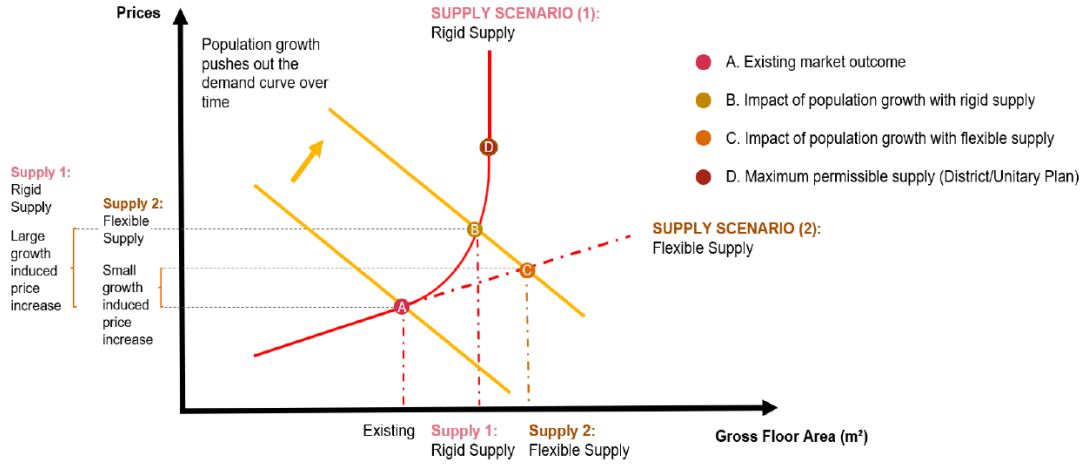
- Housing demand is affected by population changes, which respond to economic activity levels and the location of jobs, plus other factors that affect the desirability (or otherwise) of living in specific locations, including relative income.

Along with other recent analysts, we characterise the current problem for analysis as one of overly rigid housing supply. Constrained by existing regulatory controls, developers are not able to respond fully to housing demand. They may be limited in where they can build and what they can build. The impact on prices of rigid housing supply versus flexible supply that

[28] Mackay and Taylor (2020)
[29] Denne and Raichev (2019); Nunns et al (2019)
[30] Institute for Public Policy Research (2021)

is more responsive to demand is illustrated in Figure 3. The impact on prices is significantly greater during times of higher demand, such as from faster population growth.

Figure 3 Impact of rigid supply on housing price



Source: PWC (2020)

2.2.6 Māori Participation

The issue of Māori participation in the RM system is neither new nor novel. A cornerstone of the reform process that led to the RMA was the recognition of Māori cultural and spiritual values and the Treaty of Waitangi. A 1988 paper from the Ministry for the Environment saw the Minister state:

> *The new law will be both practical and just. The principles of the Treaty of Waitangi form an important component for the decisions made in this review. The new Resource Management Planning Act will provide for more involvement of iwi authorities in resource management, and for the protection of Māori cultural and spiritual values associated with the environment.*

Compared to pre-RMA days, Māori involvement in processes under the RMA has improved, though this was from an initial base of almost nil.[31] Nevertheless, concerns remain around the 'strength' of the legislative requirement in respect of RMA decisions as they relate to Māori (ie current decisions do not consistently give effect to the principles of the Treaty). Moreover, the RM system as it stands, sees low rates of participation by Māori.[32]

Further, even where consideration of a Māori perspective (and associated advice leading to best practice around such perspective) is included in the legislation, primacy seems to be given to other factors. For example, the requirement in the current Act to "have particular regard" to kaitiakitanga has been problematic in the sense that it must be considered alongside several other factors. As one commentator has claimed, this effectively reduces the import of kaitiakitanga in the current Act:[33]

> *Its placement within s 7 immediately renders the concept subordinate to the purpose of the RMA, which is to promote "sustainable management of natural and physical*

[31] Love (2001)
[32] New Zealand Government (2021)
[33] Love (2001)

resources" and in doing so to "recognise and provide for" the matters of national importance contained in s 6. This placement abates the significance of kaitiakitanga within the RMA due to a hierarchical approach in which the words "recognise and provide for" in s 6 imply a stronger obligation than the words "regard must be had to" in s 7." Furthermore, kaitiakitanga is only one amongst eight other matters, post 1997 amendment, that must be regarded by a decision maker.

The author identifies a further issue around the 'place' where Māori spiritual and cultural values appear in the RM system. While acknowledging progress in terms of policy statements and plans, the author claims that District Plans are where the opportunities were greatest for inclusion of spiritual and cultural values in the RM system and to achieve gains at the practical level. However, that was the area in the RM process where Māori involvement and inclusion seemed to be the lowest.

Thus, there are problems around Māori involvement *in* the RM system (ie at a 'governance' level) as well as Māori involvement *with* the RM system (ie at a 'management' level).

2.3 The Proposed RM Reforms

To assess the effects of the reforms, the analysis needs to reduce the proposed reforms to a small set of changes that can be analysed for their effects. The components of the analysis in this report are listed in Table 5.

Table 5 Components of analysis in this report

Reform element	Components of analysis in this report
System Efficiency	Analysis to include: • Assumptions as used by Castalia, and modified by MfE, in estimation of process costs. • Compliance costs to be considered as part of analysis of individual outcome areas: natural environment, built environment and Māori. This includes assumptions around the use of least (or low) cost policy instruments, particularly the greater use of market-based instruments. • Improved allocation of natural resources, including water and land.
Natural environment	Increased environmental quality and/or speeded up improvements across the following domains: • freshwater; • coastal water and the quality of estuaries; • air quality; • soil quality; and • biodiversity, habitats and ecosystems, including protection, restoration or improvement of nationally and regionally significant landscapes, natural features and areas of indigenous vegetation.
Built environment	Reforms in the built environment are analysed as: • Less rigid restrictions on supply of land for development. • Clearer specification of environmental limits to development.
Māori	Reforms as they benefit Māori are analysed with respect to: • Cultural heritage, including cultural landscapes are identified and protected. • Greater involvement in decision making, to recognise the relationship of iwi and hapū and their tikanga and traditions with the ancestral lands, water, sites, wāhi tapu, and other taonga is protected and restored. • Protected customary rights are recognised.

2.4 Impact Analysis

The Government has set out its expectation that new regulations deliver a stream of benefits or positive outcomes over time, in excess of the costs or negative outcomes. Similarly, it expects the removal or redesign of existing regulations that no longer deliver obvious net benefits.[34] The Government expects that outcomes will be durable and valuable when a regulatory system:

- it is clear, ie it:
  - has clear objectives;
  - has processes that are predictable and consistent;
  - is clear and easy to understand; and

- it is economically efficient, ie it:
  - seeks to achieve objectives at least cost, with minimum market disruption;
  - allows flexibility in compliance;
  - does not reduce potential for international trade, except when this would compromise important domestic objectives and values;
  - is flexible to changing circumstances or new information; and

- it is fair and consistent, ie it:
  - is proportionate, fair and equitable;
  - is well-aligned with existing regulations and minimises duplication; and
  - conforms to established legal and constitutional principles and supports compliance with New Zealand's international and Treaty of Waitangi obligations.

To this end, the Government has set out requirements for Regulatory Impact Analysis (RIA) that includes a clear definition of the problem, identification of policy objectives and an assessment of costs, benefits and risks.[35] This report addresses these issues.

The theoretical underpinnings of the analysis are in welfare economics as briefly set out in Annex 2.

[34] New Zealand Government (2017)
[35] Cabinet Office circular: CO (20) 2

3 System Efficiency

3.1 Process Costs

Building on work by Castalia,[36] MfE has estimated the changes to process costs of the proposed reforms. MfE has adjusted Castalia's assessment of costs; the results are summarised in Table 6. There is estimated to be an overall 7% reduction in process costs, with increased costs for central and local government and reduced costs for users, eg consent applicants. The increased costs for central and local government will be passed on, in turn, as increased taxes or rates, or a reduction in other services.

Table 6 Current System vs Proposed System Process Costs (estimate), Average Annual Costs ($million)

Party	Current system process costs	Proposed system additional process costs	Proposed system: cost savings	Proposed system: net cost change
Central government	$17	$21[a]	-$2	$19
Local government	$401	$102	-$59	$43
Users	$799	$61	-$210	-$149
Total	$1,218	$185	-$270	-$85

[a] Costs to central government may increase further if full system monitoring and oversight functions are approved. This would add around $30 million per year to central government's ongoing costs. This will be confirmed for the final RIS.
Source: MfE

The estimated changes are based on the assumptions and estimates summarised in Box 1, some of which are subject to ongoing analysis as the proposals are developed further.

Box 1 Explanations for cost changes

Central Government

- an additional $21 million in ongoing costs to central government, including for
  - direct support to help iwi and hapu organisations participate in RM processes ($5m pa);
  - approximately 30 additional MfE staff for monitoring of targets and environmental limits ($4.5m pa).
- some ongoing cost savings from reduced plan-making appeals and (20%) savings in Environment Court running costs ($1.7m pa).

Local Government

- an additional $102 million in ongoing costs to local government, including:
  - developing and monitoring new economic instruments ($27m pa)
  - a 20% increase in monitoring and enforcement activity ($18m pa)
  - reviewing additional National Direction under the NPF ($15m pa).
- some ongoing cost savings from:
  - increased national direction and strategic planning that reduces private plan changes, appeals, Commissioners and litigation over resource consenting decisions ($30m pa); and
  - an open portal for consent applications[37] to reduce consent processing costs ($29m pa).

Users

The largest cost savings ($149m) in the proposed system are for system users, including:

- reduced consenting costs – an assumed 20% fewer consents with savings in costs of preparation, along with a reduction in private plan change applications ($110m pa); and

[36] Castalia (2021)
[37] The open portal will make one local authority responsible for administering the portal in a region which should help facilitate joint processes between relevant consenting authorities and ensure that inter-dependencies within applications are understood.

- reduced process costs from improved IT and web-based tools, saving 20% of applicant's time and resources ($100m pa).

Some costs may increase for users, including shortening of terms in a new allocations regime might require permit holders to make more applications ($48m pa). These costs for users do not include:

- opportunity costs from foregone development;
- the costs of RMA regulations on housing and other development types (except for direct consenting fees and holding costs); or
- wider costs to the environment, economy and society.

Māori

The RM system has costs to Māori which are not included above, eg where iwi or hapu groups are required to input to resource consent processes (estimated at $12.5m pa). There is likely to be a large cost for Māori to participate in the design of new regional spatial strategies and combined plans, and the extent to which these costs would be funded has not been determined currently. In the process costs assumptions, it is estimated that central government would provide direct support to help iwi and hapu organisations participate in RM processes, at around $5m pa.

Source: MfE

3.2 Compliance Costs

Compliance costs are the costs faced by companies and individuals for the things that they need to do differently because of the legislation. This includes the actions taken to *avoid, remedy, or mitigate* any adverse effects of activities on the environment, as required under Section 5(2)(c).

Recent analysis by NZIER[38] used existing studies to estimate user compliance costs for consenting new houses and apartments; these were combined with estimates of the number consented per annum. The total cost estimates using these numbers are shown in Table 7,[39] along with an estimate of "excess regulatory costs", using the NZIER assumption that 20% of the costs are above what is necessary. The total excess cost is approximately $200 to $400 million per annum.

Table 7 Annual process costs for new dwellings

	Low	High	No pa	Total costs: Low ($million)	Total costs: high ($million)
New house	$32,500	$60,000	27,993	$910	$1,680
New apartment	$65,000	$110,000	3,258	$212	$358
Total				**$1,122**	**$2,038**
Excess costs (20% of total)				$224	$408

Source: data from Clough (2020)

In 2008, Federated Farmers had estimated annual costs of $81 million[40] or approximately $3,560 per farm on average.[41] The total converts to approximately $101 million in 2021 dollar values.

If we continue this assumption from Box 1 of a 20% saving from fewer consents, these costs might fall by 20% also, ie savings of approximately $65 to $102 million per annum or an average of $83 million.

[38] Clough (2020)
[39] The total costs are higher than those estimated by Clough (2020) who appears to have multiplied the house costs by apartment numbers and vice versa.
[40] Federated Farmers (2008)
[41] Clough (2020)

3.3 Resource Efficiency Improvements

In this section we examine the benefits and costs of changes to the allocation of water resources. Improved land allocation will be examined under the *Built Environment* section below.

Under the reforms, and consistent with those of the NBA as a whole, the objectives of resource allocation will be for natural resources and the environment to be used sustainably to provide for the wellbeing of people now and in the future, within certain limits that protect the integrity of natural systems and *Te Oranga o te Taiao*. This is broadly consistent with an objective of efficient resource use, ie that resources are used by those who value them most, which is (under the right market conditions) those who would be willing to pay most for them and for whom use would provide the largest gain in wellbeing. Achieving this has implications for:

- The specification of property rights;
- The allocation of rights; and
- The tradability of rights.

3.3.1 Specification of Property Rights

Achieving efficient resource use via market transactions requires well-defined property rights. Often it is assumed that a property right is synonymous with the ability to alienate, ie to buy or sell. For example, in the 1950s, considering problems with over exploitation of fisheries resources as an example of the "tragedy of the commons",[42] Canadian economists Gordon[43] and Scott[44] advocated for solutions involving 'sole ownership' of fisheries defined as "complete appropriation of all of a natural resource in a particular location."[45] Much of the economics literature similarly assumes that property rights that do not contain the right of alienation are ill-defined and lead to inefficiency since rights holders cannot trade so resources are purchased by those that would manage them for their best use.[46]

In contrast to these views, Nobel prize winning economist Eleanor Ostrom with others has suggested that property rights should not be understood just as the full rights to alienation of a particular area or resource, but rather as a bundle of different individual rights.[47] Schlager and Ostrom, for example, define five property rights relevant for the use of common pool resources, like fisheries for which (1) it is costly to exclude individuals from using the good and (2) the benefits consumed by one individual subtract from the benefits available to others.[48] They are:[49]

- Access: The right to enter a defined physical area and enjoy non-subtractive benefits, eg recreational boating, kayaking.

[42] Hardin (1968)
[43] Gordon (1954)
[44] Scott (1955)
[45] Scott (1955), p117 n4
[46] Ostrom and Hess (2007)
[47] Ostrom (2000); Schlager and Ostrom (1992); Ostrom and Hess (2007)
[48] Schlager and Ostrom (1992)
[49] In a NZ Treasury Working Paper, Guerin (2003) groups these into three fundamental rights to use (access or withdraw resources), possess (manage and exclude from) and dispose of (alienate).

- Withdrawal: The right to obtain resource units or products of a resource system eg catch fish.

- Management: The right to regulate internal use patterns and transform the resource by making improvements, eg control catch levels.

- Exclusion: The right to determine who will have access rights and withdrawal rights, and how those rights may be transferred.

- Alienation: The right to sell or lease management and exclusion rights.

Ostrom and Hess suggest that rather than focussing on one right (alienation), it is useful to consider different types of rights and different types of right holder; they list five of each (Table 8).

Table 8 Bundles of Rights Associated with Positions

	Owner	Proprietor	Claimant	Authorised user	Authorised entrant
Access	X	X	X	X	X
Withdrawal	X	X	X	X	
Management	X	X	X	X	
Exclusion	X	X			
Alienation	X				

Source: Ostrom and Schlager (1996) in Ostrom and Hess (2007)

Ownership brings the potential for a large variety of use rights, but owners can make many of these rights available to others. In some cases this might be achieved through voluntarily reducing their own rights, as occurs when landlords give property access rights to tenants and limit their own rights of access. But ownership of the right of access enables them to achieve maximum value by "selling" access rights to a tenant.

Currently, in New Zealand, the RMA separates out the rights to use from the rights to alienate the resource (equivalent to resource ownership), eg there is no owner of water in the sense of having full control over what water is used for. The Government position has been made clear in evidence before the Supreme Court in an appeal concerning the restructuring of the Crown's ownership of Mighty River Power Ltd. The Deputy Prime Minister asserted that any recognition of Māori interests in water must "*involve mechanisms that relate to the on-going use of those resources, and may include decision-making roles in relation to care, protection, use, access and allocation, and/or charges or rentals for use.*"[50]

Although this set of issues is far reaching, it is also limited. It does not extend to outright ownership or rights to alienation. This remains the Government's position extending into these current reforms.

[50] SC 98/2012, Para 146

3.3.2 Allocation of Rights

As noted above, provided the rights are tradable in an efficient market, the final allocation of resources (who uses them) would be the same, regardless of the initial allocation.[51] For example, if rights to use water are currently allocated to a farm for irrigation, the value of the water right (or some fraction of it) to the farmer is the difference in farm profit with and without the water. This represents the farmer's willingness to pay (WTP) for water, and if a meat processing plant establishes and has a higher WTP for the water, the farmer would (in theory) change land use and sell the water right.

Initial allocation matters in some circumstances.

- In the absence of trading, when efficient use of resources depends on the Government (at whatever level) making the best allocation decisions. This is unlikely with strict FIFS. In addition, if a resource is fully allocated, FIFS provides no basis for allocating to a new high-value business that was not there when allocations were made.

- If concerned about equity. Giving to one company means it cannot be given to another, which can be seen as unfair, especially if a higher value use cannot obtain access to a resource. In this sense, the best outcomes from an equity perspective may be similar to those from an efficiency perspective.

- If concerned about fiscal impacts. If the Government sold rights rather than gave them away it would obtain a revenue that could be used for other wellbeing enhancing projects (that met CBA criteria) or to offset taxes that distort behaviour and reduce wellbeing.[52] Government revenues can also be obtained by combining use rights with the payment of resource royalties.

3.4 Reforming Water Rights

Water rights belong to a person or other entity independent of land ownership. However, the usual way in which transfers occur is at the same time as changes in land ownership. The permit is transferred to the new owner of the land and the value of the water right is capitalised in the value of the land.

Take or use[53] permits can only be transferred to another site (including short term transfers)[54] if both sites are within the same catchment, aquifer, or geothermal field and it:

(i) is expressly allowed by a regional plan; or

[51] Coase (1960)

[52] Many forms of taxation are distortionary because they reduce the value of activities that are taxed. For example, if income is taxed there is less incentive to work (Creedy and Mok 2017). Taxation is least distortionary when it is widely spread (like GST) and at a low level, is levied on goods or services for which price elasticity of demand is low (eg cigarettes) or is in the form of a lump sum payment rather than related to any marginal change in activity (eg property taxes/rates).

[53] Take = abstraction or removing of water from a water body; Use = the final action taken with the water following its removal, eg irrigation or use as stock water.

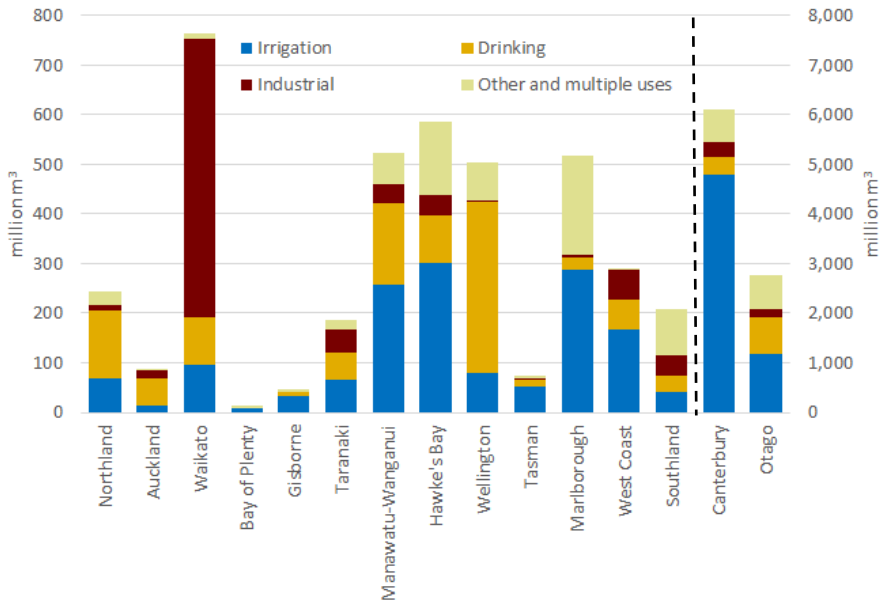
[54] Amendments to the RMA in 2005 introduced a clause that allows for transfers to be for a limited period only

(ii) has been approved by the consent authority that granted the permit, taking account of matters set out in Section 104 including the effects on the environment.[55]

Permits can also be transferred to another person at the end of the (usually 35-year) consent period. There is no right of renewal for a consent, so on expiry a new resource consent must be applied for unless a condition in the plan or resource consent states otherwise. There is no guarantee of renewal but Section 104(2A) notes that, for applications for permit renewal, the council as consent authority must have regard to the value of the investment of the existing consent holder. In making such an assessment, the council must consider, *inter alia*, the efficiency of the person's use of the resource (Section 124B) unless a regional plan states that these provisions do not apply, or if there is an allocation plan for the resource (Section 124A). This implies that there is a requirement to consider whether the existing user requires all of the water allocated. Permits can be cancelled by a regional council if not exercised for a continuous period of five or more years (RMA Section 126).

There are relatively few catchments and regional plans, mainly in Canterbury and Otago, that have capped the overall take of water and created the conditions for trading.[56] These are the regions in which the greatest volume of water is currently allocated via permits. Figure 4 shows maximum consented volumes in 2017-18 by region; volumes for Canterbury and Otago are measured against the right hand axis, which is an order of magnitude higher than that the left hand axis, used for the other regions.

Figure 4 Maximum consented take by region 2017-2018 (billion m^3)

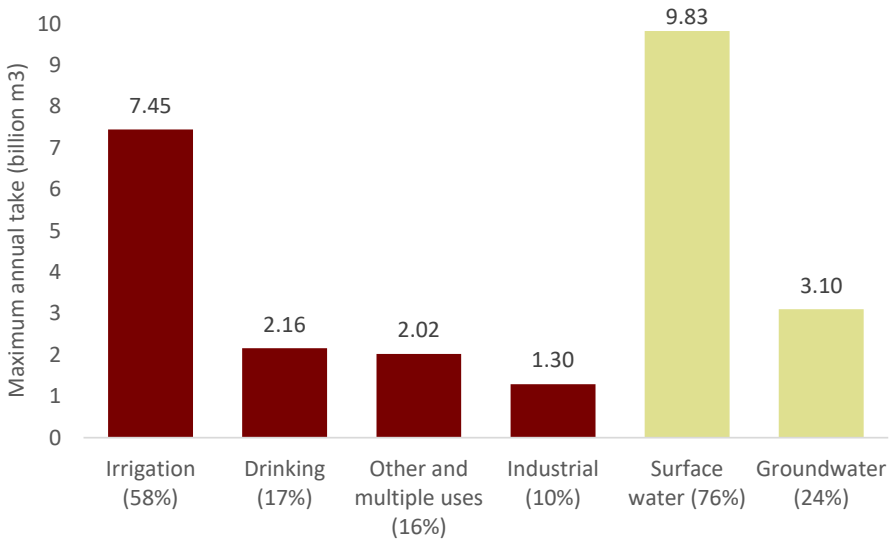


Note: data for Canterbury and Otago on right hand axis; all other data on left hand axis
Source: Data from StatsNZ (https://www.stats.govt.nz/indicators/consented-freshwater-takes)

[55] The impacts on the environment include localised effects relating to ground water takes which might affect any shift in location, and impacts on surface water, particularly associated with shifting the take location upstream. The impacts of water use are separated in space and time from the impacts of take, and this has led to discussion over the separation of the two components.
[56] Sharpe (2017)

Irrigation dominates total consented water in New Zealand (Figure 5) and 76% is of surface water.

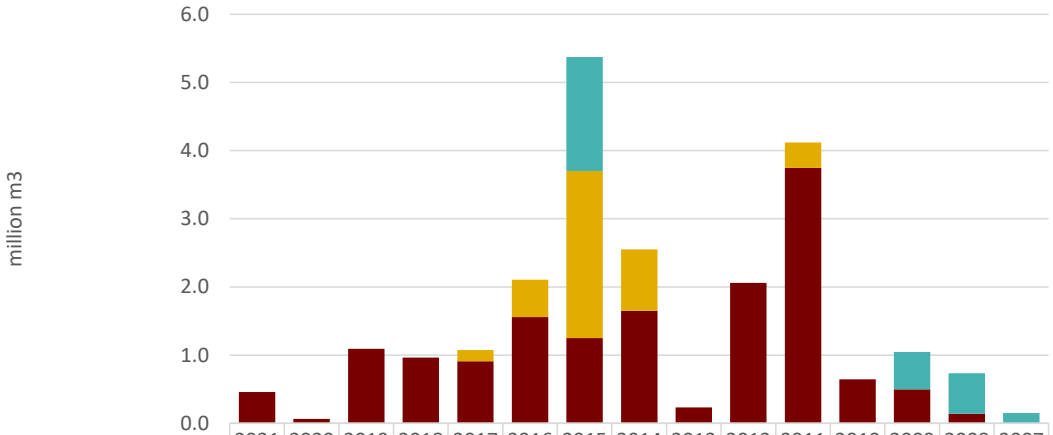
Figure 5 Maximum consented take 2017-2018 (billion m³)



Source: StatsNZ (https://www.stats.govt.nz/indicators/consented-freshwater-takes)

Trading of water rights has been very limited to date. Figure 6 shows quantities traded or leased per annum on the Hydrotrader platform.[57] The highest trading year was in 2015 with 3.7 million m³ of sales and 1.7 million m³ of leases; this totals less than 1% of consented volumes for Canterbury of over 6,000 million m³ per annum.

Figure 6 Water trading in Canterbury (million m³ per annum)



	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Total	0.5	0.1	1.1	1.0	1.1	2.1	5.4	2.6	0.2	2.1	4.1	0.6	1.0	0.7	0.2
Lease(groundwater)							1.7						0.5	0.6	0.2
Sales (surface water)					0.2	0.5	2.4	0.9			0.4				
Sales (groundwater)	0.5	0.1	1.1	1.0	0.9	1.6	1.3	1.7	0.2	2.1	3.7	0.6	0.5	0.1	

Note: 2021 are for partial year only (to 1 June 2021)

Source: http://hydrotrader.co.nz/trade-history

[57] It estimates it has as much as 95% market share.

Sales and leases have fallen over time.

- Since the Canterbury Land and Water Regional Plan (LWRP)[58] was activated, all transfers (sales and leases) have required an assessment of effects, which has significant costs for trading parties. This has been particularly significant in Canterbury because of the significance of groundwater (77% of trades to date - Figure 7). Groundwater systems are highly complex, such that assessments of effects are likely to always be required. Trading will have more potential in catchments dominated by surface water, eg the Clutha or Waikato rivers.

- The Canterbury LWRP also includes a rule that transferral of permits in over-allocated catchments[59] include a surrender of a proportion (usually 50%) of the allocated water.[60] This is especially problematic for leasing, as 50% is lost each time there is a temporary transfer.

- These two issues have impacts on sales also as they are a significant transaction cost for each trade. In addition, sales are falling because those to date have had a significant impact on surplus allocations within the region. Many of the efficiency gains have been obtained already.

The gains from trading depend on the differences in community value of water as currently allocated and its value to some other potential use not currently able to obtain a permit.[61]

3.5 Wider Use of Economic Instruments

3.5.1 Objectives of Economic Instruments

In addition to the potential use of tradable rights for water, economic instruments (EIs) might be used more widely under the RM reforms.[62]

Behaviour Change

EIs are policy tools that provide incentives for changes in behaviour using market signals. They either change market prices (charges or subsidies) or introduce markets where previously there were none, eg through allocating rights to use resources and allowing owners to trade these rights (such as the emissions trading scheme or a system of tradeable water rights, as discussed above).

EIs can provide incentives for the optimal allocation of natural resources, including levels of damage to the environment. This is achieved when a charge is levied on resource use (or its associated effects) equal to the marginal external cost. This ensures the private costs of resource use (ie those borne by the resource user) are equal to the full (social) costs to the community of that resource use. This approach does not guarantee a particular

[58] Environment Canterbury (2018)
[59] Where water is over-allocated with respect to environmental limits, councils must reduce allocated amounts. Rationing can be used during periods in which water flows fall close to environmental limits (Ministry for the Environment and Ministry of Agriculture and Forestry, 2004)
[60] Environment Canterbury (2018), Section 4.71.
[61] Denne and Hoskins (2012)
[62] This discussion builds on that in Denne (2018)

environmental outcome as it is uncertain how the company (or individual) facing the charge will respond.

EIs can also be used to provide incentives for specific outcomes, eg by raising a charge to a level which changes behaviour sufficiently, or by using a tradable allowance or permit scheme in which a limited number are available on the market. The number available determines the total environmental impact, while the price to achieve this outcome is not initially known.

EIs are often favoured over other instruments (notably regulatory controls) for achieving environmental objectives because they can:

- provide a means for discovering the optimal level of policy intervention;
- achieve targeted objectives at least cost because they provide flexibility in how outcomes are achieved, including who takes action and by how much; and/or
- introduce dynamic effects that provide incentives for ongoing environmental improvement.

Studies that have compared the costs of environmental policy as predicted before implementation (ex-ante estimates) with costs after implementation (ex-post estimates), have shown that ex-ante cost estimates tend to be higher than measured ex-post costs, and that this is consistently so for economic incentives.[63] However, there are also cautionary tales for the design of policy. Comparative studies will often contrast idealised EIs with other forms of regulation that are imperfectly implemented. In practice, some of the theoretical advantages of EIs can be lost through poor design, including following political interference to protect individual firms and industries.[64] But post-implementation analyses of EIs have demonstrated that, when well designed, a high proportion of the predicted efficiency gains can be achieved.[65]

Revenue Raising

Pure revenue raising instruments, such as property rates or income taxes, are distortionary when they are levied on goods, services or income in a way that changes behaviour from what it would have been in the absence of the instrument. Given this potential outcome, tax theory suggests levying items with low price elasticity of demand (consumption does not change appreciably if price rises)[66] or to levy at a low rate across everything so there is little or no change in relative prices (eg GST).

EIs for environmental purposes will often *aim* to be distortionary; they may be designed to change behaviour.[67] However, they may both shift consumption to a more optimal pattern and raise revenue. Revenues can then be used in different ways.

[63] Harrington et al (2000)
[64] Stavins (1995)
[65] Kerr and Maré (2001)
[66] Examples of goods with low price elasticities include petrol and cigarettes, both of which are taxed significantly in New Zealand.
[67] They might also be designed simply to internalise external costs without expectations of changing behaviour

- They can substitute for distortionary taxes. This is the so-called double-dividend of corrective taxes or charges. There is one social dividend (benefit) from correcting the externality; there is a second social dividend from reducing other taxes (or from correcting another market failure).

  For local government, this shift is useful when existing tools are distortionary. However, rates are relatively non-distortionary; they are lump sum payments with little effect on marginal decisions because they are unavoidable, short of selling a property.

- The revenues can be used for specific purposes (hypothecation), eg to pay for environmental projects. While there may be arguments for doing so in terms of public acceptability, there are economic efficiency arguments against. Limiting the use of the revenue to a particular purpose can reduce the overall efficiency of the instrument if the expenditure is not justified by a market failure or a CBA. Decisions about the best instrument to meet the original environmental (or other) purpose should, from a theoretical perspective, be separated from decisions about the best use of the revenues.

3.5.2 Regressivity

EIs can be regressive, ie they can impose a greater cost (relative to their income or wealth) on the poor than on the rich. This occurs when low income households or individuals are less able to avoid the costs imposed, or are more likely to be subject to the effects. For example, research on the use of congestion charging in New Zealand has included assessments of the impacts of low income households that are often more car-dependent.[68]

We note above (Section 0) that other countries, eg the UK and the US, require distributional impacts to be included in CBAs.

3.5.3 Economic Instruments under the Resource Management Act

The RMA was drafted during a time in which there was considerable interest in the use of EIs for environmental purposes. The original Section 32 of the RMA stated that local government must consider alternatives, assess the benefits and costs of objectives, policies, rules and other methods. It should have regard to other means including "… the provision of information, services, or incentives, and the levying of charges (including rates)". Although this had required regional councils to consider EIs, it is not clear that it empowered them to use them[69] and the Act does not provide any clear tools. An amended version of Section 32 removes the explicit reference to charges and incentives, stating only that local government should "…examine whether the provisions in the proposal are the most appropriate way to achieve the objectives."

Under Section 24(h), one of the functions of the Minister for the Environment is "the consideration and investigation of the use of economic instruments (including charges, levies, other fiscal measures, and incentives) to achieve the purpose of this Act." And a

[68] Auckland Transport et al (2020); Denne and Raichev (2019); Nunns et al (2019)
[69] Bullen *et al* (2000)

more targeted channel for using economic instruments under the RMA is the provision for introducing financial contributions.

Financial Contributions

Section 108(2)(a) of the RMA states that a resource consent may require a financial contribution to be made. This might include payment of money or a land contribution (or some combination of the two). Financial contributions may be required for various purposes, including:

- offsets—providing funding for positive measures to improve the environment to offset adverse effects; and

- compensation—to mitigate adverse effects on the environment of use and development.

This is potentially a means for their introduction locally, but financial contributions are being phased out, and will not be used after 2022.[70]

Offsets

Offsets are mechanisms that allow environmental damage in one location to be compensated by environmental improvements in another location. They are a form of transferable or tradable permit. An offset requirement might measure the level of residual damage associated with an activity, eg biodiversity loss; a project would then be required to improve biodiversity elsewhere of an equivalent amount, in some other location, using some agreed metric (see Section 4.6.3). Variants of this basic approach are those that:

- required the offset to have a greater positive effect on the environment (net gain); and
- are fully tradable, eg a market for offset credits rather than being project-specific.

In New Zealand, biodiversity offsets or biobanks[71] have been the offsets discussed most, including guidance on best practice.[72] The guidance has discussed the potential use of offsets under the RMA, the Crown Minerals Act 1991 and the Conservation Act 1987. More recently Maseyk *et al* (2018) have provided updated guidance following 2017 amendments to the RMA and focussed on biodiversity offsets.

Transferable Permits

There is limited current potential for the establishment of transferable or tradable permits under the RMA. In general, consents are transferable between landowners (consents run with the land), but not between types of activity or locations.[73] Currently there are three main ways in which transfers can occur.

- Coastal permits allow holders to use coastal areas for specified purposes (section 12 RMA), and may be transferred to another person, but not to another site, unless the

[70] Ministry for the Environment (2017)
[71] Environmental Defence Society (2017)
[72] New Zealand Government (2014).
[73] Guerin (2004)

consent or a regional coastal plan expressly provides otherwise (Section 135).

- Permits for damming or diverting water may be transferred only to owners or occupiers of the same site. Other permits, eg for taking water, may be transferred only if allowed in a regional plan and approved by the consent authority (Section 136).

- Discharge permits may be transferred to other sites, if this is allowed in a regional plan, and provided the transfer will not reduce environmental quality (Section 137).

Waikato Regional Council introduced a nitrogen discharge allowance trading system by a rule which classified nitrogen-leaching farming activities as controlled activities.[74] Historical data were used to define a permitted level of discharge from a specific land area, but these permitted discharges could be traded subsequently to enable an increase in the permitted discharge at one site, balanced by a reduction at another site.

3.6 Summary

This section has discussed a broad range of expected system efficiency improvements which we summarise below.

There are expected to be net cost reductions for RM system users, including business and householders. This includes annual net process cost reductions for users of $149 million in addition to average process cost reductions of $83 million, balanced by expected increases in net costs for central and local government. In aggregate there are expected to be annual cost reductions of approximately $168 million or close to $2.6 billion as a present value (PV) over 30 years (Table 9).

Table 9 Summary of expected changes in net process and compliance costs

Party	Net Process Cost change	Compliance costs	Total	PV
Central government	$19		$19	$292
Local government	$43		$43	$661
Users	-$149	-$83	-$232	-$3,573
Total	-$85	-$83	-$168	-$2,589

PV = 30 years @ 5%

There are expected additional benefits to users from changes to approaches to resource allocation and from the wider use of economic instruments.

Changes to resource allocation will enable resources, including water, to be allocated to the users that most value the resource. We are unable to quantify these net benefits as it depends partly on the extent to which gains have already been made in Canterbury through limited water permit trading.

Greater use of economic instruments is expected to yield benefits from increased flexibility in compliance. For example, in reducing emissions of a pollutant, this would include

[74] Duhon et al (2015)

changes in who makes emission reductions, when and by what method. Research suggests there are significant potential cost savings available from wider use of EIs.

4 Natural Environment

4.1 Overview

4.1.1 The Effects of the Reforms

There are several changes which are expected to have positive impacts on the natural environment.

- Raising objectives for environmental protection to the level of **purpose and outcomes**, including:
    - *the natural environment is protected and restored, and the health of New Zealand's fresh water, coastal water, air, soil, ecosystems and their ability to sustain life are maintained in line with Te Oranga o te Taiao*[75]
    - *nationally and regionally significant landscapes, natural features, habitats for indigenous species, native biodiversity and the natural character of the coast, river and lakes are maintained or where appropriate enhanced*
    - *important indigenous species and their ecosystems are protected and where necessary restored*
- **National direction** to specify natural features of national significance, with regional councils identifying features of regional significance.
- Setting of **mandatory environmental limits** (or bottom lines) for freshwater, coastal water, air, soil and habitats for indigenous species.

The NBA will carry over the RMA's requirement to 'avoid, remedy, or mitigate' adverse effects of activities on the environment. This is to ensure a management framework exists for all adverse effects, including those not covered by limits or outcomes.[76]

In addition, there are expected changes to the policy instruments used, including those used for resource allocation, focussing on the increased use of economic instruments.

There are other changes which may be detrimental. This includes changes to ease development. The recent Parliamentary Paper notes that the NBA will ensure measures to avoid, remedy or mitigate effects do not place unreasonable costs on development and resource use, noting that the NBA will "intentionally curtail subjective amenity values",[77]

[75] Under the Natural and Built Environments Bill, *Te Oranga o te Taiao* incorporates the health of the natural environment, the intrinsic relationship between iwi and hapū and te taiao, the interconnectedness of all parts of the natural environment, and the essential relationship between the health of the natural environment and its capacity to sustain all life.
[76] NZ Government (2021)
[77] Amenity values are defined in the RMA as "natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes"

although not at the expense of quality urban design, including appropriate urban tree cover.[78]

4.1.2 A General Limitation of the Analysis

The content of the National Planning Framework and the details of environmental limits have not been determined at this point. The approach to estimating benefits and costs for the natural environment is therefore limited to a demonstration of potential impacts of possible changes. These are based on assumptions and do not represent Government policy. The theoretical underpinnings are set out in Annex 2.

4.2 Freshwater

4.2.1 The Issues

Freshwater quality has deteriorated in New Zealand from factors that include run-off or leaching of nitrogen, phosphorus, sediment and pathogens (particularly *E coli*).

- Nitrogen and phosphorus can cause excessive growth of periphyton (slime and algae) in rivers and toxic algae in lakes. This can reduce the aesthetic value of waterways, the diversity of aquatic life and the potential for recreational and commercial use.

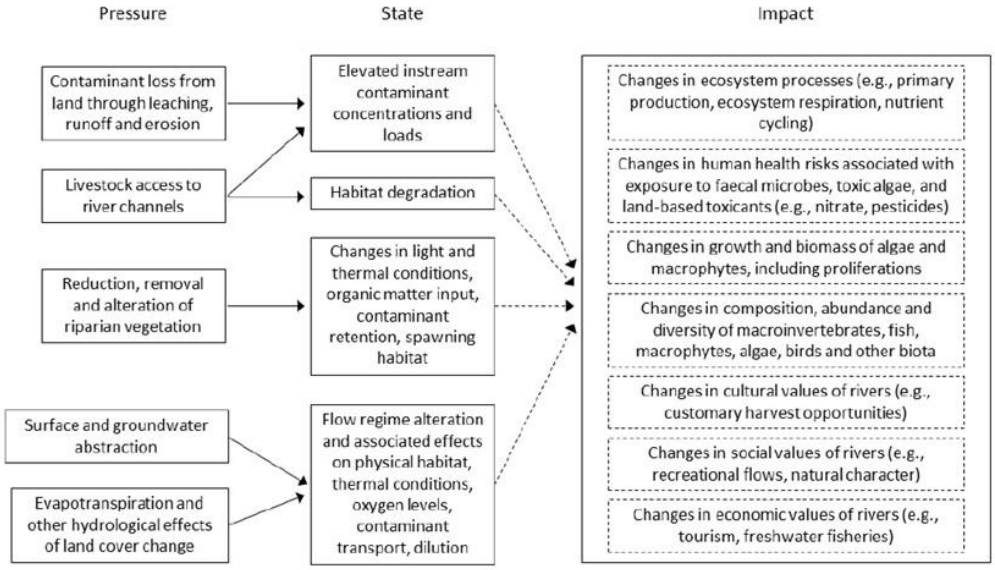
- Sediment reduces water clarity and smothers the beds of waterways to the detriment of freshwater species.

- Pathogens have impacts on human health via waterborne infections and illnesses for people in direct contact with water, such as when swimming.

Overall, the effects of contaminants in waterways are to change ecosystem structure and dynamics, with consequent impacts on recreational, customary and commercial use, and on the benefits people gain from being near freshwater or even from just knowing about the reduced quality (Figure 7).

[78] NZ Government (2021)

Figure 7 Impacts of Activities Affecting Freshwater Environments



Source: Larned *et al* (2018)

Environment Aotearoa 2019,[79] which is a synthesis report on the state of the environment, assessed the state of freshwater in 2013-17 against the Australian and New Zealand Guidelines (ANZGs) for Fresh and Marine Water Quality. It identified that 50-90% of the total river length in agricultural areas[80] exceeds most of the relevant default guideline values (DGVs) for water quality in a natural state; this compares to less than 30% of rivers in native forest areas (Table 10). The data in Environment Aotearoa 2019 were updated in the Our freshwater 2020 report.[81]

Table 10 Modelled river water quality in pastoral and native land catchments (2013-17)

		Median value		**River length (km) and % that does not meet ANZG DGV**			
Water quality variable	Units	Pastoral	Native	Pastoral		Native	
Total nitrogen	mg/m3	738.6	115.9	162,475	(86%)	57,027	(29%)
Nitrate nitrogen	mg/m3	246.6	25.6	155,000	(82%)	26,610	(13%)
Ammoniacal nitrogen	mg/m3	8.3	4	94,237	(50%)	29,464	(15%)
Total phosphorus	mg/m3	32.5	8.3	169,142	(90%)	50,977	(26%)
Dissolved reactive phosphorus	mg/m3	14.6	4.4	144,191	(77%)	45,270	(23%)
E coli	cfu/ 100ml	195	13.3	47,314	(25%)	1,117	(0.6%)
Turbidity	NTU	2.9	1.3	117,343	(62%)	22,962	(12%)
Clarity	m	1.7	3.3	13,499	(7%)	1,467	(1%)

Source: Ministry for the Environment & Stats NZ (2019)

Water quality in agricultural dominated catchments (containing approximately half of New Zealand's rivers by length) has been reducing because of changes in agriculture, and particularly:[82]

[79] Ministry for the Environment & Stats NZ (2019)
[80] Land is classified into four classes: pastoral (ie agriculture), exotic forest, native and urban.
[81] Ministry for the Environment & Stats NZ (2020)
[82] Ministry for the Environment & Stats NZ (2019)

- changes in stock type - fewer sheep and more cows (and cattle excrete more nitrogen per animal than sheep);
- increases in stock intensity per hectare;
- more nitrogen fertiliser applied; and
- more irrigated land (greater irrigation take reduces water levels in rivers and streams and concentrates pollution loads).

4.2.2 Current Policy

Freshwater management is the responsibility of councils under the RMA. National direction is provided through:

- the National Policy Statement for Freshwater Management (the NPS-FM);
- National Environmental Standards for Freshwater (NES-FW);
- stock exclusion regulations; and
- water measurement and reporting regulations.

The NPS-FM 2020 replaces the previous NPS. In the short run it aims to stop further degradation of freshwater quality and ecosystem health and to start making improvements, so that there are material improvements within five years. In the longer run, it aims to bring freshwater resources, waterways and ecosystems to a healthy state within a generation. This includes requirements for working collaboratively with tangata whenua, in addition to the achievement of quantified bottom lines that define water quality, suitability for *mahinga kai*, the health of ecosystems and the health of freshwater for recreation.

The Freshwater NES sets standards for those carrying out certain activities that pose risks to freshwater and freshwater ecosystems. The standards are designed to:

- protect existing inland and coastal wetlands;
- protect urban and rural streams from in-filling;
- ensure connectivity of fish habitat (fish passage);
- set minimum requirements for feedlots and other stockholding areas;
- improve poor practice intensive winter grazing of forage crops;
- restrict further agricultural intensification until the end of 2024; and
- limit the discharge of synthetic nitrogen fertiliser to land, and require reporting of fertiliser use.

The stock exclusion regulations and the water measurement and reporting regulations are made under section 360 of the RMA. The stock exclusion regulations prohibit the access of cattle, pigs and deer to wetlands, lakes and rivers. The water measurement and reporting regulations require holders of water permits (resource consents) allowing takes at 5 litres/s or more to keep records of those takes.

4.2.3 RM Reform Expectations

For the purpose of this analysis, the RM system reforms are expected to carry over measures similar to those adopted under the Essential Freshwater (EFW) programme that resulted in the NPS-FM 2020, the NES-FW and the stock exclusion regulations, or to simply reinforce these existing regulations. The EFW process was led by central government, with

significant consultation with stakeholders, and it is unlikely that RM reforms will lead to any significant changes, if any, to those already in train.

The EFW programme included a detailed process of analysis that included the assessment of costs and benefits at the level of a whole natural system: freshwater, including rivers, lakes, aquifers, and wetlands. The programme is assumed to be implemented relatively slowly by councils, starting in 2025, with full implementation not until 2050, although the stock exclusion policy is expected to be introduced much more quickly.[83]

4.2.4 Costs and Benefits

Benefits

Quantification of the benefits of widespread water quality improvements relies on studies that can be applied widely, whereas many of the benefit analysis studies are quite site-specific and not suitable for benefit transfer.[84] The benefits of the EFW package were quantified where possible using estimates of marginal benefits of water quality improvement from a national stated preference (SP) survey.[85] The SP study included estimates of the value for the New Zealand adult population of improvements in human health (swimmability of rivers), water clarity and ecological health (Table 11).

Table 11 Willingness to pay ($/adult/year) for a 1% increase in water quality outcomes

Attribute	Level	Median (2015)	Range (2015)[a]	Median (2019)	Range (2019)[a]
Human Health Risk	1:20	$0.70	$0.22 - $1.28	$0.74	$0.23 - $1.36
(chance of infection)	1:100	$1.15	$0.65 - $1.65	$1.22	$0.69 - $1.75
	1:1,000	$3.31	$2.79 - $3.83	$3.52	$2.97 - $4.07
Ecological Quality	Moderate (81-99)	$2.14	$1.73 - $2.54	$2.27	$1.84 - $2.7
(MCI)	Good (100+)	$5.68	$5.41 - $5.93	$6.04	$5.75 - $6.3
Water Clarity	Moderate (1.2m – 2.4m)	$4.13	$3.64 - $4.62	$4.39	$3.87 - $4.91
(metres)	Good (2.5m or more)	$7.39	$6.93 - $7.86	$7.86	$7.37 - $8.36

[a] Range = 5th and 95th percentiles

Source: 2015 values from Tait *et al* (2016); 2019 values from Denne (2020a)

These values were combined with estimates of the percentage of rivers and streams nationally that had improved across the categories included in the valuations. This used results of analysis by NIWA of: (1) stream length from which stock were excluded and the benefits for human health categories;[86] and (2) on improvements in water clarity.[87] Ecological health benefits were estimated on the assumption that the macroinvertebrate community index (MCI) bottom lines (as included in the NPS-FM 2020) would be achieved, and changes were estimated relative to current modelled MCI based on river monitoring.

The initial results are summarised in Table 12, along with the identification of several other benefits not quantified using monetary values because of the absence of suitable studies.

[83] See further detail in Denne (2020a)
[84] Marsh and Mkwara (2013)
[85] Tait et al (2016)
[86] Semadeni-Davies et al (2020)
[87] Hicks and Shankar (2020)

The non-quantified benefits include:

- Improvements in additional non-market values that could not be quantified, including ecosystem services.

- Protection of financial values at risk, including
    - commercial values from direct use of freshwater, eg guided fishing and commercialised boat trips;
    - the price premium that exporters and tourism operators obtain on the basis of New Zealand's reputation for high environmental quality.

- Avoided financial costs, including costs of denitrification of drinking water and greenhouse gas reduction costs.

Table 12 Benefits of the Essential Freshwater Package

Benefit Category	**Value**	**Median Monetary value (and range)***	
Monetarised Non-Market Values		Annual in 2050 ($m)	Present value to 2050 ($m)**
Human health	Reduced risk of infection for swimmers Valued also by non-users.	$138 ($74-$203)	$2,366 ($1,272-$3,487)
Increased water clarity	Increased value of recreational use of water Valued also by non-users. Stock exclusion policy impacts counted only.	$13 ($11-$14)	$221 ($195-$247)
Ecological health	WTP for improved MCI score by users and non-users	$79 ($64-$94)	$661 ($535-$785)
Other Non-Market Values			
Water clarity and ecological health	Additional benefits from N & P bottom lines not quantifiable.		
Ecosystem services	Water quality is the basis for the functioning of other ecological systems that are the basis for other human values.		
Protection of financial values at risk			
Commercial value	Protection of the value of commercial angling (guided fishing) enterprises, in particular. Also, other water-based activities such as boat trips.		
Reputational value	Consumers in other countries are willing to pay a price premium for NZ products and for certified reduced water pollution. Some of this premium is at risk in the absence of improvements in water quality.		
Avoided costs			
Protection of drinking water quality in underground aquifers	Protection of human health for babies and adults, or avoided costs of denitrification		
Greenhouse gas reduction co-benefits	Water quality policy is expected to lead to increased afforestation and other planting. This will absorb CO_2 and reduce the need for other emission reductions to meet NZ's emissions cap.		
Avoided costs of delay			
Irreversible effects and higher future costs	Failure to reduce concentrations early can lead to the build up of sediments and contaminants in rivers, lakes and estuaries. This can result in shifts to alternative states which may be irreversible over reasonable time frames or high cost to change.		

* The range is based on the 5th and 95th percentile values in Tait et al (Table 11); ** The present value is to 2050 discounted at 3%

Source: Denne (2020a)

Table 12 includes additional possible irreversible effects or those that are slow or costly to reverse. These were analysed by NIWA[88] and include those associated with changes of ecological systems to alternative states if allowed to deteriorate. Reducing pollutant concentrations early helps to reduce the risks of these events.

In the final CBA used in the Government's RIA,[89] additional benefits were included for wetland preservation, based on international assessments of the value of ecosystem services produced by wetlands.[90] These were used to produce a value of $50,000/ha in 2019NZ$ values.[91] This value was multiplied by estimates of the annual loss of wetlands prevented (300 ha per annum).

The overall benefits are summarised in Table 13. They include the annual benefits in 2050 and the present value (PV) of benefits to 2050 (from 2020) using a 5% discount rate. An equivalent annual benefit is estimated from the PV. These differ slightly from those in the RIA.[92]

Table 13 Benefits of EFW ($ million)

	Annual in 2050	PV to 2050 @ 5%	Equivalent Annual Benefit
Human health	$138	$1,817	$118
Water clarity	$13	$170	$11
Ecological health	$79	$450	$29
Wetlands	$450	$2,760	$254
Total	$680	$5,197	$412

Note: Equivalent annual benefit estimated from PV over 30 years at 5%

If it is assumed that the RM reforms will require councils to implement the EFW reforms more quickly, the benefits for water clarity and ecological health would be brought forward (the human health and wetland benefits are already assumed to be achieved rapidly). Table 14 shows an estimate for bringing forward the full implementation to 2040; there is an additional estimated benefit of $105 million estimated as a PV to 2050 (a 2% increase) and an additional annual benefit of $7 million ($419m compared to $412m in Table 13).

Table 14 Benefits of Faster implementation of EFW ($ million)

	Annual in 2040	PV to 2050 @ 5%	Additional benefits (PV)	Equivalent Annual Benefit
Human health	$134	$1,817	$0	$118
Water clarity	$18	$171	$1	$11
Ecological health	$77	$554	$104	$36
Wetlands	$300	$2,760	$0	$254
Total	$529	$5,301	$105	$419

[88] Graham *et al* (2020)
[89] Ministry for the Environment (2020b)
[90] Clarkson *et al* (2013); Russi et al (2013); and Costanza *et al* (2014)
[91] Susan Guthrie, personal communication
[92] Ministry for the Environment (2020b)

Potential for Underestimates

The quantified benefit estimates may be significantly higher under different assumptions about rights to clean water.[93] The monetarised benefits above are based on WTP analysis. This assumes a set of existing rights to discharge contaminants. However, such rights are not established in law; rather the RMA states that no person may discharge any contaminant into water unless allowed by a regulation, a plan, or a resource consent. A different set of rights, eg which established rights for the public to have clean, uncontaminated water (unless appropriately compensated for any loss), could be agreed. It would require a different approach to valuation and would be expected to produce higher values than those presented here. The economics literature makes clear that studies that assess willingness to accept compensation for a loss of environmental quality result in higher estimates of value.[94]

Costs of the EFW package

The costs of the EFW package were estimated by MfE and an updated version using a 5% discount rate (rather than 3%) is shown in Table 13.[95] We estimate an equivalent annual cost using the same approach as for the benefits analysis, ie discounted over 30 years at 5%.

Table 15 Costs of EFW programme ($ million)

	Annual in 2050	PV to 2050 @ 5%	Equivalent Annual Cost
Stock exclusion	$61	$826	$54
Farm plans (annual 2025-35)	$22	$150	$5
N mitigation	$30	$144	$5
Measuring & reporting	$10	$154	$5
Council costs	$76	$1,151	$38
Total	$166	$2,425	$107

Source: Updated from Ministry for the Environment (2020b); Resource Economics analysis

Net Benefits

The net benefits estimated for the EFW programme are $2.8 billion as a present value to 2050 at 5%.[96] If this is brought forward, benefits and costs would be expected to change in a similar pattern, eg a 2% increase in the PV of costs and benefits, resulting in a net benefit of $55 million or $6 million per year as an equivalent annual net benefit.

4.2.5 Summary

The net benefits of the reforms for freshwater are uncertain as it depends significantly on whether further changes are made to those included in the EFW programme that has recently been adopted. The EFW programme follows an approach similar to that envisaged under the reforms; it is a process led by central government to produce national direction, and involved extensive consultation with a wide range of stakeholders resulting in significant changes to take account of sectoral concerns.

[93] Denne (2020a)
[94] Pearce and Turner (1990)
[95] Using data and assumptions from Denne (2020b)
[96] $5.2 billion (Table 13) minus $2.4 billion (Table 15)

However, if further environmental improvements result from the changes, the existing analysis suggests there is potential for positive net benefits from marginal changes. As an example, bringing forward the changes by ten years would be expected to produce annual net benefits of $6 million; using the same approach for estimating the PV of process cost changes (PV over 30 years at 5%), this would yield a PV of $92 million.

4.3 Coastal Water and Estuaries

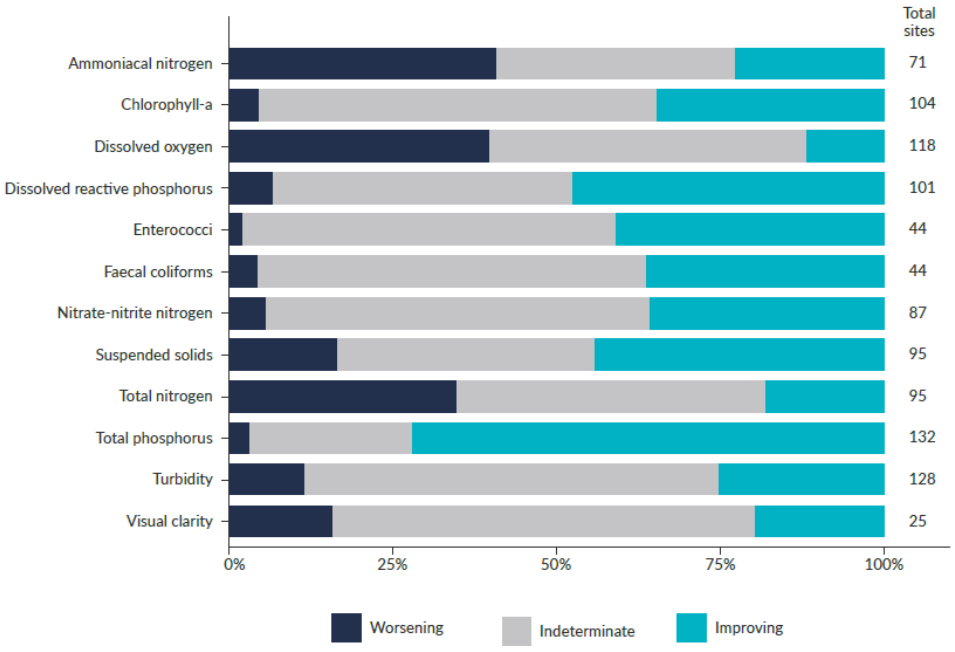
4.3.1 The Issues

Environmental Impacts of Human Activity

MfE and Stats NZ report that an estimated 30% of Aotearoa New Zealand's biodiversity is in the sea but many species are at risk.[97] There are major data gaps in the knowledge of the status of marine water ecosystems, but the data available suggest 22% of marine mammals, 90% of seabirds and 80% of shorebirds are threatened with, or at risk of, extinction. At the same time, 214 non-native species have been identified as established in New Zealand. Many non-native species can spread rapidly and some affect native species and habitats.

MfE and Stats NZ note that it is difficult to assess the overall state of coastal water quality because of the number of different variables that affect quality and geographical differences in natural capacity to process pollutants.[98] Variables measured include nutrients (phosphorus and nitrogen), phytoplankton, oxygen, water clarity, and pH. In addition, faecal bacteria concentration is used to assess water quality for human health. For many variables there are no national guidelines that would allow consistent assessment. Figure 8 shows the variability in the direction of change for different variables used to defined quality.

Figure 8 Coastal and estuarine water quality trends measured at monitoring sites, 2008—2017



Source: Ministry for the Environment & Stats NZ (2019)

[97] Ministry for the Environment & Stats NZ (2019)
[98] Ministry for the Environment & Stats NZ (2019)

The human impacts on the coastal environment include those from land-based activities that produce sediment, nutrient and chemical (including pharmaceutical and cleaning product) discharges, in addition to plastic and other materials entering and polluting the marine environment.[99] These contaminants come from land uses that include agriculture, forestry and human settlements.

There are also marine-based activities that affect the marine environment directly.[100]

- Coastal hardening which involves replacement of natural coastal environments with hard surfaces. This includes coastal protection works, building ports, wharfs and jetties, residential development, and reclaiming land from the sea.

- Dredging to increase channel depth which disturbs the sea bed with impacts on seabed habitats and resuspending sediment.

- Fishing activities, including:[101]
    - Unsustainable levels of harvest of some fisheries. Although those assessed under the Quota Management System (QMS) are managed back to sustainable levels under the Harvest Strategy Standard,[102] this is not a precise science and does not use a precautionary approach. In addition, many stocks are not assessed including those fished largely for recreational purposes or caught mainly as bycatch;

    - Bycatch of non-target species during fishing activities, including marine mammals and birds;

    - Direct impact of some fishing methods, including bottom disturbance by trawling.

- Aquaculture which can concentrate nutrient deposition and foster the development of diseases which can spread to wild populations.

- Mining of minerals and extraction of oil and gas, which can disturb the seabed and surrounding habitats, and cause direct pollution, eg leakage from oil platforms. Other activities that can have impacts include laying of cables.

- Shipping which can result in effects that include:
    - spread of non-native species;
    - leaks of fuel oil;
    - waste discharges, including plastic pollution; and
    - associated need for wharves and port facilities (coastal hardening).

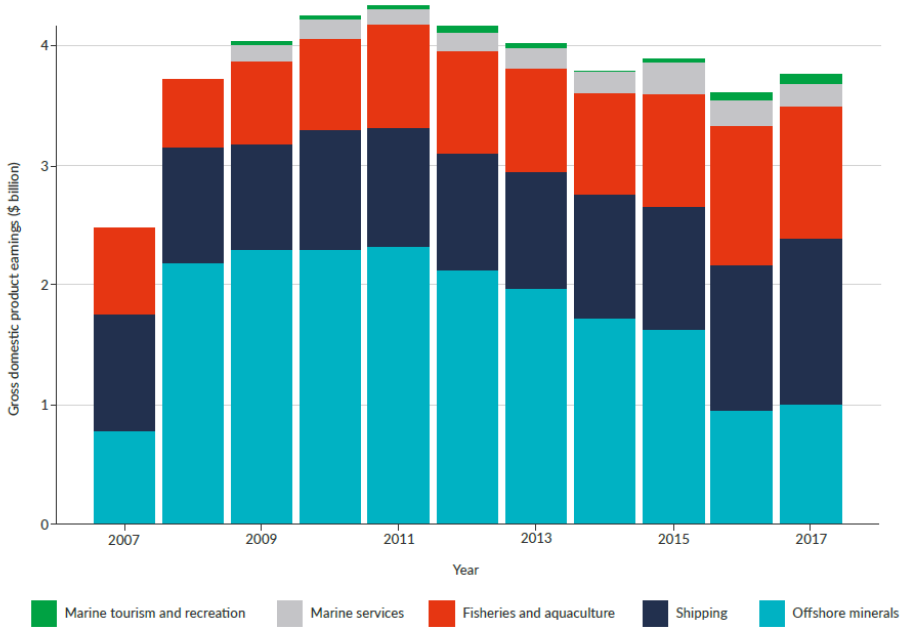
[99] Building on Ministry for the Environment & Stats NZ (2019)
[100] Ministry for the Environment & Stats NZ (2019)
[101] Fisheries New Zealand (2020)
[102] Ministry of Fisheries (2008)

The interaction of the marine environment with human activity is also affected by climate change, and sea level rise in particular. The RM reforms are addressing climate impacts but those issues are not considered in this report.

Economic Importance of the Marine Environment

The impacts of human activities in the marine environment are offset by the contribution of that activity to the economy and to community wellbeing. As part of its development of satellite accounts, Statistics NZ compiled data on the contribution of the "marine economy" to GDP for 2007-2017. This included fishing, aquaculture, shipping, and coastal development (Figure 9).

Figure 9 Contribution of activity category to the marine economy, 2007—2017



Source: Ministry for the Environment & Stats NZ (2019)

In 2017, the marine economy contributed $7 billion (approximately 2%) to GDP and employed more than 30,000 people (approximately 1% of the labour force). Of the GDP contribution, 37% was from shipping, 29% from aquaculture and fishing, and 27% from offshore minerals. Additional contributions are from the industries that depend on shipping for exports or imports, eg $48 billion in exports and $43 billion of imports.[103]

4.3.2 Current Policy

The marine environment is governed by several pieces of legislation, including the Fisheries Act, legislation setting up marine protected areas (MPAs) and that managing the Exclusive Economic Zone (EEZ). The RM reforms are not affecting these existing pieces of legislation (see Box 2), despite the obvious interaction of effects.

The RMA controls factors that cannot be managed through area-based restrictions, including:[104]

[103] Fob and cif bases respectively
[104] Froude and Smith (2004)

- management of the land-sea interface to address issues such as sedimentation and eutrophication, such as through the establishment of riparian strips to filter run-off and implementation of catchment management strategies; and

- the requirement for regional councils to prepare Regional Coastal Plans to address their functions in the coastal marine area, including aquaculture management areas.

Box 2 Other Relevant Marine Legislation

Fisheries Act

The Fisheries Act 1996 currently regulates fishing in New Zealand and is the regulatory basis for the Quota Management System (QMS). Its purpose (section 8) is "*to provide for the utilisation of fisheries resources while ensuring sustainability*", where sustainability means "*maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment.*"

There are concerns over the extent to which the focus of the Act on achieving maximum sustainable yield (MSY)[105] for individual fish stocks, rather than achieving sustainable management of marine ecosystems in a wider sense.[106] The Ministry of Fisheries (now MPI) noted in 2011 that fisheries management is rapidly evolving towards incorporating ecosystem considerations into the harvest strategies that set the targets and limits against which stocks are assessed, but this has not changed the focus on MSY. Regardless, these issues are beyond the scope of this document as the RMA reforms are not reforming the Fisheries Act.

Marine Protected Areas (MPAs)

Marine Protected Areas (MPAs) are areas of the sea in which specified activities are banned. These vary with the area and the level of protection, but might include all commercial fishing, specified methods (eg trawling and dredging). These include:

- Marine Reserves established under the Marine Reserves Act 1971 provide the highest degree of protection, banning all forms of fishing while allowing public access. Marine reserves are established primarily for the scientific study of marine life;
  Marine Mammal Sanctuaries under the Marine Mammals Protection Act 1978 (MMPA), which restrict certain fishing activities. The MMPA and the Wildlife Act 1953 also prohibit direct harvest of marine mammals and other protected species everywhere, although fisheries bycatch is effectively permitted if reported.
- Benthic Protection Areas (BPAs) and Seamount (underwater mountain) Area Closures, both of which are established via regulations under the Fisheries Act. They are used to protect sensitive areas against trawling and dredging.

In addition, certain areas are set aside for customary fishing.[107]

- Taiapure-local fisheries created by Order-in Council for areas that have customarily been of special significance to any iwi or hapū as a source of food or for spiritual or cultural reasons.
- Mātaitai reserves declared by the Minister of Fisheries through notice in the Gazette where there is a special relationship between tangata whenua and the area. The Minister appoints a Tangata Kaitiaki/Tiaki to manage the mātaitai, who is then empowered to make bylaws restricting fishing activity. Commercial fishing is not normally permitted in a mātaitai reserve.

Exclusive Economic Zone (EEZ)

The Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 has the purpose of promoting the sustainable management of the natural resources of the exclusive economic zone (EEZ) and the continental shelf; and for waters beyond the EEZ outer limits, to protect the environment from pollution by regulating or prohibiting the discharge of harmful substances and the dumping or incineration of waste or other matter.

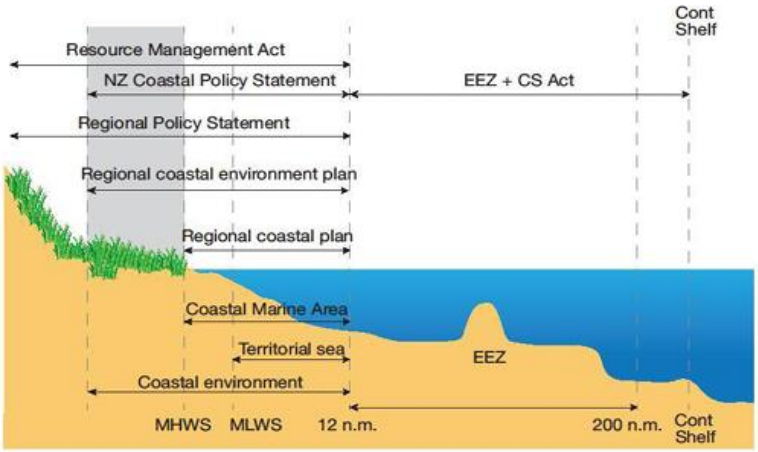
[105]MSY is defined under the Act (Article 2) as " *the greatest yield that can be achieved over time while maintaining the stock's productive capacity, having regard to the population dynamics of the stock and any environmental factors that influence the stock*."

[106] See Peart (2018) for a recent discussion of the fisheries regulation.

[107] Peart (2018)

The area under the control of the RMA is partly defined by the definition of the areas governed by regional councils. This includes the coastal marine area (CMA), which is the area between mean high water springs (MHWS) and the 12 nautical mile limit of the territorial sea (Figure 10).

Figure 10 RMA Coastal Management Jurisdiction



MHWS = Mean High Water Springs
MLWS = Mean Low Water Springs
EEZ = Exclusive Economic Zone
Cont Shelf = Continental Shelf
EEZ + CS Act = Eclusive Economic Zone + Continental Shelf (Economic Effects) Act 2012
n.m. = nautical miles

Source: Quality Planning (2013)

Currently a New Zealand Coastal Policy Statement (NZCPS) and regional coastal plans are compulsory.[108] The Review Panel noted that the NZCPS covers the 'coastal environment', but that does not include all areas that generate impacts on the CMA (eg land uses generating sediment) or that depend on coastal infrastructure, eg export ports.

The latest NZCPS was produced in 2010.[109] Its purpose is to set out policies to achieve the purpose of the Act in relation to the coastal environment. It states policies on issues including preservation of natural character; coastal subdivision, use and development; and coastal hazard risks.

4.3.3 RM Reform Expectations

For the purpose of this analysis, it is assumed that the effects of the RM reforms on coastal management would include greater integration of land management with the ocean and greater flexibility in permits for marine farming. This is assumed to enable analysis of marginal changes in environmental outcomes.

The Panel suggested the government would set out its environmental priorities and management approach to nationally important coastal issues in the NZCPS. Regional coastal plans (incorporated into combined plans) would be required to 'give effect to' the NZCPS and be 'consistent with' spatial strategies which should extend into the CMA as this will promote integration between land use, the coastal environment and water quality.

[108] Sections 57 and 64 of the RMA
[109] Department of Conservation (2010)

The Panel suggested the NZCPS must include environmental limits for the quality of coastal water.

Integrated Planning

Integrated planning includes greater use of marine spatial planning, following the example of the Sea Change Tai Timu Tai Pari Hauraki Gulf Marine Spatial Plan.[110] It was produced through a collaborative, stakeholder-led, co-governance process and included proposals to improve the health, mauri (life force and vitality) and abundance of marine life in the Hauraki Gulf Marine Park through controls on activity in the marine area and reducing the impacts of sedimentation and other land-based activities on water quality.

The Government has responded to the Sea Change proposal with a strategy published in June 2021.[111] It includes a set of new initiatives as outlined in Table 16.

Table 16 Initiatives under the Tai Timu Tai Pari Hauraki Gulf Strategy

	Initiative	Detail
1	Fisheries management	An area- and ecosystem-based fisheries plan for customary, commercial and recreational fisheries by June 2022. It will include: • removal of trawl fishing for a significant portion of the Gulf; • limits on scallop dredging; • management strategies to address localised fisheries depletion; • more intertidal harvesting controls, such as blanket seasonal closures; • greater mana whenua and regional participation in management; • a fisheries indicator and monitoring framework.
2	Active habitat restoration	Establishing a habitat restoration framework to guide new investment and restoration initiatives, to be completed in 2021.
3	Aquaculture	Identifying government actions to remove impediments to aquaculture initiatives by 2023.
4	Marine biosecurity	Continuing agency support for the Top of the North Marine Biosecurity Partnership.
5	Marine protection	Increase the area under marine protection in the Gulf from 7% to 18% via new legislation to be passed in 2024. To include: • 11 new High Protection Areas to protect and restore marine ecosystems, and recognise the role of mana whenua as rangatira and kaitiaki through provision for customary practices, consistent with biodiversity objectives. • 5 Seafloor Protection Areas and 2 areas of marine protection adjacent to existing marine reserves.
6	Protected species	Expanding the existing work by DOC and MPI/FNZ for protected marine species in the Gulf over the next three years, including threats to burrow-nesting seabirds on island refuges, improving by-catch measures, and prioritising research and monitoring of protected species.
7	Ahu Moana (local marine management by mana whenua and local communities)	Initiating pilot projects with mana whenua and local communities in 2021 to explore how to improve fisheries and conservation in local areas. Existing fisheries regulatory tools will support the pilots. Lessons from the pilots will inform the development of an Ahu Moana framework by 2023.
8	Governance	Establishing a cross-agency implementation group comprising DOC and MPI/FNZ (the agencies) to oversee the implementation of the Strategy, noting that future Treaty negotiations relating to the Gulf will focus on governance arrangements (including the Hauraki Gulf Forum).

Source: Department of Conservation *et al* (2021)

[110] Sea Change (2017)

[111] Department of Conservation *et al* (2021)

This is being developed under existing legislation so that arguably, if this is the model for future developments, the RMA reforms will not enable anything that does not exist already. However, the Government's Hauraki Gulf strategy suggests the RMA reforms are part of the background to the achievement of the strategy. The reforms are listed alongside other initiatives underway including:

- the Government's EFW and the Productive and Sustainable Land Use (PSLU) packages that will reduce land-based sources of sediment and other contaminants;
- Auckland Council and Waikato Regional Council projects;[112] and
- projects led by mana whenua and community groups.[113]

However, although these strategies and the resulting improvements in environmental quality could happen under existing institutional arrangements, it is assumed for the purpose of this analysis that the RM reforms make it more likely that this approach will be used more widely across the country and will speed up the implementation of the Hauraki Gulf strategy.

Marine Protected Areas

For the purpose of this analysis it is assumed that an increase in the use of MPAs will be part of the reforms, noting calls internationally for a significant increase in protected areas both internationally and in New Zealand.[114]

Flexible Aquaculture Permits

Suggested approaches to achieve greater flexibility with permits include the use of different time periods and allowing some location flexibility.

The Panel cites the Norwegian model as one in which location is movable, although this is only within defined aquaculture areas.[115] Norwegian legislation allows for a licence to be sold from one holder to another without any review or approval by public authorities. It also provides grounds for a permit to be withdrawn if the location is no longer deemed to be environmentally appropriate, eg if a survey of biological diversity shows vital natural values have been adversely affected.[116] A new 2021 strategy is establishing a committee to review the current licensing regulations.[117]

The Norwegian experience does illustrate some of the issues. Enabling flexibility in licensing, especially over space occupation, has the potential for adverse effects on natural systems, depending on the sensitivity of the site and for conflicts with other uses, which may have site preferences. These trade-offs will need to be managed, but it means the

[112] These are actions in response to various land and freshwater proposals in the Sea Change Plan, including habitat restoration, managing sedimentation, improving water quality and managing marine debris.
[113] These include the Ngāti Whātua Ōrākei restoration project in Okahu Bay and the Taramaire Stream restoration project
[114] Rovellini and Shaffer (2020)
[115] Standing Senate Committee on Fisheries and Oceans (2016)
[116] Norwegian Ministry of Fisheries and Coastal Affairs (2009)
[117] https://www.hatcheryinternational.com/norways-new-strategy-to-grow-its-aquaculture-industry/

introduction of flexibility has no certainty of outcome in either direction – better or worse from a wellbeing perspective.

Environmental Limits

Environmental limits for coastal water quality are proposed. For the purpose of this analysis, it is assumed this would include improvements in water quality for swimming and other human activity, plus for harvesting of kai moana and for the restoration of natural habitats.

4.3.4 Costs and Benefits

To estimate the costs and benefits requires a more detailed understanding of what will change as a result of having a more integrated approach to land and coastal management. Some of the elements included in Table 16 are expected under existing regulations, eg management strategies to address localised fisheries depletion are expected under the Fisheries Act and the Harvest Strategy Standard, plus ongoing investment to address discharges to the ocean from wastewater overflows, including the recently announced changes to institutional arrangements for the three waters.[118] However, the additional elements might include:

- the establishment of additional marine protected areas (MPAs);
- environmental limits for water quality; and
- increased co-governance arrangements with mana whenua and local communities.

We address the issues relating to collaboration under impacts on Māori below (Section 6). Here we discuss the costs and benefits of expansion of MPAs, and the effects of water quality environmental limits.

4.3.5 Costs and Benefits of MPAs

Costs

Further expansion of MPAs will have impacts on commercial, recreational and customary fishers; Māori may be affected under all three categories.

Commercial fishers will face higher costs when they are restricted from fishing in MPAs, although the effects are likely to be in the form of higher costs of effort rather than lost revenue,[119] ie they will need to fish for longer in different locations or in different vessels if MPAs tend to be located by more sheltered coast areas. Fishing cost increases would be expected to reduce the WTP for Annual Catch Entitlements (ACE), which will, in turn, affect the value of quota shares. This will affect all owners of quota shares, including Māori.

Recreational fishers might be affected by extensions of MPAs also. They go fishing for a wide range of reasons that provide positive contributions to their wellbeing. This might be through catching fish for consumption or for the enjoyment of a day's fishing with friends

[118] https://threewaters.govt.nz/

[119] When commercial fishing is restricted from parts of a fishery, the loss is the reduction in the future stream of net benefits. However, the space available for fishing may not be the binding constraint on the quantity of fish caught and the revenue obtained. Rather the availability of Annual Catch Entitlements (ACE) under the Quota Management System (QMS) is the binding constraint.

or family. The costs for recreational fishers who currently use areas in which MPAs would be established, would not be expected to be significant if there were nearby substitute sites where the same activities can be pursued. However, unless where they fish is chosen at random, we can assume that the substitute sites provide less value or enjoyment.

Several non-market valuation studies have assessed the value of recreational sea fishing in New Zealand. The value is measured as the surplus that people obtain; it is the difference between their costs (eg what they spend on travel or bait etc) and their expressed WTP. This surplus, summed across all recreational fishers, is assumed to be the measure of social (or community) benefit. Published New Zealand studies use different survey questions to produce different values on different bases, including value per fish caught,[120] per fisher per year,[121] per person per day[122] and per fishing trip.[123]

However, to use these values to estimate the costs of new or extended MPAs would require estimates of change in one of the relevant indicators: the number of fish caught, total recreational fishers, numbers of fishing days or trips. We do not have such estimates, particularly because significant site substitution would be expected to occur.

Costs of Monitoring and Enforcement
In addition to the compliance costs falling on fishers, there will be costs to introduce the new regulations, including education of fishers and the community, and to monitor and enforce compliance. Identifying such costs is not straightforward as it depends on the level of enforcement, levels of community engagement and the expected conservation outcome. Costs will be high when there is continuous patrolling and enforcement but can be low where it depends more on voluntary measures and/or reporting by locals.[124] Where the costs of enforcement are significant (taking account of the effectiveness of voluntary restraint), they can have an impact on decisions over the optimal size of an MPA.[125]

Benefits

The benefits of spatial closures of fisheries to commercial and recreational fishing are estimated to result from the restoration of habitats and an increase in biodiversity and abundance. These effects, in turn are expected to result in:

- An increase in levels or associated values (consumer surpluses) of activities that are enabled by the greater biodiversity. This might include snorkelling and diving;

- Increases in existence value for people who value the ecological quality of the MPAs;

- Increases in cultural values for some people and groups;

[120] Wheeler and Damania (2001) used a survey at boat ramps which asked fishers if they would still go fishing that day if their trip was more expensive by stated amounts (based on increased costs of bait, fuel, ice, etc).
[121] Kerr *et al* (2003) produce relatively low estimates of value based on a survey which assessed fishers' willingness to pay for a marine fishing licence which would be required for sea fishing. They suggest the values include the influence of protests about the idea of a marine fishing licence.
[122] Kaval and Yao (2007)
[123] Schischka and Marsh (2008)
[124] Brown *et al* (2018)
[125] Albers *et al* (2020)

- Potentially positive spillover benefits for commercial and recreational fishing in areas close to the MPAs.

Recreational Benefits – new activities
The predicted change in ecological quality inside the MPAs enables new recreational opportunities that are not widely available elsewhere or not with such high value. This can be seen from the use of other marine reserves:

- The Cape Rodney–Okakari Point Marine Reserve (or Goat Island Marine Reserve), near Leigh, is smaller than the current proposals but closer to the large population of Auckland. A 2010/11 survey found 47% of visitors to the reserve said snorkelling was their main reason for the visit and that it is widely regarded as "the place to swim with the fish".[126] Estimates of annual visitor numbers to the reserve range from "a conservative figure of 200,000"[127] to 375,000.[128]

- The Poor Knights Island Marine Reserve is more difficult to access and approximately 1053 commercial trips were made to in 2003–2004 carrying approximately 14,836 passengers.[129] A survey of 355 boats within the reserve between 1998 and 2002 found diving was the main activity for 80% of the passengers.

To value these activities requires an estimate of the additional recreational trips expected because of the change in ecological values, in addition to a value per additional trip. Although there are some per trip values in the literature,[130] we do not have estimates of the number of additional trips. And even if we did, it is important to take account of whether these recreational trips are truly additional, or if they represent a change in location and/or in activity. However, unlike the removal of recreational fishing opportunities for which there are likely to be substitutes, the creation of MPAs is developing something unique, enabling snorkelling and diving for which there are fewer equivalent substitute sites. This is likely to add recreational value as seen at existing MPAs.

Thus, new or enhanced recreational opportunities are expected to compensate, in part, in whole or in excess, for recreational fishing that might be displaced to new sites.

Existence values
People express values for the existence or quality of natural sites and habitats they might never visit. These are referred to as 'existence values'.[131]

One recent example of their measurement is a study in the Waikato which used a survey to estimate the WTP for improvements in water clarity, reduced numbers of *E coli* infections and increased ecosystem health (based on levels of nutrients and algae, and suitability for

[126] Race (2011); Race and Orams (2014)
[127] Race (2011)
[128] DoC (2005) in Hunt (2008)
[129] Sim-Smith and Kelly (2009)
[130] See, for example the value of saltwater recreation in: Kaval and Yao (2007)
[131] Sharp and Kerr (2005); Marsh and Mkwara (2013)

sensitive species). Separate values were estimated for those who visit the sites and those who do not. Non-use values accounted for 79% of the use value.[132]

Existence values are part of the set of values that would be enhanced by the creation of new MPAs.[133] In the same way as in published studies of existence values, many people living nearby and further afield would be expected to value the establishment of MPAs because of the value they place on enhanced marine biodiversity. As with most non-market values, measuring existence values requires site-specific stated preference surveys.

An alternative approach to quantifying these less-tangible values is that used by van den Belt and Cole who estimated the value of the ecosystem services provided by New Zealand's MPAs.[134] Ecosystem services are one way of defining the benefits that people derive from ecosystems. Standard definitions include the following services:

- provisioning, ie products obtained, such as food, water, fuel;
- regulating, such as climate regulation, water purification, pollination;
- cultural, including spiritual and religious, aesthetic, educational; and
- supporting of other services, eg soil formation, nutrient cycling.

Using values derived from New Zealand and international studies, particularly Costanza *et al*'s valuation of the whole world's ecosystem services,[135] van den Belt and Cole estimated annual values for New Zealand marine reserves using per hectare values for individual biomes (estuaries, reefs, open ocean etc) within the reserves. Because of its size, this attributes very large values of over $1.4 billion per year (2010 dollar values) to the Banks Peninsula Mammal Sanctuary. However, this approach is too simplistic to be useful and does not differentiate between the before and after effects of creating reserves.

These ecosystem service values include more than existence values, but the recognition that natural areas provide ecosystem services is part of the reason for existence values being expressed. It is likely that there will be existence values for new MPAs but we are not able to accurately quantify them.

Spillover Benefits

The establishment of marine reserves can provide safe spawning grounds for commercial and recreational fish and other species, allowing them to develop to larger sizes or in greater number, within more diverse ecosystems.[136] One of the arguments frequently raised is that these effects have spillover benefits for surrounding areas as the reserve becomes a source for increased numbers and larger individuals in fished areas.[137]

Although widely predicted, spillover benefits have been notoriously difficult to measure as statistically significant effects in empirical studies, particularly when the size of the reserve is small compared with the surrounding area that is fished.[138]

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[132] Phillips (2014)
[133] Davis *et al* (2019)
[134] van den Belt and Cole (2014)
[135] Costanza *et al* (1997)
[136] Roberts *et al* (2001)
[137] Dayton *et al* (2000)
[138] Babcock (2003)

Increasing the number of fish available to recreational and commercial fishers was one of the goals of the California State Government when it implemented a string of marine protected areas (MPAs).[139] One recent study in Southern California has identified positive spillovers for spiny lobsters.[140] The results show that a 35% reduction in fishing area was compensated for by a 225% increase in total catch after six years. The authors suggest the effects are more detectable in lobster species because they can be intensively fished using stationary traps that can be placed near reserve borders.

Despite positive spillovers reported in several other studies, including greater catch numbers or larger fish,[141] some have not identified a detectable effect, particularly with greater distance from reserve boundaries. However, Di Lorenzo et al (2016) suggest this is more a challenge to research rather than evidence of little or no effect.[142]

Research in New Zealand has shown large increases in abundance and size of species within MPAs, including of snapper, spiny lobster and blue cod, and that these increases have been rapid, occurring within one year in the case of snapper.[143] Babcock suggests the spillover effects would be impossible to detect given the small proportions of New Zealand coastline protected in reserves.[144] Davidson et al recognise the difficulty of measuring increase in adjacent areas but note that improvements in density of populations in a marine reserve may indicate the potential for emigration from that reserve.[145]

If there are positive spillovers, fishers might be better off through the establishment of MPAs. However, they are unlikely to be established through voluntary arrangements amongst fishers as each individual fisher continues to have the incentive to use these areas.[146] It is likely to require government intervention to establish them.

Cultural Benefits

Additional benefits accrue to Māori, in particular, where the MPAs enable additional customary food collection or the restoration of habitats with which they have a cultural connection. These are even more difficult to quantify than other values discussed above, particularly because ecosystem damage may not be regarded as something that can be traded-off against other sources of value. Impacts on Māori include those associated with the loss of commercial fishing rights and opportunities, including via any downward movement in the value of fishing quota.

Quantification

Although we have not attempted to quantify the costs and benefits here, some international studies have attempted to do so. This includes one study in Western Australia of the costs and benefits of a network of large-scale marine sanctuaries.[147] It suggested costs for commercial and recreational fishers of approximately A$9 million and $2 million

[139] Bland (2019)
[140] Lenihan *et al* (2021)
[141] Halpern *et al* (2010); da Silva *et al* (2015); Russ *et* al (2004); Roberts *et al* (2001)
[142] Di Lorenzo *et al* (2016)
[143] Babcock (2003); Willis (2013)
[144] Babcock (2003)
[145] Davidson *et al* (2002)
[146] This could be regarded as an example of the Tragedy of the Commons after Hardin (1968)
[147] Allen Consulting (2009)

respectively, with offsetting benefits including new ecotourism benefits of A$5-$10 million, spillover benefits of up to A$2 million and non-market (existence) values of A$100-$200 million.

The authors were able to quantify the effects by, eg assuming a 15% reduction in average rock lobster catch, rather than estimating increased effort, and by making simple assumptions about the increase in eco-tourism numbers. They also had a relevant non-market valuation study which had estimated a $140 WTP per person per year for ecological improvements in Ningaloo Marine Park. This was multiplied by a State adult population of 1.6 million. In contrast, we do not have the relevant and transferable data for costs or benefits to enable this type of assessment.

The identified costs and benefits of establishing MPAs and restricting methods are summarised in Table 17.

- The costs identified are from the greater effort being required to catch fish (commercial fishers), of displacement to less-favoured sites (recreational fishers). These costs may be compensated, at least in part, by spillover benefits from the MPAs.

- The benefits include the new recreational opportunities created for divers and snorkellers. Because there are few sites offering such high value experiences, these are unlikely to be simply the transfer of diving/snorkelling activity from other locations. There are existence value benefits for the wider community that values conservation of marine life.

Table 17 Summary of Costs and Benefits

Sector/Group	Costs	Benefits
Recreational fishers	Fishing displaced to less-favoured sites or increased effort required using alternative fishing methods (where provided for)	Possible spillover benefits from MPAs producing larger and more numerous fish, crustaceans and shellfish
Divers and snorkellers		New sites offering high value experiences, not available in many other NZ locations.
Wider community		Existence values – benefit of knowing of increased biodiversity in MPAs.
Māori	Loss of value of quota (as for commercial fishing)	Some restoration of *mana* where there are cultural connections to areas in MPAs.

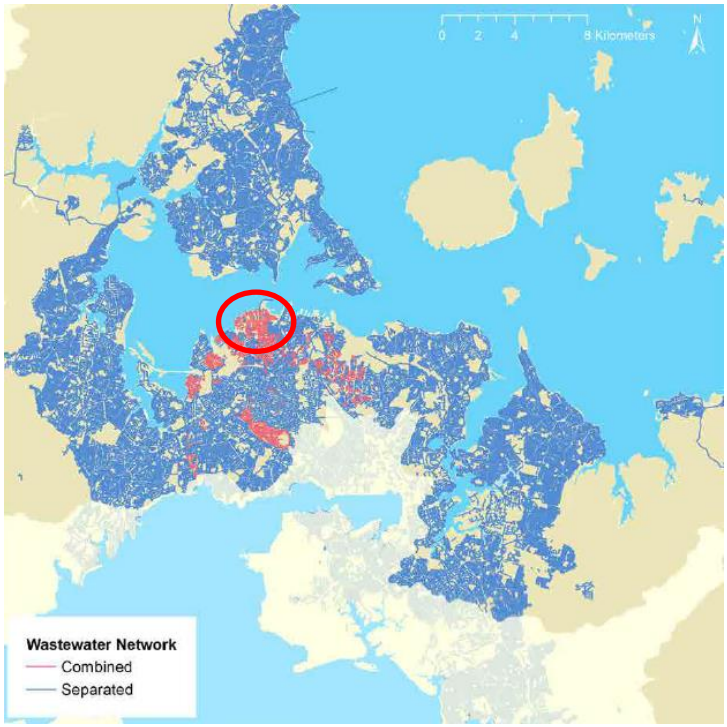
4.3.6 Costs and Benefits of Environmental Limits

The NZCPS is to include environmental limits for coastal water quality. We assess the costs and benefits below on the assumption that this will require improvements largely in wastewater discharges to the ocean.

As an example of costs and benefits, we use the water quality improvement projects at Freeman’s Bay and St Mary's Bay areas in Auckland. Prior to the project, this was an area in Auckland that still had a combined wastewater and stormwater pipe system (see circled area in Figure 11) that would result in wastewater combining with stormwater in significant weather events, resulting in wastewater discharge to the ocean (Figure 12). The project

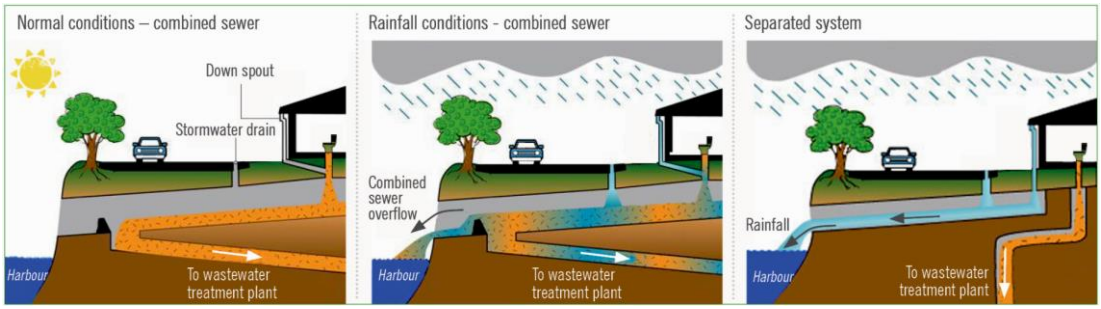
involves a network separation and new stormwater system for Freeman's Bay[148] and installation of a pumping and screening station, as well as a new pipeline, to reduce sewage overflows and increase swimmable days at local beaches.[149] The combined cost is approximately $62 million, alongside those of the larger central interceptor project which it integrates with.

Figure 11 Central Auckland areas with combined or separated wastewater and stormwater systems



Source: Hauraki Gulf Forum(2020)

Figure 12 Difference between combined and separated systems



Source: https://www.watercare.co.nz/Faults-outages/Plumbing-and-wastewater/Wastewater-overflows/Wet-weather-overflows

The project is expected to significantly reduce combined stormwater and wastewater discharges, thus improving water quality for swimming, sailing and paddling. It would also improve the environment for birds and marine life.

[148] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-projects/projects-central-auckland/projects-auckland-city-centre/Pages/picton-street-stormwater-network-separation-project.aspx
[149] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-projects/projects-central-auckland/projects-auckland-city-centre/Pages/st-marys-bay-area-water-quality-improvement.aspx

We provide an analysis of possible benefits of the project in Annex 3. We estimate quantifiable benefits for water quality improvement in Herne Bay/St Mary's Bay will have a PV to 2050 of $26 - 53 million at a 3% discount rate (Table 18). The annual benefits are assumed to start in 2025 and the present value (PV) of benefits is estimated from 2025 to 2075 (discounted to 2021). This analysis uses the results of studies that have identified the WTP for improvements in water quality in Orakei basin and in the Auckland inner harbour area. The results were expressed per household

Table 18 Total benefits - annual (in 2025) and present value to 2050 ($ million in 2021$ values)

	Value pa ($/household)	Households (2025)	Average pa population growth	PV (3%)	PV (5%)
Local residents	$47	19,664	0.83%	$26 m	$17 m
Auckland city residents	$7	226,323	1.55%	$53 m	$33 m

The top end is similar to the estimated project costs. There are additional benefits that are not quantifiable, particularly those associated with the ecosystem services provided by marine species that are currently affected by water contamination.

This provides an example of an analysis of the costs and benefits of a water quality improvement project undertaken under the existing RMA. Additional projects to meet new environmental limits might be expected to yield similar results, ie quantified benefits in the same order of magnitude as costs but with many benefits unquantified, suggesting positive net benefits in aggregate.

4.3.7 Summary

Changes in the coastal and estuarine environment have been analysed on the assumption of increased use of MPAs, more flexibility in aquaculture permits and improvements in water quality.

A significant increase in MPAs is widely proposed internationally and by New Zealand scientists. They have costs to existing users of marine space, including commercial and recreational fishers; in general, these parties will face higher costs rather than reduced catches, as they would be forced to fish in different locations. This would be balanced by benefits to the rest of the community from improvements in marine ecosystems affecting the diversity of marine life more widely, including increased potential for other recreational pursuits (eg diving), potentially positive spillover benefits to fished areas, in addition to existence benefits from knowing of the biodiversity improvements. The benefits may be site-specific and there may be reducing marginal benefits from increased in protected areas. But we note the extent of MPAs in New Zealand currently is significantly below that suggested by most proponents.

Flexible aquaculture permits would provide greater scope for changes in location, however the net benefits are highly uncertain and would need to be further researched in New Zealand.

Improvements in marine water quality are expected to be high cost and may be driven significantly by changes already underway as part of the widescale three waters reforms, but improvements in water quality are expected to yield positive net benefits.

4.4 Air Quality

4.4.1 The Issues

Air quality problems include human health effects, reduced visibility and discolouration of air, and nuisance and amenity effects, including dust, smoke, materials damage and odour. Studies of air pollution in New Zealand suggest the greatest impacts are the health effects from long-term exposure to particulate matter less than 10 micrometres (µm) in diameter (PM_{10}) from combustion sources, and from exposure to carbon monoxide (CO). Impacts of exposure to nitrogen dioxide (NO_2) was also thought to be problematic, although little data has been available to identify exposure-response relationships.

New Zealand's air quality is assessed as being good in most places and at most times of the year.[150] However, problems which are generally geographically or time-limited, include:

- emissions from home heating can raise particulate matter (PM) to levels above standards and guidelines in cooler months, especially when the weather and landscape contribute to pollutants building up;
- vehicle emissions contribute to poor air quality in some locations, particularly heavily-used transport corridors in urban areas; and
- light pollution particularly in urban areas.

Analyses of the impacts of air pollution have concentrated on the associated health effects. This includes effects on immediate respiratory problems (shortness of breath and coughing, heart attack, stroke, and days on which these issues restrict the activities that a person can undertake) and longer-term impacts on respiratory diseases, cardiac problems and shortening of life (Table 19).

Table 19 Estimated health effects per 100,000 population

Health effect	2006	2016
Premature mortality (adults 30+)	29	27
Cardiac hospital admissions	6	5
Respiratory hospital admissions	9	9
Total hospital admissions	15	14
Restricted activity days	36,300	31,800

Source: Ministry for the Environment & Stats NZ (2018)

4.4.2 Current Policy

A national environmental standard for air quality (NES-AQ) was introduced in 2004 and amended in 2011. Further amendments were proposed in 2020.[151] The current NES-AQ manages particulate matter (PM) pollution through:

- a daily ambient air quality standard for small particulates of 50 µg PM_{10}/m^3;

[150] Ministry for the Environment & Stats NZ (2018)
[151] Ministry for the Environment (2020a)

- a maximum number of times per year the standards can be exceeded;
- emissions and thermal efficiency standards for wood burners newly installed in properties less than two hectares in size;
- an indefinite ban on newly installed domestic, solid-fuel burning open fires (open fires) in airsheds that have breached the PM_{10} standard;
- a requirement for councils to decline new resource consent applications for PM10 discharges in PM10 polluted airsheds, unless the applicant will offset the discharge within the same airshed; and
- the ability for councils to introduce more stringent provisions through regional plans and bylaws.

The 2020 proposed amendments are shown in Table 20.

Table 20 Proposed amendments to the NES-AQ

Component	Detail
$PM_{2.5}$	Daily average $PM_{2.5}$ standard – 25 µg/m^3 (three or fewer exceedances allowed in a 12-month period) Annual average $PM_{2.5}$ standard – 10 µg/m^3 Monitoring required in all airsheds Publicly notify breaches Replace PM_{10} with $PM_{2.5}$ for 'offset' and open fires provisions
PM_{10}	PM_{10} standard retained Publicly notify breaches
'Offset' discharges in polluted airsheds	Reflect change from PM_{10} standard to $PM_{2.5}$ standards 'Polluted' if either daily or annual $PM_{2.5}$ standard is breached, averaged where possible over previous five years Meaningful data required to calculate average exceedances PM_{10} standard used where airshed does not have adequate meaningful $PM_{2.5}$ data Decline new applications for consent to discharge $PM_{2.5}$ in a polluted airshed, unless offset within the same airshed
Emissions standard for solid fuel burners	No more than 1.0g/kg Updated and/or appropriate methods for measuring
Thermal efficiency standard for burners	No less than 65 per cent (retained) Updated and/or appropriate methods for calculating
Application of standard for burners	Applies to all newly installed domestic burners including: open fires, wood, coal, pellet and multi-fuel burners, space heaters, cookers, water boilers on properties less than two hectares in size
Solid-fuel burning open fires prohibited	Reflect change from PM_{10} standard to $PM_{2.5}$ standards Applies indefinitely when either daily or annual $PM_{2.5}$ standard is breached
Monitoring methods	Updated and/or appropriate methods for monitoring PM
Mercury	
Use of mercury in industrial processes	Prohibit use of mercury in industrial processes specified in Annex B of the Minamata Convention
Emissions that may contain mercury	Incorporate by reference international best practice guidelines for emissions sources specified in Annex D of the Minamata Convention

Source: Ministry for the Environment (2020a)

4.4.3 RM Reform Expectations

The assumptions for the RM reforms are that additional and tighter standards for air quality are adopted. However, to assess the costs and benefits of marginal air quality

improvements beyond the current standards requires additional information about the expected changes that would be required, in addition to any changes expected from existing policy changes, such as GHG emission prices and the introduction of the clean car discount policy. This level of analysis is beyond the scope of this study. Here we bring together analysis based on existing air quality CBAs to provide some estimates of the expected balance between costs and benefits for marginal improvements.

4.4.4 Costs and Benefits

Focus on Health Effects

The benefits of reduced air pollution are from a reduction in adverse effects, which include:

- Human health effects.
- Reduced visibility and discolouration of air.
- Nuisance and amenity effects, including dust, smoke, materials damage and odour.

Most economic studies that have estimated the full set of effects of air pollution have concluded that the health effects dominate, particularly the impacts on mortality rates;[152] this includes New Zealand studies.[153] Health effects include increases in the risk of mortality and of several diseases, resulting in impacts on health status, hospitalisations and activity levels.

Several studies have estimated the costs and benefits of air quality improvements in New Zealand, including analyses of the original NES-AQ by MfE in 2004[154] and an updated analysis by NZIER in 2009.[155] A 2019 CBA focussed on the proposed amendments.[156] In addition there has been a CBA of limits on domestic fires in Auckland[157] and of Low Emission Zones (LEZs) and regional emissions testing in Auckland.[158]

The most recent CBA of the proposed NES-AQ amendments,[159] used benefit values from the Health and Air Pollution in New Zealand (HAPiNZ) study.[160] HAPiNZ provides estimates of total costs of air pollution in New Zealand rather than estimates of the marginal costs of changes in air pollution. There are differences between marginal and total (or average) costs because the effects of air pollution are dominated by chronic effects, ie the cumulative effects of air pollution from living for many years in elevated concentrations. Reducing air pollution tomorrow reduces the acute effects of air pollution but the chronic impacts will take several years to eventuate. The marginal impacts can be assessed using assumptions about the time before the full benefits are realised, ie the cessation lag.[161]

Characterising the mortality effects

The health effects of air pollution are dominated by mortality effects and there are two main approaches to measuring these: changes in numbers of premature deaths alongside

[152] Hohmeyer (1998); Dones *et al* (2005); Ricardo-AEA (2014); Amann et al (2017)
[153] Ministry of Transport (1996); Jakob et al (2006)
[154] Ministry for the Environment (2004)
[155] NZ Institute of Economic Research (2009)
[156] Akehurst *et al* (2019)
[157] McIlrath (2013)
[158] Denne and Atkins (2015)
[159] Akehurst et al (2019)
[160] Kuschel *et al* (2012)
[161] See discussion in Denne and Atkins (2015), COMEAP (2010) and Walton (2010)

an estimate of the value of statistical life (VoSL) or estimates of life years lost (or saved) with an estimate of the value of a life year (VoLY). The issues surrounding the two approaches are discussed at length elsewhere.[162]

Numbers of premature deaths has been widely used in New Zealand but may give an overly simple impression of the effect.

- Most deaths, even with no air pollution, could be considered premature as people tend to die of something, other than simply old age. Air pollution changes how premature the death is via health impairment, eg it can make people more "frail" and susceptible to other causes of death[163] or it can increase the risk of death for people with existing conditions.[164] Because the impacts are mainly contributory, individual deaths cannot be attributed directly to air pollution, even in retrospect;[165] what is observable is the change in age-specific all-cause death rates in response to changes in levels of air pollution.

- Because everyone dies, air pollution does not result in more deaths in a population; it changes the timing. If all other factors remain the same (eg the same birth and migration rates), a population with air pollution would have the same number of deaths per year in the long run as one without, but the population would be smaller and younger.[166]

Addressing the question of presentation (as premature mortality or life years lost), the UK Committee on the Medical Effects of Air Pollutants (COMEAP) notes that there is, to some extent, a trade-off between full accuracy and accessibility but that "*total population survival time (life years gained or lost) is … the most accurate and complete way of capturing the mortality effects of air pollution reductions … [and] by far the single most relevant metric for policy analysis,*"[167] however many analysts present results using both metrics (premature deaths and life years lost).

Life years lost per premature mortality are generally estimated in the region of a six months gain or loss per 10 $\mu g/m^3$ change in $PM_{2.5}$,[168] which is consistent with characterising the effect as shortening of everyone's life by a small amount.

Net Benefits of Policy

The 2004 and 2009 analyses of the NES-AQ used only premature deaths to estimate benefits. The 2019 analysis included an analysis of life years lost, however the benefits are over-estimated so are not usable.[169] The results using the VoSL assumptions only are shown

[162] See Denne and Atkins (2015), COMEAP (2010) and detailed discussion in the upcoming revised HAPiNZ study.
[163] Seethaler et al (2003)
[164] Alberini *et al* (2004); Brunekreef *et al* (2007)
[165] Rabl (2003)
[166] COMEAP (2010)
[167] COMEAP (2010), p84
[168] Pope et al (2009); Sommer et al (1999); COMEAP (2010); Correia et al (2013)
[169] Akehurst et al (2019) significantly over-estimate the number of years of life lost (YLLs) and consequently the policy benefit in their VoLY analysis because they simply distributed the total estimated number of reduced premature mortalities across age cohorts in proportion to the current population in those cohorts (eg "*if 5% of the population in an airshed falls in the age group 5-9 years, then 5% of air pollution related premature deaths*

in Table 21; we have not included the results using the high 8% discount rate as this is significantly higher than the current Treasury-recommended rate of 5%. Analysis using VoLY would be expected to yield a lower estimate of net benefits.[170]

Table 21 Results of 2019 Cost Benefit Analysis of NES-Air Quality using VoSL

	4%	6%
Costs	$123.4	$109.5
Benefits	$1,062.8	$931.1
Net benefits	$939.4	$821.6

Source: Akehurst *et al* (2019)_

The analysis suggests considerable positive net benefits from the amendments to the NES-AQ. Tighter standards for air pollution that might be introduced via the RM reforms would similarly be expected to have positive net benefits, although the extent of this depends on factors that include shifts in the underlying levels of air pollution, the stringency of new standards and the efficiency of policy introduced to achieve them.

Not all analyses of air quality policy have suggested positive net benefits. A CBA of Auckland-specific policies, including Low Emission Zones, found positive net benefits for only some options analysed.[171] If greater use is made of economic instruments, eg a charge or tradable allowance system for one or more pollutants, the net benefits might be greater than suggested here.

4.4.5 Summary

The impacts of the reforms on air quality are uncertain but for the purpose of this analysis, it is assumed they will result in increased stringency of emission standards. CBAs of air quality standards to date have suggested significant positive net benefits from improvements, although this depends on the policy instruments adopted, with some examples of net costs for some policy options examined in New Zealand. We note the discussion earlier about the potential gains from the use of economic instruments and this may be an area where their use could yield positive net benefits.

4.5 Soils

4.5.1 Soil Problems

There are a number of environmental issues that are affected by the quality of soil resources. This includes:

- Impacts on the ecosystem services that rely on soil quality;
- Hazardous substances and contaminated sites; and
- Loss of highly productive soils.

that occur, are 5-9 year olds", p21), rather than in proportion to current deaths in these cohorts (via a change in age-specific all-cause mortality rates, consistent with how the exposure-response functions are specified). This significantly over-estimates the number of premature deaths in young age groups (with many life years remaining) and under-estimates the number in old age groups (with few life years remaining).

[170] This is because the average years gained per reduction in premature death is less than the average age of the population or of those killed by traffic accidents, as used in estimating the VoSL.

[171] Denne and Atkins (2015)

Soil Quality

Defining Good Soil Quality

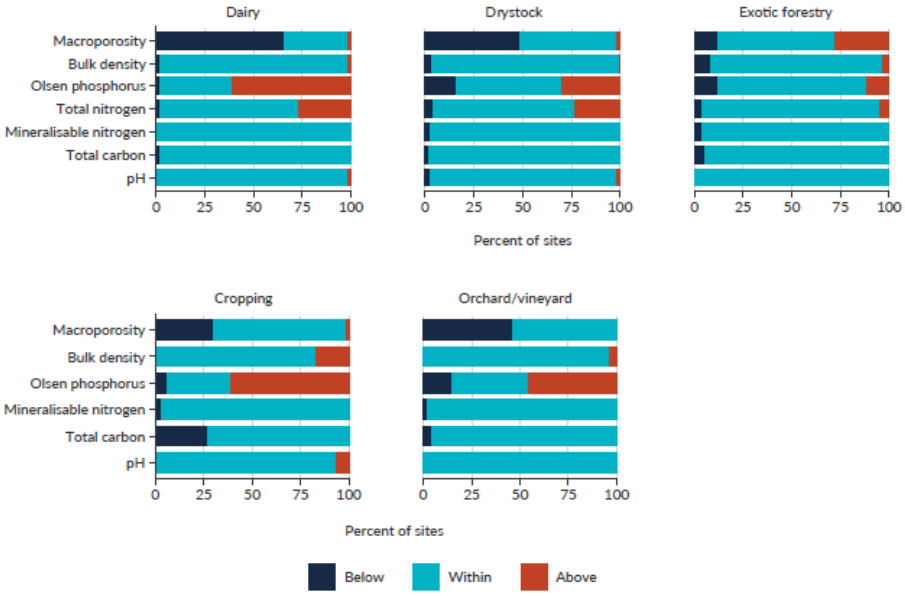
Well-functioning soils can provide several ecosystem services. They can:[172]

- drain excess water, retain water and important nutrients, and supply these to plants when they are needed;
- enable processes such as carbon and nutrient cycling, structure development, biological activity, and disease suppression; and
- build up and retain carbon and nutrients.

The attributes that define good quality soils have been measured using seven indicators and target ranges for: pH, total carbon (TC), total nitrogen (TN), anaerobically mineralizable nitrogen (AMN), Olsen phosphorus (Olsen P), bulk density, and macroporosity enabling air supply to roots;[173] in addition, trace element data are collected for As, Cd, Cr, Cu, F, Pb, Ni, and Zn.[174] Soil quality is monitored routinely by councils in New Zealand using a set of indicators, with sites sampled every 4–5 years.[175]

MfE reports the proportion of sites above, below, and within soil quality target ranges for each of the seven soil quality indicators by land use, as well as by soil order. An example set is shown in Figure 13.

Figure 13 Sites within target range of soil quality indicators by land use, 2014–18



Source: Ministry for the Environment & Stats NZ (2021)

There is no current nationally agreed approach to reporting trace element concentrations as part of soil health. One possible approach is using ecological soil guideline values (Eco-

[172] Ministry for the Environment & Stats NZ (2021)
[173] Technically defined as air-filled porosity, and measured as the difference between total porosity and volumetric water content of soil measured at a tension of 10 kPa.
[174] Stevenson *et al* (2020)
[175] Ministry for the Environment & Stats NZ (2021)

SGVs) which have been developed to define levels that would protect terrestrial biota (soil microbes, invertebrates, plants, wildlife and livestock).[176]

Factors affecting Soil Quality

Activities that result in reduced soil quality include:[177]

- irrigation;
- excessive use of fertilisers;
- pesticides use that kills soil microorganisms;
- compaction by livestock; and
- ploughing to turn soil over.

Research in New Zealand suggests pastures that have been managed less intensively had more soil complexity than those managed as highly intensive dairy pastures.[178]

Contaminated Sites

At a sufficient concentration in soil, hazardous substances can have adverse effects on human health and the environment, particularly where food is grown or if the contamination is near buildings, people, water bodies and significant habitats. Hazardous substances can also transfer from the soil to more distant locations, via surface or groundwater movement and air dispersal. Human health effects include those in the:[179]

- short term – acute effects such as arsenic ingestion from sheep dip or timber treatment sites; and
- long term – chronic effects from low-level chemical exposure over an extended period, eg carcinogenic or developmental effects.

Soil contamination with hazardous substances in New Zealand has resulted from historical use and disposal of certain chemicals by industrial, agricultural and horticultural activities, including:[180]

- the manufacture and use of pesticides;
- production of gas and coal products;
- production, storage and use of petroleum products;
- mining;
- timber treatment; and
- sheep dipping.

Loss of Highly Productive Soils

Highly productive land (HPL) is land that is suitable for multiple uses, particularly for intensive arable cropping and land used for high value uses, such as viticulture and stone fruit.[181] HPL is differentiated from land used for residential and industrial purposes which also has high value and often much higher market value. Some of New Zealand's most valuable productive land is on the edge of expanding urban centres and is at risk from urban expansion or division into smaller rural lifestyle properties, which increase the area in

[176] Stevenson et al (2020)
[177] Ministry for the Environment & Stats NZ (2021)
[178] Ministry for the Environment & Stats NZ (2021)
[179] Ministry for the Environment (2010)
[180] Ministry for the Environment (2010; 2011)
[181] Ministry of Primary Industries and Ministry for the Environment (2019)

driveways, dwellings, garages or utility buildings that further reduce the amount of land available for production.[182]

We discuss below (Section 4.5.4) whether this is a problem definable as a market failure and resulting in irreversible loss of a finite resource expected to be valued highly by future generations, or if it is the outcome of a functioning market in which land is being allocated to its highest value use.

4.5.2 Current Policy

There are several current and planned regulations addressing elements of soil quality and contamination. These are:

- Objectives, policies and rules for soil conservation in regional plans.
- The national environmental standard for assessing and managing contaminants in soil to protect human health (NES-CS) 2011. It contains a nationally consistent set of planning controls and soil contaminant values. Prior to the NES-CS, the controls applied by councils to manage contaminated soils were not consistent across the country. The NESCS means all councils now follow the same planning and decision-making framework.
- The National Environmental Standards for Storing Tyres Outdoors (NES-STO) 2021. It provides nationally consistent rules for the responsible storage of tyres, including tyre volumes, heights of stacks and distance from power lines and water bodies.
- The proposed National Policy Statement for Highly Productive Land (NPS-HPL)[183] would require councils to identify highly productive land, and could provide national direction to councils on assessing trade-offs between competing land uses.

Other measures being pursued by the Government include those in the Productive and Sustainable Land Use (PSLU) package being developed by MPI.[184] It will promote farmland use practices that deliver improved environmental outcomes and improved productivity using a mix of extension advice, modelling and landowner participation.

Despite the series of regulations, in practice many activities that affect soil quality are not influenced by the RMA, eg most farming activities are permitted activities, although permits may be required for water takes. In addition, there is a perception that the regulations are somewhat piecemeal (eg the NES-STO) and there would be a benefit from a more comprehensive set of national direction. In addition, the RMA limits the extent of intervention. For example, Section 43 limits the use of national environmental standards for soil quality to be "in relation to the discharge of contaminants" (s43(1)(a)(iv)).

[182] Ministry of Primary Industries and Ministry for the Environment (2019)
[183] Ministry of Primary Industries and Ministry for the Environment (2019)
[184] https://www.mpi.govt.nz/funding-rural-support/farming-funds-and-programmes/productive-and-sustainable-land-use/

4.5.3 RM Reform Expectations

The additional measures assumed to occur under the RM reforms are the development of a more comprehensive set of standards or other regulations that define good quality soil, increase protection of existing soil and set targets for improvement. The Panel proposed the setting of mandatory environmental limits for the quality and conservation of soil. The Panel also noted that the NES for contaminated soil has emphasised safety issues rather than environmental impacts, suggesting that its remit should be clarified and/or extended.

How any expanded environmental limits might be specified or what are the regulatory instruments that might be used to achieve them, is not well understood. As with other topics, in the absence of clear guidance on the extent of environmental improvement, below we explore the relationship between costs and benefits at the margin across the different issues.

4.5.4 Costs and Benefits

Soil Quality

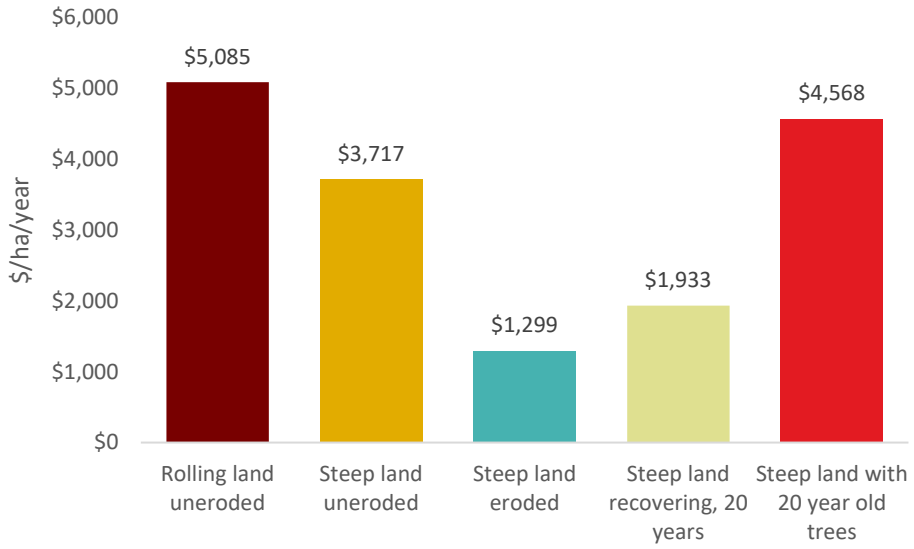
Despite the potential economic importance,[185] there appear to be relatively few quantitative analyses in New Zealand of the costs and benefits of soil protection, eg erosion control.[186] Some estimates of the change in value of soils from changes in quality have used an ecosystems services (ES) approach (see Section 0) which categorises the values using the classification system developed by Millennium Ecosystem Assessment (MEA) (Figure 27 above).

Mackay *et al* (2013) and Dominati and Mackay (2014) estimated the value of the ecological services provided by soils in specific sites using market prices (eg for food production), defensive expenditures (ie the costs of measures to prevent the adverse impacts) and the costs of alternative ways to provide the same services. For example, the average value of soil services from a Horotiu silt loam under a dairy operation over 35 years was $11,610/ha/yr using a 3% discount rate, with the major benefits from the provision of food (provisioning services) and the filtering of phosphorous and contaminants (regulating services). In other examples, filtering of N and flood control had high values.[187]

This approach was used to estimate the costs of marginal changes in soil values, eg from compaction or soil erosion. Figure 14 shows estimates of the change in the value of ecosystem services ($/ha/yr) for a sheep and beef operation from before erosion to immediately after erosion, following 20 years of recovery, and with 20 years old wide spaced trees. The immediate cost of erosion on steep land was estimated at approximately $2,400/ha/yr or 64% of the starting value.

[185] Krausse *et al* (2001)
[186] Jones *et al* (2008)
[187] Mackay et al (2013)

Figure 14 Impacts of erosion and recovery on value of ecosystem services



Source: Dominati and Mackay (2014)

Some of these ES values are included in current market prices, eg the value of food production (less the costs of production) is a determinant of land prices. Where soil quality is a determinant of future productivity of the land, it would be expected (under efficient market assumptions) that this would affect land value also, eg the market value of land would be higher if the land had higher soil quality. However, there are significant non-market values also. Dominati and Mackay suggest the ecosystem services provided are dominated (80-85%) by regulating services rather than the provisioning services that produce marketable products. Thus they note a traditional CBA of soil conservation suggests planting trees is not profitable unless the trees are harvested for timber, and a low discount rate (<5%) is used,[188] but that with the inclusion of the value of ecosystem services provided by the trees, in addition to the reduced risk of soil erosion, the Net Present Value of the investment is greatly positive, regardless of the discount rate (0-10%).

The analysis is partial but suggests there are high values associated with the regulatory services provided by soils, and that a significant proportion may be external to the decisions made by land-owners. Writing twenty years ago, Parminter *et al* suggested that councils, in promoting soil conservation to farmers, need to emphasise the non-monetary and insurance benefits of erosion control via tree planting[189] and that financial incentives may be needed to persuade farmers who are strongly profit-driven to take these measures.[190]

Contaminated Land

A CBA of the NES for contaminated soil estimated the effects relative to a counterfactual of MfE providing guidance only.[191] It suggested the impacts would vary regionally, depending on the extent of current council rules across the country. The NES would be expected to result in contamination rules and standards that are stricter in areas where councils

[188] Parminter *et al* (2001) reach a similar conclusion
[189] Their analysis was of poplar planting
[190] Parminter et al (2001)
[191] Irvine and Denne (2010)

currently have no such rules or standards and are unlikely to introduce any. In other areas, where councils have already implemented contaminated land rules and standards, the NES could result in standards that are comparable or more lenient for some contaminants. Thus the costs and benefits would vary across the country.

The CBA suggested that the costs were in the same order of magnitude as benefits, simply on the basis of changes in administrative costs (reduced costs for councils and increased costs for central Government), health benefits and increased remediation costs, without quantifying any benefits from environmental quality improvements (Table 22). These costs and benefits are estimated over a 20-year period, with future impacts discounted at 8%.

Table 22: Estimated costs and benefits of NES for contaminated soils (2011$ million)

Component	Benefits	Costs	Certainty
Reduced council planning and consenting costs	$4 - $5		High
Other avoided costs	$0.5 – $3.5		Low
Avoided public health costs	$0 – $1.5		
Potential environmental benefits	??		
Information systems upgrade		$0.5 – $1	High
Increased remediation costs		$4.5	Low
Increased consent application and investigation costs		$1	
Reduced property values		$0 – $0.5	
Total	$4.5 – $10	$6 – $7	

Source: Adapted from Irvine and Denne (2010)

Extending the applicability of contaminated site regulations beyond safety issues towards environmental protection, as suggested by the Panel may increase benefits that are not readily quantified and which were not quantified in the CBA. The balance between marginal costs and benefits is thus uncertain and would need to be analysed for any additional national direction.

Highly Productive Land

A recent CBA on the draft NPS-HPL[192] was challenged by the Treasury for the inclusion of downstream and upstream impacts (normally assumed to be already accounted for in market prices in a CBA) and for not identifying a market failure to justify intervention,[193] suggesting that the differences in land value is evidence that HPL would be better allocated to urban uses.

We understand the market failure issues as follows. If there were no regulatory constraints on urban development, it would be expected that there would be no discontinuity in land price with increased distance from an urban centre.[194] In this situation, the price for land at the urban fringe (but not in urban use) would be set by its value in the next best use, and the value of HPL would be expected to be higher than less productive land at the urban fringe.

[192] Hampson *et al* (2019)
[193] The Treasury (2019)
[194] See discussion in Denne et al (2016)

Removal of barriers to development would be expected to include removing restrictions on going up (high-density housing) as well as on going out (urban spread). And with a less regulated development market, HPL would be expected to remain in non-urban uses when there was alternative low productive land available at the urban fringe (which would be expected to be lower in price). Assuming this outcome in an unregulated land market, the use of HPL for urban purposes (while less productive land was not used) might be evidence of a market failure such that protection of HPL could be justified. The benefits of this are the difference in value between HPL and less productive land on the urban fringe, assuming that this less productive land would be the focus for development in the absence of market failure.

4.5.5 Summary

Good quality soil has very high value but there are few studies of the costs and benefits of soil conservation. We would expect well-specified soil conservation policies to yield positive net benefits. There has been a CBA of the NES-CS suggested benefits in the same order of magnitude as costs, but with many environmental benefits unquantified. However, it is unclear if the reforms would make changes to this existing national direction.

4.6 Biodiversity, Habitats and Ecosystems

4.6.1 The Problem

The call for protection of biodiversity in New Zealand is consistent with urgent calls internationally, recognising the fundamental dependence of people on nature for services that include the significant loss of insects pollinating crops and of plants with potential for provision of medicines, in addition to the feedback effects on climate change and loss of species valued in their own right. The World Economic Forum (WEF) ranks biodiversity loss in its top-five risks to the global economy; it was rated the second most impactful and third most likely risk for the next decade.[195]

As a result, the WEF has endorsed the Global Deal for Nature (GDN), which is a "*time-bound, science-driven plan to save the diversity and abundance of life on Earth.*"[196] The GDN has set a target for 30% of Earth (land and sea) to be formally protected by 2030 (hence 30 x 30)[197] and an additional 20% designated as climate stabilisation areas. A recent 30 x 30 Economic Analysis study suggested that[198] expanding protected areas (PAs) to 30% of the Earth, focussed on low- and middle-income countries, would have significant positive net benefits in addition to reduced risks of climate change and an expansion in the areas under the stewardship of indigenous peoples and local communities.

The Review Panel suggested New Zealand's biodiversity (native plants, animals and ecosystems) is under significant threat. They note that almost 4,000 native species are threatened with or at risk of extinction, along with 90% of seabirds, 80% of shorebirds and

[195] World Economic Forum (2020). In 2010, it ranked its top five risks as asset price collapse, China economic meltdown, chronic disease, fiscal crises and global governance gaps. By 2020 this list had changed entirely to environmental concerns, with biodiversity loss, alongside extreme weather, climate action failure, natural disasters and humanmade environmental disasters.
[196] Dinerstein *et al* (2019)
[197] https://www.campaignfornature.org/
[198] Waldron *et al* (2020)

26% of indigenous marine mammals classified as threatened with or at risk of extinction. New Zealand is particularly vulnerable because of the percentage of indigenous species found nowhere else (Table 23).

Table 23 Proportion of indigenous species found only in New Zealand

Type	%	Type	%
Birds (land, freshwater & marine)	72%	Marine mammals	7%
Vascular plants (land & freshwater)	84%	Freshwater fish	88%
Insects (land & freshwater)	81%	Reptiles, frogs, bats (land & freshwater)	100%

Source: Department of Conservation (2020a)

The maintenance of indigenous biodiversity and restoration of viable populations of indigenous species is one of the objectives of the reforms.

4.6.2 Current Policy

Current biodiversity policy is addressed by several pieces of legislation and the Aotearoa New Zealand Biodiversity Strategy (ANZBS) 2020.[199]

Legislation

Biological diversity is defined in section 2 of the RMA to mean "*the variability among living organisms, and the ecological complexes of which they are a part, including diversity within species, between species, and of ecosystems."* Under the Act:

- regional councils are required to establish, implement, and review objectives, policies, and methods for maintaining indigenous biological diversity (s.30(1)(ga)); and

- territorial authorities must control the effects of the use, development, or protection of land, including for the maintenance of indigenous biological diversity (s.31(1)(b))

In addition, Section 6 of the RMA sets out matters of national importance. To achieve the purpose of the Act, it requires all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, to recognise and provide for, *inter alia*:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development; and
(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

There are other pieces of legislation that are designed to protect biodiversity alongside the RMA (Table 24).

[199] Department of Conservation (2020a)

Table 24 Legislation protecting biodiversity in New Zealand

Legislation	Key Elements
Biosecurity Act 1993	• stopping pests and diseases before they arrive • dealing with any if they do enter the country
Conservation Act 1987	• Establishment of conservation areas • Preparation of statements of general policy, conservation management strategies and management plans • Creation of marginal strips on sale/deposition of Crown land • Granting of concessions in conservation areas • Management of indigenous freshwater fisheries, including the whitebait fishery • Management agreements • Conservation agreements
Crown Pastoral Land Act 1998	• Control of activities on high country leasehold land • Tenure review and transfer of land into freehold and conservation land, including provisions for protective mechanisms on freehold land
Fisheries Act 1996	• Sustainable management of fish stocks to meet the reasonably foreseeable needs of future generations • avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment
Forests Act 1949	• Control of logging, milling and export of indigenous timber • Providing standards for sustainable logging • Granting sustainable forest management plans and permits
Local Government Act 2002	• Funding local government activities • Charging development contributions
Marine Mammals Protection Act 1978	• Regulates protection and management of marine mammals
Marine Reserves Act 1971	• Preserves areas containing underwater scenery, natural features or marine life of distinctive quality, for scientific study
National Parks Act 1980	• Establishment and management of national parks
Native Plants Protection Act 1934	• Enabling native plant species to be protected
Overseas Investment Act 2005	• Consideration of whether there will be adequate mechanisms in place for protecting or enhancing existing areas during sale of New Zealand land to overseas investors
Queen Elizabeth the Second National Trust Act 1977	• Creation and administration of open space covenants on privately-owned land
Reserves Act 1977	• Establishment and management of land-based reserves • Conservation covenants
Resource Management Act 1991	• Providing protective provisions in plans • Creating esplanade reserves and strips • Requiring financial contributions • Environmental compensation and biodiversity offsets
Trade in Endangered Species Act 1989	• Requiring permits for import and export of endangered species
Wildlife Act 1953	• Protecting a range of identified wildlife • Establishing wildlife sanctuaries, refuges and management reserves • Providing for population management plans to address fishing-related mortality

Source: Department of Conservation (2020a);
www.environmentguide.org.nz/issues/biodiversity/im:2506/legislation/

Aotearoa New Zealand Biodiversity Strategy

The ANZBS 2020 provides the overall strategic direction for biodiversity in New Zealand for the next 30 years. It is intended to guide all those who work with or have an impact on biodiversity, including whānau, hapū and iwi, central and local government, industry, non-government organisations (NGOs), scientists, landowners, communities, and individuals.

It covers all domains: land, fresh water, estuaries and wetlands, and the marine environment from the coastline to the outer edges of the EEZ and the extended continental shelf. The ANZBS sets out a series of desired outcomes and objectives for 2030 and 2050, many of which are measurable. It adopts a collaborative approach to its development, particularly with Māori, and the next phase of strategy development will be to develop an implementation plan that will set out actions and responsibilities. It will be developed collaboratively with central and local government, Treaty partners, and stakeholders.

Other National Direction

Other elements of national direction include a National Plan of Action (NPOA) for Seabirds.[200] It sets a vision of zero fishing-related seabird mortalities, and it focuses on education, partnering to find innovative solutions to bycatch mitigation, and ensuring that all fishers know how and are taking all practicable steps to avoiding seabird bycatch.

Proposed NPS on Indigenous Biodiversity

The Government has proposed a new NPS on Indigenous Biodiversity (NPS-IB).[201] It identifies the current problems as that, although the RMA requires councils to manage indigenous biodiversity, approaches vary from being stated in plans or through resource consent conditions; some councils identify and map Significant Natural Areas (SNAs) in their plans with community involvement, while other councils do not identify SNAs until a landowner or developer applies for a resource consent that may disturb indigenous vegetation or habitat of indigenous fauna. It suggests this has resulted in uncertainty for councils and communities, and litigation that is costly and time-consuming for councils, landowners, tangata whenua, and community groups.

The proposed NPS-IB is intended to give consistency to councils' interpretations and application of the RMA, resulting in more consistency in councils' monitoring and management approaches, and resulting in better outcomes for biodiversity.

4.6.3 RM Reform Expectations

The current set of institutional arrangements for biodiversity are regarded as overly complex, spread over numerous pieces of legislation, while not working as well as it should be, "failing to tackle issues at the scale needed to address the ongoing and cumulative loss of indigenous biodiversity."[202] Further, the institutional arrangements have been criticised for being "*inconsistent, disjointed, under-resourced and poorly enforced, resulting in a failure to achieve many biodiversity outcomes. There is no clear and universal mandate to protect or manage species or ecosystems across all environments, and there are inconsistencies in how species and habitats are managed under different legislation.*"[203]

[200] Fisheries New Zealand and Department of Conservation (2020)
[201] Ministry for the Environment (2019b); New Zealand Government (2019)
[202] Department of Conservation (2020a)
[203] Department of Conservation (2020a)

The NPS-IB is addressing these issues and we expect the RM reforms to lead to the finalisation and introduction of the NPS-IB.

Biodiversity Offsets

The reform expectations include that of the greater use of economic instruments. In the biodiversity sphere, biodiversity offsets have been much discussed as a way to provide incentives and funding for conservation improvement.[204] Biodiversity offsets are instruments that enable damage to the environment (a loss of biodiversity) in one location to be compensated by an increase in biodiversity in another location, with the goal of no net loss and preferably a net gain of biodiversity on the ground.[205]

Offsetting is not straightforward, however, particularly the objective of achieving no net loss,[206] including when this involves a time dimension.[207] MfE notes that because biodiversity offsets and biodiversity compensation address the loss of biodiversity values associated with the activity by generating biodiversity gain elsewhere, they pose a higher risk for indigenous biodiversity. A successful outcome for indigenous biodiversity is less certain.[208] More work is required in this area before we are close to the development of an operational market mechanism.

4.6.4 Costs and Benefits

Biodiversity protection in New Zealand includes the protection of native flora and fauna from invasive pests and weeds, in addition to protection from human activity that might destroy natural habitat or affect the environment that indigenous flora and fauna depend on.

The approach to estimating costs and benefits of biodiversity improvement is the same as for other environmental domains, although there are some unique issues in the management and protection of endangered species, where other decision criteria may be involved or where costs and benefits might be evaluated differently. An issue of particular concern is the interests of future generation in the decision outcome. This was an issue that has also been raised in the context of climate change policy to suggest that very low discount rates might be appropriate,[209] and has been suggested for exhaustible resources that "really matter."[210] In practice, endangered species management is often treated more as a moral responsibility than something that might be weighed in a CBA. Although costs are always a relevant issue, a CBA was not used to justify the predator free by 2050 strategy,[211] for example.[212]

[204] Maseyk et al (2018)
[205] Maseyk et al (2018); Ministry for the Environment et al (2014)
[206] Gardner et al (2013)
[207] Denne and Bond-Smith (2011)
[208] Ministry for the Environment (2019b)
[209] Stern (2006)
[210] Solow (1974)
[211] Department of Conservation (2020b)
[212] We note the absence of a detailed (evidence-based) analysis has resulted in some criticism See, eg Linklater and Steer (2018)

Biodiversity protection is a huge field of interest and the costs and benefits of biodiversity protection have been analysed for some ecosystems, pests, weeds or diseases. Section 70 of the Biosecurity Act 1993, for example, requires pest management plans to include an analysis of the benefits and costs of the plan.

Consistent with this, some CBAs have been undertaken for pest eradication programmes. Greater Wellington Regional Council provide assessments for individual pests, concluding that the benefits exceed costs for many species, despite the analysis being based on a mix of quantified costs and qualitative descriptions of benefits.[213] Auckland Council estimated benefits in monetary terms using the TEV framework for the Auckland community only.[214] The analysis suggested positive net benefits (in present value terms using a 4% discount rate) of $13 million for a limited pest management programme with modest investment and $734 million for a more significant level of effort (Table 25).

Table 25 Summary of Costs and Benefits of Pest Management ($million PV at 4% discount rate)

	Option A			Option B		
	Lower	Medium	Upper	Lower	Medium	Upper
Total benefits	$101.80	$177.0	$441.30	$585.49	$1,141.4	$2,193.02
Total costs	$167.55	$163.7	$148.08	$423.61	$407.28	$341.97
Net benefits (NPV)	-$65.8	$13.3	$293.2	$161.9	$734.2	$1,851.0
Benefit-cost ratio (BCR)	0.61	1.08	2.98	1.38	2.80	6.41

Source: Rohani and Murray (2018)

Other studies have examined costs and/or benefits relating to individual species. Tait et al (2017) used a choice experiment to estimate the non-monetary environmental benefits that accrue incidentally from pest management conducted primarily to control bovine tuberculosis (TB). They estimated the WTP of the general New Zealand public for various biodiversity attributes (Table 26).

Table 26 Marginal willingness to pay for biodiversity attributes

	Median WTP for each 1% increase in protection (NZ$/person/year)
Canopy tree species	$2.02 (1.53 - 2.50)
Large native invertebrates	$0.35 (0.29 - 0.42)
Native birds	$0.72 (0.64 - 0.79)
Within-forest plants	$0.51 (0.37 - 0.63)

Note: 5th and 95th percentiles in brackets.
Source: Tait et al (2017)

Catherine Murray assessed the costs and benefits of mangrove management[215] which involved assessing the benefits in terms of sediment management, mangrove encroachment and the ecosystem in which they live. She quantified costs but noted the data constraints on quantifying benefits, and the uncertainty because of the complexity of ecosystem function.

[213] Gale *et al* (undated)
[214] Rohani and Murray (2018)
[215] Murray (2013)

CBA of the Draft NPS-IB

A draft CBA and Section 32 Report of the NPS-IB comprised a high-level identification of costs and benefits based on interpretation of the direct and consequent effects and processes that arise as a result of the NPSIB provisions; and a quantitative and qualitative assessment of costs and benefits of the NPSIB for six case study districts.[216]

The CBA included nuanced conclusions that there was a market failure justifying intervention (the public good nature of biodiversity) and that, while further work is needed to quantify and monetise the costs and benefits, the analysis (including the six case studies) supports a preliminary conclusion that the aggregate, long-term and cumulative benefits of implementing the NPS-IB will, on balance, outweigh the expected aggregate and generally short-term costs.

The CBA suggested widespread environmental benefits from enhanced biodiversity as a public good for current and future generations. It noted the benefits would not be evenly distributed and would be greatest outside of DOC administered land.

It suggested that councils may not realise the potential benefits of greater regulatory efficiency and reduced litigation costs as strongly, because under the status quo, managing the effects on indigenous biodiversity may be a relatively minor issue. However, for some councils where there is significant biodiversity, there will be clear benefits of greater national direction in terms of clearer definition of roles, integrated management, input from tangata whenua and reduced litigation due to uncertainty and inconsistency.

Costs will include those of a more stringent planning framework to protect SNAs and maintain indigenous biodiversity. These costs are potentially significant for some councils. However, these costs are expected to be mostly in the short-term, with ongoing implementation costs falling substantially over time.

The increased costs for central Government were uncertain in this analysis.

There may be increased costs for landowners, particularly landowners whose properties contain SNAs, concentrated in peri-urban and rural areas. There may be opportunity costs to a small portion of those landowners (including Māori landowners) as the requirements in the NPS-IB provisions to "avoid" certain adverse effects on SNAs may constrain or prevent new subdivision, use and development. However, this is thought to be a very small percentage of total landowners.

4.6.5 Summary

The NPS-IB and ANZBS are forms of national direction that provide the basis for ambitious improvements in biodiversity conservation, achieved via a collaborative approach with widespread community participation. The RM reforms are assumed to reinforce rather than replace this approach, and specifically to result in the introduction of the NPS-IB or something similar.

[216] Wyeth and Hampson (2019)

It is not possible to draw any domain-wide conclusions on the net benefits of biodiversity improvement as the benefits and costs are highly site, type or ecosystem specific. Nevertheless, the existing literature suggests the high value of biodiversity and provides examples of significant positive net benefits, even when many benefits cannot be quantified in monetary terms. The preliminary CBA of the NPS-IB suggests positive net benefits, although this result is somewhat speculative.

5 Built Environment

5.1 Scope

The housing analysis in this section provides information about the extent to which the RM reforms could make a difference to housing supply, affordability and choice. The quantified outputs include:

- the increase in overall housing supply under optimistic and conservative scenarios versus the baseline (SQ) over 30 years, which will provide information about the number of additional dwellings,
- the dollar value of the change in housing affordability versus SQ over 30 years (as a consumer surplus),
- the change in choices available to households, including residential density and household crowding,
- and a distributional analysis providing estimates of the benefits to different communities.

To assess the outcomes of the reform, we start with a review of the Status Quo (SQ) scenario, based on National Policy Statement on Urban Development (NPS-UD). We then evaluate the proposed changes in comparison with the SQ. Then we provide a description of our methodology and present the results of our assessment.

5.1 Current Policy

The NPS-UD provides guidelines for improving the competitiveness of urban land markets by increasing the responsiveness of development to local land price changes. A more *competitive land market* will reduce the monopoly power of landowners, increase competition between locations across a city and is expected to result in lower land values.

To achieve this, the NPS-UD requires local governments to promote development permission for both brownfield and greenfield developments, particularly in areas of high demand with better access to jobs. Auckland Council (2021) used GIS mapping to illustrate that a higher land value correlates with high density housing areas. Assuming demand is highest at the city centre, these results suggest that allowing greater density (more up-zoning) would increase supply where demand is greatest and would be expected to lead to lower prices in the city centre and beyond.

The NPS-UD requires local councils to provide sufficient feasible development capacity in resource management plans and support that with infrastructure.[217] It uses the Future Development Strategy (FDS) process for ensuring that the planning processes provide enough development capacity to meet future growth needs. The objectives of the FDS are to:

- improve the alignment between spatial planning and land-use and infrastructure planning;
- inform RMA plans and other relevant legislation; and
- promote a well-functioning urban environment, informed by the values of iwi and hapū.

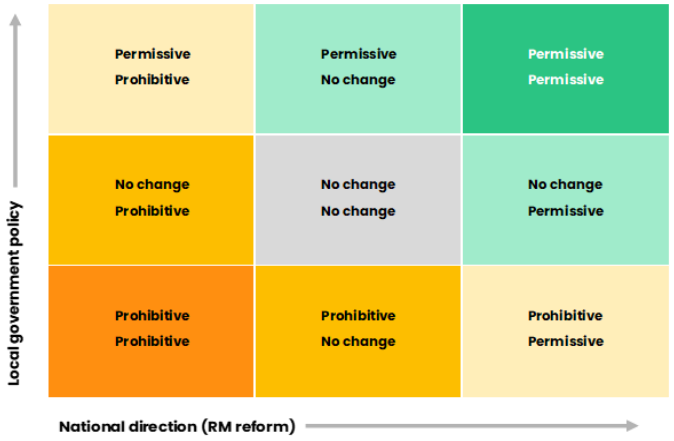
[217] Providing feasibility analysis of urban development capacity is a requirement for high- and medium- growth local authorities.

The FDS tasks councils with providing information about the location of future development and timing of infrastructure investment. The objective of the FDS is to minimise infrastructure costs and prevent severe rises in house prices. To achieve this, the NPS-UD recommends developments in areas with high accessibility to jobs, urban amenities and transport technologies.

5.2 RM Reforms

As will be discussed in this section, the NPS-UD and RM reforms are highly aligned in their objectives. The outcomes of councils' planning regulation (driven by the NPS-UD), if accompanied by a permissive and transparent RM system, can lead to higher benefits than those from the NPS-UD alone. As Figure 15 shows, the combination of the features of the RM system and their interactions with the councils' regulation may lead to a wide range of outcomes for the housing market. For a successful effective reform, the interaction of that with the council policies needs to be addressed carefully. We will discuss this further below.

Figure 15 Combinations of permissive RM reform accompanied with a permissive planning regime



5.2.1 Housing specific objectives of the reforms

Beyond the overall objectives of the reforms agreed by the Cabinet (see Table 1), the housing specific objectives of the reforms include:

- more flexibility for people to use resources and for places to change, while looking after the natural environment;
- the right infrastructure, in the right place at the right time, that provides adequate access to economic and social opportunities and enables people to maximise their wellbeing;
- elastic (more responsive) housing supply, with competitive land markets enabling more efficient land use and responsive development, which helps improve housing supply, affordability and better meets a range of housing needs (by type, size, location and price point).

To achieve this, there is a range of policy changes proposed in the reforms including:

- providing more national level direction to:
    - decrease the chance of negative externalities from one region's urban growth on other regions;[218]
    - increase certainties around permitted and prohibited activities (with less room for discretion);

- increase integration across Acts (including RMA, Local Government Act 2002 (LGA), the Land Transport Management Act 2003 (LTMA) and the Climate Change Response Act 2002 (CCRA)) to resolve any potential inconsistencies across different pieces of legislation leading to a higher certainty level; and

- improving *Te Tiriti* provisions.

As described above, the NPS-UD aims to provide a similar range of outcomes, by improving infrastructure investment plans, elasticity of housing supply and ultimately improved housing affordability and choice. Table 27 shows the high-level objectives of the status quo (SQ) and the RM reforms by outcomes areas.

Table 27 High level housing outcomes of SQ and the Reform

Outcomes	SQ (NPS-UD & RMA)	RM reform
Affordability	NPS-UD has a range of recommendations contributing to housing supply elasticity, including: • intensification through more liberal planning constraints; • development at scale; • competitive land markets and high-quality greenfield development	• National direction and more clear legislation leads to decreases in consenting cost which translates into allocative efficiencies • Housing supply is responsive to demand, with competitive land markets enabling more efficient land use and responsive development, which helps improve housing supply
Choice	Improving housing choice through: • increasing planning flexibility; • aiming for agglomeration benefits, ie larger or denser places tend to provide greater variety of services and consumer goods	Increase housing supply to better meet residents' demand for housing (by type, size, location and price)
Māori participation	Recognise Te Tiriti and contains provisions aiming to enable Māori participation in the system	• Enabling the housing aspirations of Māori such as by enabling papakāinga developments • Providing opportunity for Māori to participate as Treaty partners across the RM system, including in national and regional strategic decisions. Māori will be sufficiently resourced for duties or functions that are in the public interest
Climate change	Better prepare for adapting to climate change and risks from natural hazards, and better mitigate emissions contributing to climate change	A reduction in transport carbon emissions versus the status quo from more efficient land use patterns through improved spatial planning
Improved System performance	Focused on improving effectiveness of planning regulations	Improve system efficiency and effectiveness, and reduce complexity, while retaining appropriate local democratic input

[218] For example, with extensive urban development in Auckland, the water take from Hamilton's Waikato river has increased.

To support its mutual objectives with the NPS-UD, the reforms are assumed to support resolving the RMA land use planning issues identified in the NPS-UD (and the NPS-UDC 2016).[219] Table 28 shows the problems identified by the NPS-UDC and the potential solutions of the Reform.

Table 28 Problems with RMA land use planning and the potential contribution of RM reform[220]

NPS-UDC problems	Potential RM reform solution
1 Unresponsive urban planning policies that change very slowly in response to new information – this includes resource consenting	• Transparency and consistency of regulations will be associated with mixed effects on resource consenting • Increased system performance leads to faster plan preparation, faster approvals, fewer plans, consents and appeals.
2 Inefficient policies and rules (which their costs exceed their benefits)	The requirement of NPF for plans to provide urban growth capacity sufficient to meet population growth +20% within environmental limits will require more efficient local planning
3 Coordination failure between RMA planning and infrastructure planning	• NBA and NPF protect infrastructure corridors • SPA provides national direction on the location of infrastructure
4 Planning practices that place priority on some effects over others. For example, weighting local effects over national effects	NPF's greater (mandatory) national direction leads to improved prioritisation of national outcomes and better governance of potential negative externalities

Source: MRCagney et al (2016), PWC (2020)

5.2.2 The Strategic Planning Act

The SPA is an important reform element that is not specified in detail currently, including the level of granularity of SPA regulations. In a parallel analysis to this report, MfE has commissioned SGS Australia to assess the impact of the SPA. With the lack of information around the SPA regulations, SGS's assessment will be at a high level focused on the potential economic gains from the indicated objectives.

5.2.3 Expected Changes

The expected improvements from the RM reforms include:

- a **more certain regulatory framework** that will lead to higher certainty around zoning regulations.[221] The housing objectives of the RM reforms are consistent with the NPS-UD but are assumed to lead to a more substantial regulatory framework expected to produce structural changes to local governments' regulations (and regulatory power) and, ultimately, change the shape of New Zealand metropolitan and rural areas.

- **more flexible housing supply.** National direction is assumed to be more focussed on permissive regulation, allowing more flexibility in housing supply. And environmental limits are assumed to result in more housing intensification. This is more significant in land scarce regions, particularly Auckland. Given the long-term

[219] The National Policy Statement on Urban Development Capacity 2016 was replaced by the NPS-UD in 2020.
[220] The problem with an inadequate information base on feasible development has been resolved by requiring high- and medium- growth local authorities to provide feasibility analysis of urban development capacity.
[221] Zoning land is not a requirement of RMA, but it is a basic technique for controlling land use.

impact of RM reform, the other regions will likely feel the impacts more significantly in the next decades.

As discussed in the NPS-UDC, to improve competitive land markets, policy makers must provide for the efficient use of scarce resources (land and infrastructure). The contribution of the reforms to the efficient use of land, over and beyond the effects of the NPS-UD, is unclear at this stage. However, for analysis, we assume the RM reforms will result in a higher probability of both brownfield and greenfield development. To achieve this, the reforms are assumed to provide a more 'liberal' regime that will respond more favourably to the factors of location choice for residential and business use, while noting the need to keep within environmental limits.[222]

We have listed the housing supply elasticity estimates available from the literature in Table 29. They capture the impact of 1% increase in house prices on the rate of new housing consented. Given this and the period of data coverage, the highest and lowest estimate of supply elasticities estimated in most of these studies provide information about the potential impact of planning policy within the RMA regulations.

Table 29 Housing supply elasticities

Author	Auck-land	Hamil-ton	Taur-anga	Welling-ton	Christ-church	Queens-town
Sanchez and Johansson (2011) Nation-wide model (1994-2007), Quarterly data	0.705	0.705	0.705	0.705	0.705	0.705
Grimes and Aitken (2010) TLA level (1991-2004), Quarterly data	1	2.9	1.2	0.2	1.1	3.6
Grimes and Aitken (2006) National average (1981-2004)	1	1	1	1	1	1
(Hyslop et al., 2019)	1.2	1.2	1.2	1.2	1.2	1.2
PwC (2020) TLA level (1998-2019), Monthly data	0.876	0.84	0.517	1.353	0.778	0.875
This analysis	0.876	0.84	0.517	0.705	0.778	0.875

Source: Sanchez and Johansson (2011); Grimes and Aitken (2010); Grimes and Aitken (20056); Hyslop et al., 2019; PwC (2020).

The estimates using most recent data for Auckland, Hamilton, Tauranga, Christchurch and Queenstown suggest a decrease in supply response to an increase in house prices over time.[223] The reason for this decrease in supply elasticity can be by geographic constraints, planning regulations, and technical constraints in the construction market.[224] A permissive RM reform is expected to lead to an increase in supply elasticities.

[222] Denne *et al* (2016) use high-rise apartment sale prices against marginal construction cost as an indicator for competition in dense areas. They suggest discontinuities in land values between zones as an indicator for competitive land markets on the fringe of cities.
[223] This is a comparison between PWC (2020) estimates and Grimes and Aitken (2011) estimates.
[224] Saiz (2010); MRCagney *et al* (2016)

5.3 Costs and Benefits assessment framework

5.3.1 Components of Analysis

Regulation reduces the responsiveness, or elasticity, of housing supply. Over time, the growth in housing supply lags behind growth in demand. This will lead to increased housing prices and larger economic costs. The economic costs include the difference between the benefits that would have been obtained by the owners of the houses that have not been built and by the builders and developers. In the inelastic housing supply scenario, people who would have purchased houses end up with some outcome they regard as inferior. This includes for example sharing accommodation, renting or migration.

In a comprehensive study of the costs and benefits of the NPS-UD, PWC (2020) estimated direct and indirect impacts of intensification, minimum car parking requirements, and local government analysis and strategic planning requirements. Their results suggest that the benefit to cost ratio (BCR) of higher responsive housing supply (to price changes) across New Zealand cities is between four and seven. The estimates of PWC (2020) do not directly account for the impact of RMA regulation.

To complete this assessment, we need to address the following issues:

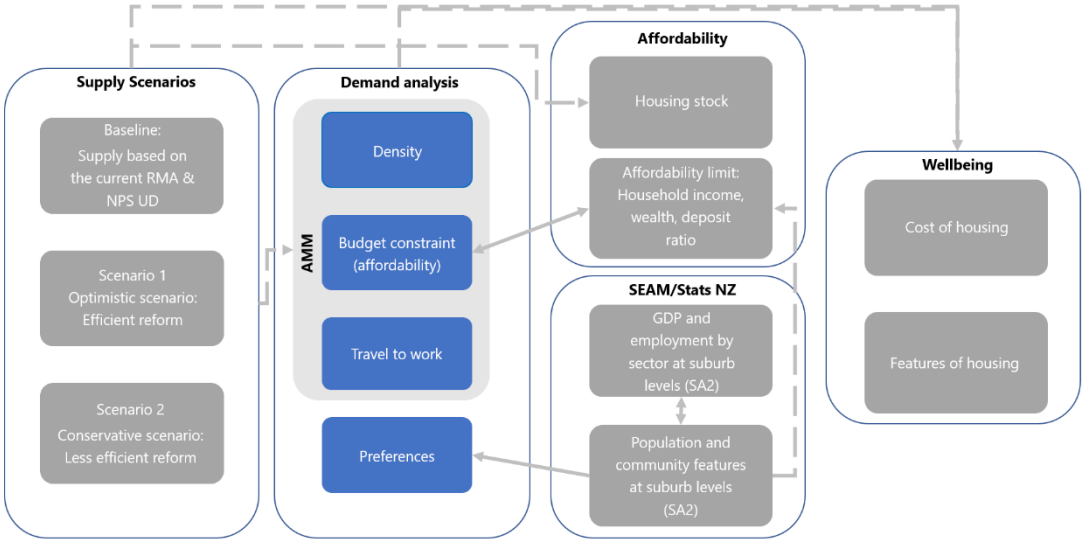
1. The information about the impact of the RMA (in isolation from planning objectives set by individuals councils) is limited;
2. At the time of the preparation of this analysis, the targets of the reform are under development;
3. To assess the potential distributional effects from the reform, we need to understand the impacts at more granular geographic and household levels.

Our strategy for overcoming these issues is to rely on the best available information from the previous studies and use theoretical economic modelling frameworks to provide most likely estimates of the distributional effects. Where possible, we use sensitivity analysis or comparisons with the results of the previous studies to understand the impact of our assumptions on the outcomes. To understand the impacts on housing affordability and the distributional effects of the RM reform, we:

- capture the likely impact of different objectives of the reform on land values;
- estimate the likely changes in housing supply associated with the changes in land values;
- simulate the likely distribution of housing supply at different distances to the CBD;
- simulate the likely features of the people benefiting from the new housing based on their income and the likely distance from the CBD; and
- estimate the negative transport (and environmental) externalities from the likely future location of housing.

We illustrate our overall housing impact assessment framework in Figure 16. We use two scenarios to show the likely impact of the reform with different outcomes/level of success.

Figure 16 Housing impact framework



5.3.2 Assumed impact of the reform objectives

Given the consistency between the objectives of the reform and that of the NPS-UD, our overall approach for estimating costs and benefits of the housing outcomes is similar to that of PWC (2020) and MRCagney et al (2016). However, we need to understand the differences between the expected outcomes of the NPS-UD and the RMA reforms. Hence, we try to capture the land value impacts of improved transparency, increased centralisation, and other regulations, separately.

The total impact of the reform and that of NPS-UD is assumed to equal to the impact of reaching an elastic housing supply, through minimising the costs imposed by regulation. This suggests that in absence of the NPS-UD and the reform, the housing supply will be lower, and the house price growth will be larger. The current housing elasticity in different regions is based on the PWC (2020) estimates, as shown in Table 29. We use these parameters to estimate the likely change in supply of housing when the elasticity of housing supply changes from the current (inelastic) levels to an assumed future supply elasticity equal to 1. This informs our estimation of the changes in housing stock resulted from the combination of NPS-UD and the RM reforms.

Figure 17 illustrates the supply and demand for housing under inelastic and elastic supply. With increases in population over time, demand for housing increases and the demand curve shifts outwards. If the housing supply is inelastic (unresponsive), then the price increases to P_1. If the housing supply is elastic (responsive to the increase in demand), then the house prices increase less than P_1, to P_2 levels and the quantity of housing purchased increases from Q_1 to Q_2. These are purchases from people who could not afford to purchase at price P_1 but can at P_2. The benefit of the higher supply elasticity is equal to the shaded triangle between Q_1 and Q_2; it represents the difference between willingness to pay and price paid for the additional housing (or floor space) purchases.[225] There will be additional impacts in the market, including reductions in the value of existing houses; these are

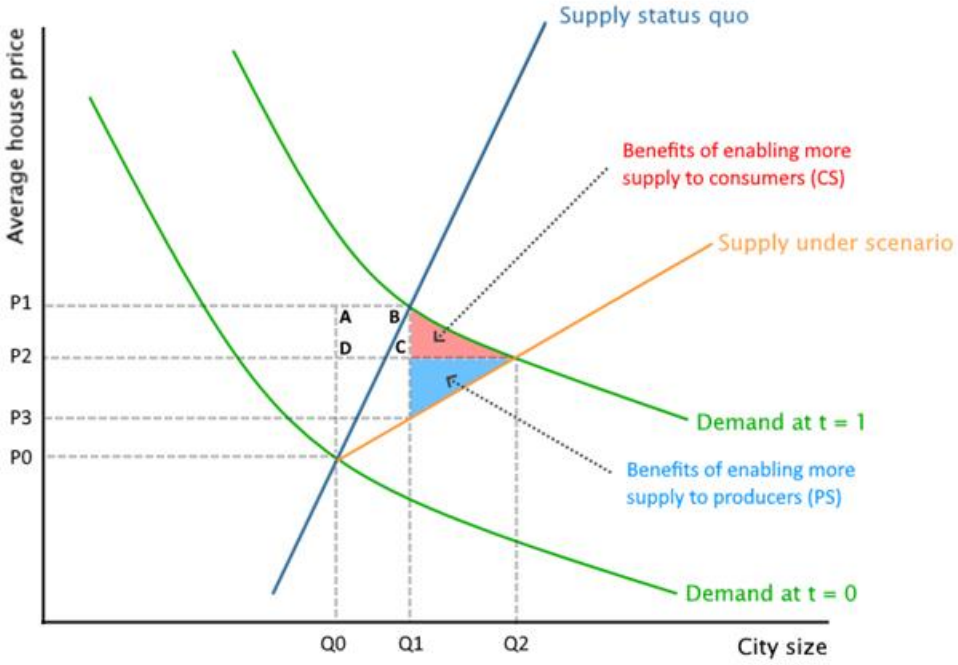
[225] This is the same approach that PWC (2020) takes for estimating the total benefits from increase housing supply elasticity driven by a less stringent planning regulatory regime.

transfers of wealth within the economy from one group to another. Accordingly, the benefit is estimated from the change in consumer surplus (CS) and producer surplus (PS) are as follows:[226]

$$CS = \frac{(P_1 - P_2) \times (Q_2 - Q_1)}{2}$$

$$PS = \frac{(P_2 - P_3) \times (Q_2 - Q_1)}{2}$$

Figure 17 Impact of enabling more flexible supply



Source: Adapted from MRCagney et al (2016) and PWC (2020)

Previous housing market analyses have not included producer surplus (PS) in their assessments,[227] although without explanation. It might be argued that our interest here is largely driven by the benefits for consumers (house purchasers)[228] but this does not provide a basis for ignoring a benefit that would accrue to the community. We include it here.

The previous studies counted the surface of the $ABCD$ rectangle as an additional benefit from higher elasticity of housing supply. This area captures the benefits from increased migration – ie the change in consumer surplus from additional welfare to the people who will migrate to New Zealand as a result of lower housing cost. While this is a benefit to the economy, we do not count this as the social benefit of an elastic housing supply.

Distinguishing Reform impacts from the NPS-UD

To distinguish between the impact of the reform and that of the NPS-UD, we use estimates of the impacts of an improvement in the resource consent process and its impact on land

[226] Our estimate of deadweight loss is different
[227] MRCagney et al (2016) and PWC (2020)
[228] This is part of the argument used in CS-only analysis as used in competition analysis - see eg Albæk (2013); Salop (2010); Pittman (2007); Lande (1982)

values. Any impact on land values in addition to the estimated impacts of resource consent is attributable to the SQ. We discuss these effects further in the next section.

We decompose the impact of the RM reforms for the impact of the expected changes discussed above. The estimated land values resulted from achieving the objectives of the RM reforms in Auckland are shown in Table 30. These parameters change slightly across regions, depending on the average land values. As illustrated, a 100% increase in transparency is associated with 4.17% lower land values through its impact on resource consents.[229] Centralisation (or national direction) is associated with 0.41% higher land values, in the absence of its potential positive impact on competitive land markets (CLM). The impact of CLM through less stringent Urban Growth Boundaries (UGB) is a decrease in average land values by 0.23%. The rest of the impact of removal of the housing supply constraint is captured through the other regulations. This impact may still be affected by the RM reforms, through a more prescriptive SPA and improved alignment with infrastructure planning. We could not capture this because of lack of information in the literature about the impact of the RMA.

Table 30 Parameters used for estimation of the impacts for the Auckland region

Objective	Impact on land values (%)	Source	Impact of RMA
Transparency	-4.17	T1, T2, G, N, P	Yes
Centralisation			
In isolation	0.41	T1, N, P	Yes
CLM - UGB	-0.23	T2, P	Yes
CLM - Other	-17.60	G, P	No
Total	**-22.00**		

Source: T1 = Torshizian (2015); T2= Torshizian (2018); N = Nunns (2021); G = Grimes (2015); P = Principal Economics analysis.
Note: For calculating the percentages based on the available estimates, we source regional land and property values from the Auckland Council Rating database.

Our analysis is sensitive to the parameters used in Table 30. For a high level cross check, we used these parameters to estimate the benefits from a responsive housing supply in Auckland. We applied this to the same framework that MRCagney et al (2016) used for their evaluation of the impact of an elastic supply. Our estimated benefit is $2.5 billion. This is close to the (undiscounted) $2.6 billion CS estimated from a responsive housing supply by MRCagney et al (2016).

To distinguish between the impact of RM reforms and that of the NPS-UD, we simply use a multiplier of the estimated impact of RM reforms on land values as a ratio of the total impact (of the reforms and NPS-UD) on land values. We use this multiplier to calculate the benefits attributable to the reforms only. For the estimation of the impacts of the parameters affected by RM reforms, we do not have any previous study to compare our estimates.

For our assessment, we estimate the impacts over a 30-year timeframe in the urban areas with the high population growth and low housing supply responsiveness. As identified by MRCagney et al (2016), the high and medium growth areas that most likely will be affected

[229] We present the findings from the literature in the next section.

by the outcomes of the reform (and NPS-UD) include Auckland, Tauranga, Queenstown, Christchurch, New Plymouth, Nelson, Palmerston North and Wellington. Our analysis is focused on these regions.[230]

Table 31 Factors affecting housing market in NZ cities

City	High land price inflation?	Inelastic supply?	Restrictive regulations?	Level of growth
Auckland	Yes	Potentially	Not measured	High
Tauranga	Yes	Potentially	Yes	High
Hamilton	Yes	No	No (Waikato District is more restrictive)	High
Queenstown	Yes	No	Yes	High
Christchurch	Yes	Potentially	Yes (as are adjacent Selwyn and Waimakariri)	High
New Plymouth	No	Potentially	Not measured	Medium
Nelson	No	Potentially	Not measured	Medium
Kapiti	No	Potentially	Not measured	Medium
Palmerston North	No	Potentially	Not measured	Medium
Wellington	Yes	Yes	Yes	Medium
Napier/Hastings	No	Potentially	Not measured	Low
Blenheim	No	Potentially	Not measured	Low
Whangarei	No	Potentially	No	Low
Gisborne	No	Potentially	Not measured	Low
Invercargill	No	Potentially	Not measured	Low
Dunedin	No	Potentially	Not measured	Low

Source: MR Cagney et al (2016)

For this analysis, we also provide estimates of distributional impacts (and potential negative externalities) from the reform. This requires us to have a better understanding of the potential impacts at granular geographic levels. For this purpose, we try to disaggregate the effects at distances from the CBD. Given the lack of information on the outcomes of the SPA at this stage, we rely on most likely scenarios, based on a stylised economic model.

5.3.3 Impact of the reform (and NPS-UD) on land values

As discussed above, the reforms are assumed to improve consenting transparency and increase housing supply elasticity. In this section, we explain our approach for measuring the effects of improved outcomes. We will discuss the magnitude of the change in the outcomes resulted from the reform in the next sections.

Effects of improved transparency

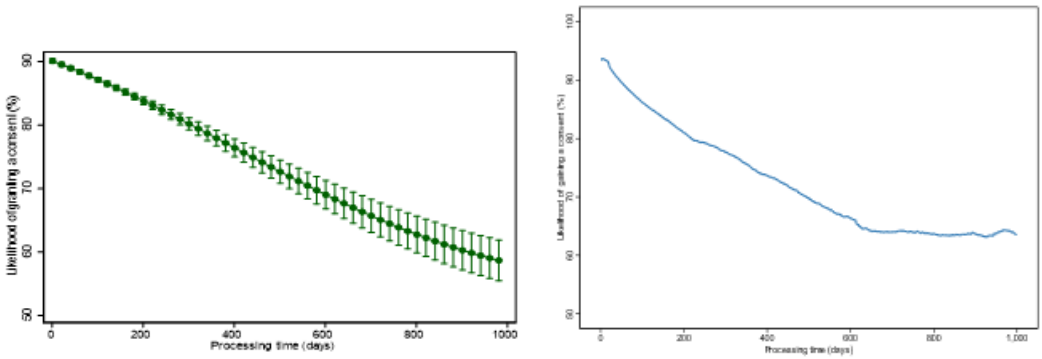
There is no measure of improvement in transparency in the literature. The most relevant information is available from Torshizian (2015), who estimated the likelihood of granting a

[230] While Covid-19 has affected migration and the population growth in the coming years, our internal modelling of the impact of Covid-19 suggests that the impacts over 30-years is not substantial. Therefore, the estimated level of growth in MRCagney (2016) will not change.

consent to different activity statuses after accounting for the features of the applications. He argues that the likelihood of granting a consent should be similar across all activity statuses after taking account of the features of the application. After accounting for the likelihood of not applying for a consent due to its high processing cost (as a combination of time required for processing a consent and the associated fees), his results suggested that the activity category 'restricted discretionary' (which restricts the scope of consideration to planners) is approximately 20% less permissive than 'discretionary', which is meant to be a more involved affair. This figure provides us with an estimate of the impact of improved transparency on the likelihood of granting a consent. This figure only shows the likelihood for those who apply for a consent – and does not show the dampening effects of the costly resource consent process on those who do not apply.[231]

The results of that study suggest that a 1% increase in the processing delays is associated with 1.4% lower likelihood of granting a consent. To capture the affordability impacts of lower consenting likelihood, we use the results of Nunns (2021), which suggest that a 1% higher likelihood of consent processing delays is associated with $24 per sqm increased costs (in term of land price distortions). Using these multipliers suggest that **a 1% lower likelihood of granting a consent is associated with $17.1 per sqm higher prices**.

Figure 18 Impact of processing delays on the likelihood of granting a resource consent



Source: Auckland Council; Torshizian (2015) on the left hand side show the relationship between 2005 and 2015; Principal Economics analysis on the right hand side shows the relationship for the 2005-2021 period.

Notes: We exclude bundled resource consent applications to avoid double counting and exclude any entries that appear to be entered incorrectly. This includes resource consents with negative processing days or dates that lie outside of the assessment period. We define consents not granted as outstanding applications using the classification method advised by Auckland Council. Where we find that business days in addition to stop days exceed the recorded number of processing days, we take the larger of the time periods.

The effects of centralisation

The success of centralisation of decision making depends on its contribution to the objectives of the reform. A successful centralisation leads to efficiency gains and significant economic and social benefits. However, an inefficient centralisation will be associated with negative outcomes.

[231] This figure provides information about a change from current less transparent restrictive discretionary activity status to the more transparent 'discretionary' activity status. The figure, however, does not provide information about a percentage change in transparency. Since there is no better estimate available, we assume that a 100 per cent improvement in transparency increases the likelihood of granting a consent by the size of a change in activity status of an application from restricted discretionary to discretionary.

Torshizian (2015) investigated the likelihood of granting a consent for different activity statuses before and after the amalgamation in Auckland. His results show that after the amalgamation in 2010, the average likelihood of all activity statuses decreased by between -1.3% and -2.7%. This figure captures the **potential negative impact on urban development from a lower opportunity to compete for attracting urban development opportunities to the region**. While this figure provides an indication of the impact of centralisation in local government, it provides an overall estimate of the likely inefficiencies involved in centralisation.

There are potential gains from improved certainty resulted from national direction. As discussed, the NPF's greater (mandatory) national direction leads to improved prioritisation of national outcomes and better governance of potential negative externalities. Improved prioritisation means that the planning regulation will redirect investments to the projects with the highest expected return on investment, after accounting for financial, economic and social outcomes. This means that the combination of the RM reform and its impact on planning regulations will lead to a more responsive housing supply.

A more responsive housing supply is driven by competitive land market, which is mainly affected by the urban growth boundary regulation and the (other) planning regulations. It is not clear to what extent these regulations are affected by the RMA. However, an effective RM reform will clarify the need for efficient planning regulation, which is assumed to contribute to a competitive land market across New Zealand. The reform is assumed to require Councils to provide infrastructure in the areas of future growth, and environmental limits would be identified. **Given the environmental constraints and the high demand, councils will need to relax a range of regulations to accommodate for the future growth**. This includes two broad set of policies on the urban growth boundaries and the other wide range of zoning regulations.

Impact on a competitive land market through less stringent urban growth boundary policies

A review of the extensive literature on the impact of urban growth boundaries in New Zealand suggests that the urban growth boundary has led to higher house prices. While it is not clear if the urban growth boundaries are driven by the RMA, the reform could lead to decreased costs from the boundaries regulation by decreasing the regulatory barrier.

In the literature, most studies do not estimate the precise effect of urban boundaries on land values because they do not have data on the value of infrastructure (which is capitalised into the value of land). Torshizian (2018) estimated the impact of Metropolitan Urban Limit (MUL) expansion on house price growth in the Auckland region. To our knowledge, this is the only study that captures the impact on prices of houses located in different proximities to the expanded area, before and after the expansion. The study captures the impact for the suburbs located near the expanded area and compares that with the suburbs with similar opportunity to expand. For benchmarking, the study uses the price growth of houses compared to the houses with similar price range located in the central area (which are not directly affected by an urban expansion). Results suggest that:

- the price growth in expanded areas is similar to the central areas;

- the price growth in areas nearby the expanded area is similar to the other areas with similar features; and
- the price growth outside the urban boundary is significantly higher for areas located closer to the expanded area.

The author concludes that the reason for high price growth in the areas located outside the boundary and nearby the expanded area, is their expectation of future growth in their area driven by **the lack of competition in the land market being a driver of house price growth**. Accordingly, the lack of competition resulted from the MUL is associated with an average of 13% higher house price growth. This is equal to an average of 0.31% additional cost to the land values, which is equal to $4,730 (in 2021-dollar values).

NZIER (2014) used the Alonso-Muth-Mills (AMM) "monocentric city" model to estimate the impact of expanding Auckland's MUL on housing and transport costs faced by residents.[232] Their results suggest that the MUL has increased combined housing and transport costs by $859-$4,560 per annum (between $1,655 and $8,731 in 2021 dollars).[233] This is equal to a minimum of 0.44% additional costs to land values.

Torshizian's (2018) estimate for a scenario with development completely unconstrained by an urban limit is significantly smaller than that of NZIER (2014). This is partly because NZIER accounts for the associated lower transportation costs. We account for the associated transportation costs/externalities separately and use Torshizian (2018) estimate of the impact of urban limit on land prices.

Distributional impact of the reform

Previous studies provide estimates of the impact of the MUL on land values. The available literature shows that the zoning regulations have led to increased development costs. While there is a potential argument for the regulatory impact of the RMA on the MUL regulations, the available literature does not provide estimates of the impact of the RMA (in isolation from planning regulations in district and unitary plans?). The RMA and the NPS-UD do not prescribe a particular urban form, nor recommend any urban limit regulation. However, as discussed in 5.2.3 and described in Figure 17, the outcomes of the NPS-UD and RM reform are assumed to be a more responsive housing supply. To understand the potential negative externalities associated with the reform and the distributional effects, we need to know the likely composition of the additional housing and their tenants.

We compare the pattern of dwelling density in Auckland before and after the RMA effects come to existence in 1991. The patterns of dwelling density are shown on the left-hand side of Figure 19. As illustrated, the pattern has changed dramatically over time.[234] This is consistent with the changes in pattern of land values illustrated on the right-hand side of

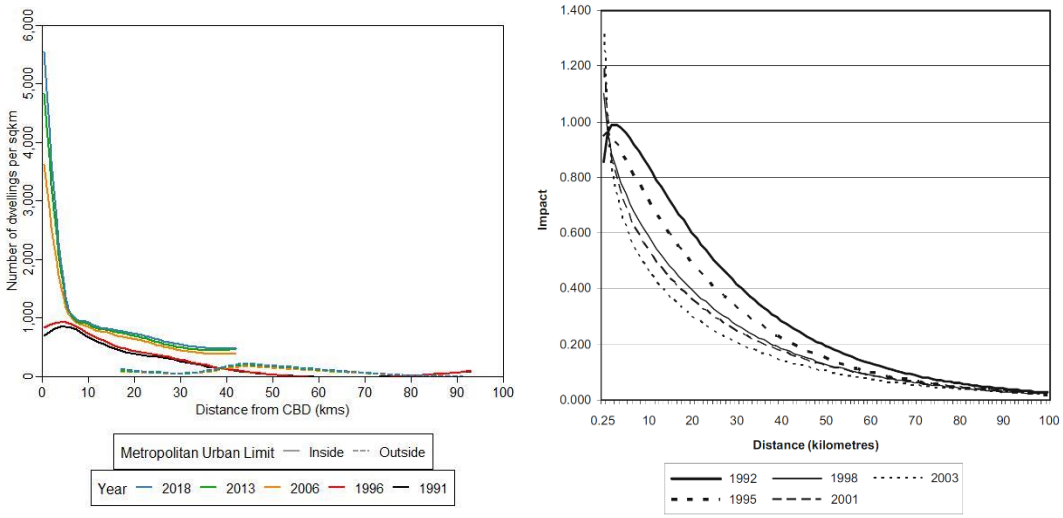
[232] AMM has been used by a range of previous studies in New Zealand, and most recently by PWC (2020) - Cost benefit analysis for a National Policy Statement on Urban Development. As highlighted in that study: "The AMM model is a simple yet powerful depiction of urban spatial structure that explains the economic substitutions associated with spatial choices that individuals make about where to live, work, and consume within the urban landscape."

[233] These numbers converted to $2021 dollar values adjusting for the housing inflation.

[234] We have shown the dwelling density for areas outside the MUL separate from the residential areas.

Figure 19. The comparisons between the two graphs shows the high correlation between patterns of dwelling density and land prices over time.[235]

Figure 19 Impact of distance from CBD



Source: Principal Economics analysis (left hand side)[236]; Grimes & Liang, 2009 (right hand side). 'Impact' in the right hand side figure refers to the impact of distance from CBD on real land values.

In the long term, a flexible housing supply will lead to maximisation of the wellbeing of the residents (ie the future supply meets the future demand for housing). To capture the likely distribution of population we used an AMM model. The AMM model is based on the following assumptions:

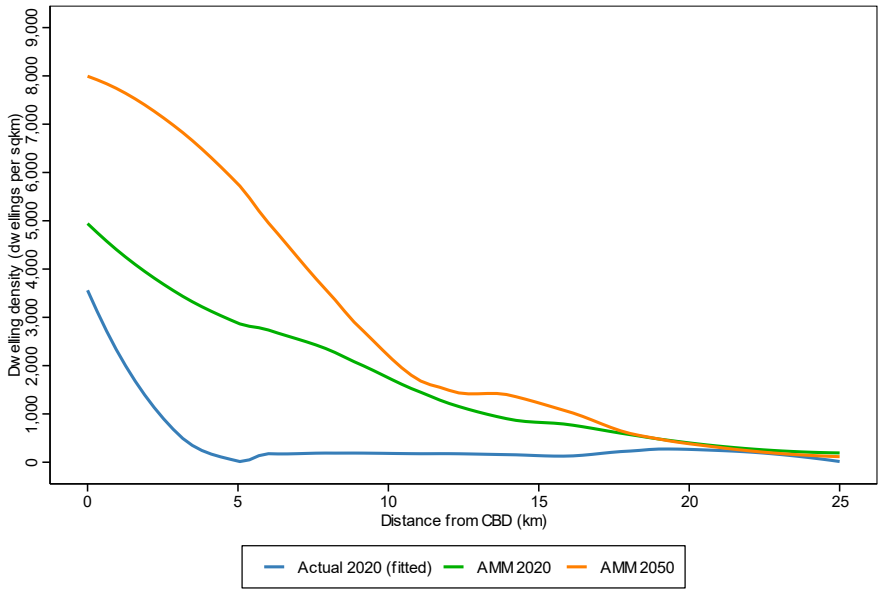
- Households choose whether to live in well-located, but smaller and more expensive, housing or in more distant, but larger and less expensive, housing towards the city fringe;
- The city structure is characterised by higher density and taller buildings close to the CBD and lower density and building heights on the fringe;
- The overall size of the city is determined simultaneously by the size of the population, the cost of transport and the value of land in alternative uses, such as agriculture.

We calibrated the model for Auckland and adjusted the outputs for the availability of land. The outputs of this analysis is shown in Figure 20. The number of dwellings in this graph are illustrative. More importantly, the figure shows the likely distribution of the additional dwellings resulted from a flexible housing supply.

[235] We also compared the estimated impacts of distance on land prices and number of dwellings per hectare and the results suggested the same high level of correlation between the impacts.

[236] Principal Economics thanks the Resource Consents Team of Auckland Council for providing the required data for this analysis.

Figure 20 Likely distribution of additional dwellings in the Auckland region



Source: Principal Economics analysis.

Negative and positive externalities

The SQ regulations potentially manage some negative externalities, ie harms imposed on other people who do not voluntarily choose to bear them. Depending on their distance to CBD, the additional dwellings will be associated with a range of externalities.[237] In this section we provide a description of the data and parameters that we use for our estimation of the externalities.

Transport-related externalities include excessive vehicle congestion, vehicle noise, emissions and crashes. We provide a high-level estimate of the transport related congestion based on the long run average cost of additional road use estimated by Wallis and Lupton (2013). We use the relationship between distance to the city centre and the average commute distance as determined by MRCagney *et al* (2016) as an input in determining the additional VKT per worker in our modelling. Using meshblock data from the Census 2018 we determine the number of workers at difference distances from the city centre as our baseline. We calculate the difference in total vehicle kilometres travelled (VKT) as a result of a changes in population at different distances from our scenario modelling (based on AMM modelling output). We then multiplied the estimated changes in VKT by the long run marginal estimates of congestion costs by distance from the CBD. Wallis and Lupton (2013) provide a comprehensive review of the cost of congestion in Auckland. They used an analysis of ART3 transport modelling results for the 2006 AM peak period and calculate the annual costs of congestion, including schedule delay costs. They estimate the short run marginal cost (SRMC) of congestion, which capture the delay imposed on other travellers, and the long run marginal cost (LRMC) of congestion, which captures the cost to expand the road network to accommodate additional journeys. We show their estimates in Table 32 and updated to 2021 values.[238]

[237] Nunns & Rohani (2016) provided a comprehensive list of the potential externalities that needs to be accounted for in an evaluation of new developments.

[238] Waka Kotahi Transport Agency (2020) provide congestion costs on a time basis, ie $/hr of delay.

Table 32 Short run and long run estimates of congestion costs

Objective	Cost per peak period VKT (2010 NZD)	Cost per peak period VKT (2021 NZD)
SRMC	$0.54	$0.68
LRMC	$0.57	$0.72

Source: Wallis and Lupton (2013); MRCagney et al (2016); Principal Economics analysis.
Note: Consistent with MRCagney et al (2016), we used Stats NZ's Capital Goods Price Index for Civil Construction to convert the 2010 dollar values to 2021.

5.3.4 Baseline, optimistic and conservative scenarios definition

The three scenarios are:

- **Baseline:** the outcomes expected with the current RM system, which includes the NPS-UD. We have not observed the full (long-term) impact of the NPS-UD. The previous CBA of the NPS-UD assumed it would achieve a flexible housing supply. We argue that to achieve a responsive housing supply, the NPS-UD needs to be complemented with the outcomes of RM reform.

- **Optimistic:** Future supply depends on a range of factors, including activity permissions and the (commercial) feasibility of development (ie if price will exceed costs of development). The optimistic scenario investigates if the RM reform will be fully permissive and allow for the supply of housing to be driven by demand (and price).

- **Conservative:** the outputs of the reform will be achieved only to some extent that we define qualitatively based on our evaluation of the potential outcomes. Accordingly, the future supply depends on a range of factors that we discuss in the next few paragraphs.

Evaluation of the potential outcomes for the conservative scenario

We try to identify the potential outcome of the reform based on the current available information. This shapes our conservative scenario based on the information available from the Interim RIS document, our meetings with stakeholders, and the literature. The criteria we used for scoring the outcomes is based on the discussions we had in the previous sections around the outcomes of the reform compared to the SQ.

We use a simple scoring system for the successful delivery of the outcome with the maximum score of 100% if we are confident that the reform is going to deliver the outcome; a 50% score if the objectives of the reform highlighted the importance of the outcome, but we were not confident that the current strategy could achieve the outcome; and a zero per cent score if we are not confident that the reform currently has relevant strategies.

There is little information available about the contribution of RMA and the reform to the resource consent processing. In our stakeholder meetings, there were some discussions around potential for improving transparency of the resource consents by decreasing the number of activity statuses. There is little empirical study on the impact of environmental regulation on the chance of issuing a consent and its economic, social and environmental

impacts. There is potential positive impact from national direction on the outcomes of resource consents. The link between national direction and resource consent processing is not clear. Therefore, given that there is not enough information available on this in the current reform documents, and because of the potential impact of national direction on the outcomes of resource consents, we score the success rate at 25%.

Based on the available Interim RIS and our conversations with client teams, we also see a chance of negative outcomes from the current national direction from decreases in local authorities' ability and incentive for economic growth. A successful reform will provide the national direction required for improved transparency around land use regulations and minimises the chance of negative centralisation outcomes. To achieve this, the reform should provide clarity around its interactions with other legislation. While the reform acknowledges the need for the consistency amongst legislations and Acts, we do not capture effective changes from the NPS-UD (SQ) in the available documents. Hence our score for the conservative scenario is 0%.

MRCagney et al (2016) referred to the complementary role of planning regulations and infrastructure planning, funding and provision. They emphasised the importance of improved coordination between planning regulation and infrastructure planning, which are governed by separate legislation, to provide the infrastructure in the right place and at the right time. This has been recognised as an objective of the RM reform. However, the current strategy for contributing and improving the outcomes of the NPS-UD is unclear. It is likely that there will be more discussion around this in the SPA. We score the likely outcome at 50%.

In addition to their discussion of the impact of urban growth boundaries and other regulations that we reviewed in the previous sections, Bassett et al (2013) also discussed development levies. They noted that the RMA sets strict rules about the relationship between development levies collected and how they were spent, but councils have sought the widest interpretation of the rules. They do not provide data but refer to some examples in Auckland. A successful RM reform will provide transparency and minimises the chance of any misinterpretation.

Table 33 Optimistic and conservative scenarios

Objective	Potential outcome (compared to SQ)	Source	Optimistic scenario	Conservative scenario
Transparency	Resource consent regulatory framework	Parker (2015); Torshizian (2015); Stakeholder meetings	100%	25 %
	National direction	Interim RIS document	100%	0 %
CLM	Improved coordination with infrastructure planning	MRCagney et al (2016); Interim RIS document; stakeholder meetings	100%	50 %
	Improved coordination with other legislation	Stakeholder meetings	100%	50 %
	Clarification of the implication of the reform for planning (zoning) regulations	Bassett et al (2013)	100%	50 %

Source: Torshizian, 2015; Nunns, 2021; Lees, 2014; Grimes, 2015; Bassett et al., 2013

5.3.5 Affordability and distributional effects

To estimate the impacts on different household income groups, we used Principal Economics' housing affordability simulation model (ASIM), developed based on a study of affordability composition in Auckland (Torshizian, 2016).[239] In this model:

- each household has an affordability limit[240] based on their income levels, household size, wealth, mortgage rates, and the deposit ratio;
- the stock of housing (as determined based on the supply and demand analyses) is allocated to the households at the highest price that they can afford to pay in an auction;[241]
- all households are classified as renters, first homeowners or investors who compete for the existing housing supply.[242] The resulting price of dwellings and homeownership rates for different household demographic groups are captured over 30 years.[243]

The outputs of the housing affordability model, and the AMM model are used as an input to Principal Economics' stochastic microsimulation model developed based on Stats NZ data - Subregional Economic Activity Model (SEAM) The outputs of the model provide details on the socioeconomic features of households, their choice of location (in search for higher quality of business and quality of life), and the economic activities of New Zealand industries.

The output of SEAM provides information about the forecasts of household income for different ethnic groups over the next 30 years, which is an input for our estimation of the affordability of different ethnic groups. The overall framework is illustrated in Figure 21. Given the high-level nature of our analysis, the model has been used at the national level.

[239] For details on ASIM see https://www.principaleconomics.com/models/asim/

[240] This is also called loan serviceability.

[241] This is a static modelling framework providing a estimates of housing prices after market clears - which is a correct assumption for providing estimates in long-term period (30 years).

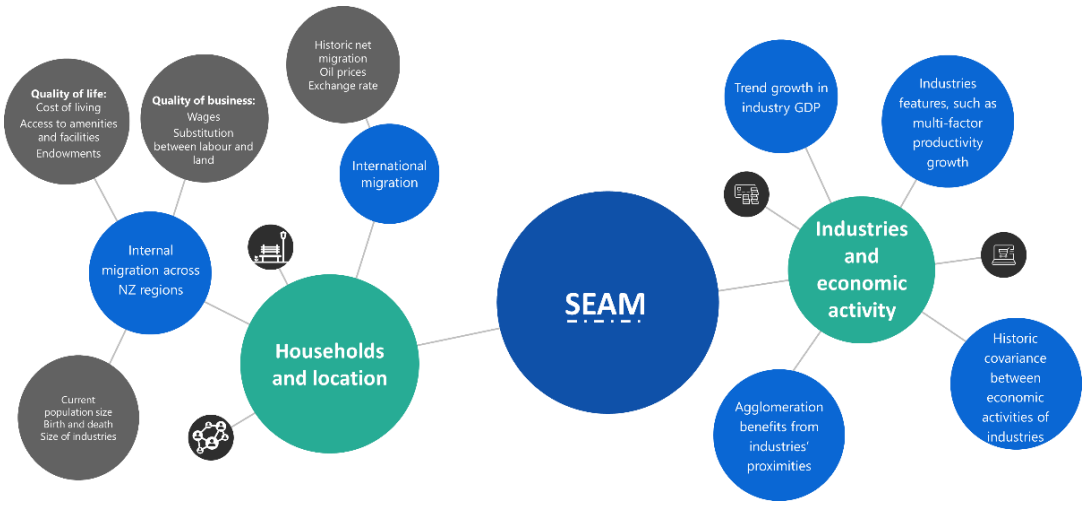
[242] This includes the current homeowners, who can potentially enter the investment market.

[243] We estimate the Affordability Limit for the median households in New Zealand using an adjusted multiplier (AM) which is the maximum affordable loan to income ratio given the interest rate (i), the down-payment ratio (β), term of the loan and the proportion of income a household allocates to mortgage payments (α). The formula we use for determining the adjusted multiplier is shown below.

$$AM = R \times \left(\frac{1-(1+i)^{-N}}{i}\right), R = \frac{\propto}{1-\beta}$$

We assume a down-payment ratio of 5%, 25-year loan term and 50% income to mortgage payment ratio across all periods to determine the Affordability limit. Median household incomes house prices have been sourced from Statistics NZ Household Labour force survey for the years of 1998 – 2020.

Figure 21 SEAM framework[244]



Source: Principal Economics

5.4 Results of our assessment

Table 34 shows the total benefits (per annum) estimated from the housing outcomes under the optimistic and conservative scenarios. The estimated total benefit is the sum of consumer and producer surpluses. For the differences between the conservative and optimistic scenarios refer to Table 33 and for the parameters that we used for the estimation see Table 30. A successful RM reform is estimated to be associated with $834 million of benefits to the economy from decreased social costs imposed by RM associated regulations. The impact can be as low as $146 million based on our conservative scenario. This suggest that **the expected benefits are very sensitive to the successful delivery of the housing outcomes**.

The estimated benefit to Māori captures the consumer surplus resulted from increased housing affordability of Māori (and not potential benefits to Māori businesses). This estimate does not capture potential impact of the reforms on Māori land disputes. We discuss the impact of disputes in section 6.

In comparison with the results of NPS-UD, our estimates of the impact on land and house prices are smaller. This is partly because we assume that NPS-UD will be fully implemented, and the reform has a complementary role in achieving the outcomes of the NPS-UD. Another reason is the difference in our estimation of consumer surplus, as discussed above. Since we use a housing simulation model and account for the potential composition of the future housing stock, including their likely location and price decile, our estimate of the change in house prices is based on the changes resulted from both supply and demand for housing (and not a linear estimation based on elasticities of supply). Our estimates account for the likely composition of the new housing – as we show in the next figures.

[244] For more information about SEAM see 'About SEAM' tab on PE's website: https://demo.principaleconomics.co.nz

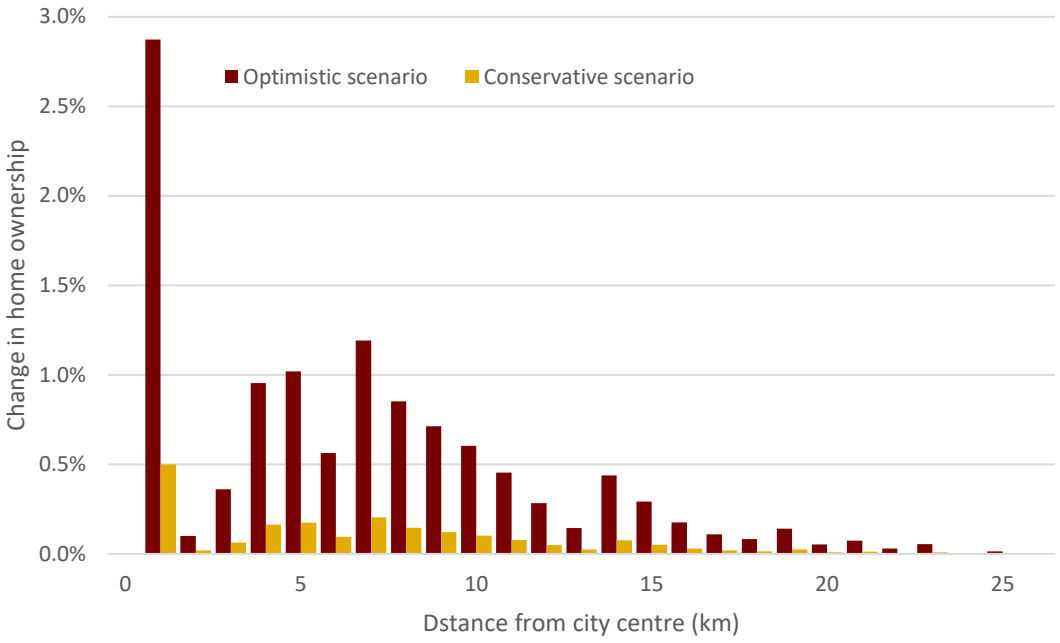
Table 34 Housing impacts of the reform[1]

Objective	Optimistic scenario	Conservative scenario
Annual benefits from increased affordability		
For Māori	$59.1 m	$15.4 m
For Other	$775.2 m	130.6 m
Total	$834.3 m	$146 m
Negative externalities from congestion	-$2.8 m	-$0.5 m
The estimated total benefits include:		
Change in real house prices from SQ	-1.1%	-0.2%
Change in land values from SQ[1]	-5.4%	-0.9%
Additional housing stock per annum?[2]	15,279	2,662

[1] This is estimated based on the parameters in Table 30.
[2] This is based on the estimated change in the housing stock as a result of RM reform. We calculate the total change in the housing stock based on a change from the current (inelastic) housing supply to an elasticity housing supply – the current elasticities are shown in Table 21.

As discussed, we used the AMM model to capture the potential changes in distribution of dwellings for each city (under an elastic housing supply scenario). The outputs of our estimation of the impact of the scenarios on additional housing stock suggests an increase in housing supply by 15,279 and 2,662 dwellings for the optimistic and conservative scenarios, respectively. We expect the increase in housing supply across New Zealand cities to follow the distribution shown in Figure 22.

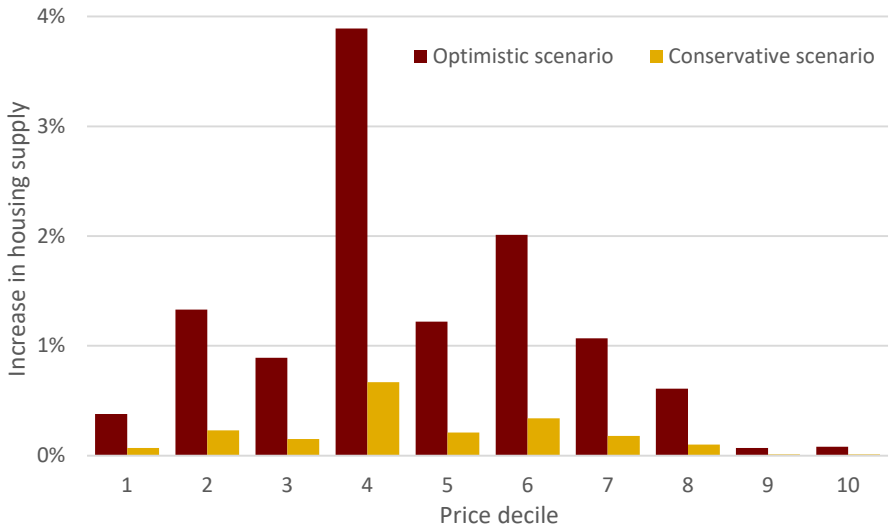
Figure 22 Change in dwellings at different distances from CBD across New Zealand



Source: Principal Economics analysis.

Figure 23 shows the expected changes in housing supply at different price deciles. Accordingly, most of the additional housing will be supplied at the average and low-price levels.

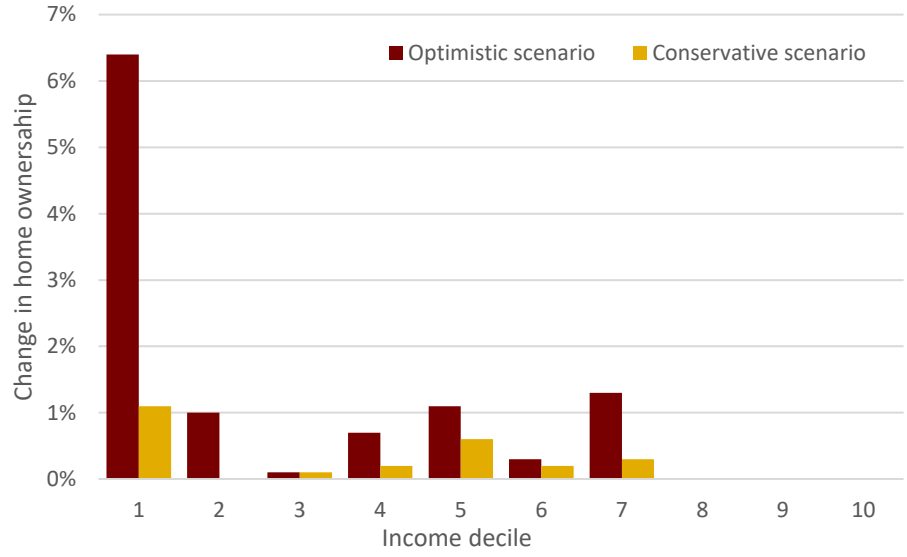
Figure 23 Change in housing supply at different price deciles



Source: Principal Economics analysis.

We used the estimated change in housing supply as an input to our housing affordability model. The results of homeownership by income deciles are presented in Figure 24. We exclude investors from the model and assume that all the future housing stock will be allocated to new home buyers. The housing stock supplied under both the optimistic and conservative scenarios will likely increase the homeownership of the lowest income decile the most.[245]

Figure 24 Impacts on homeownership by income decile without investment



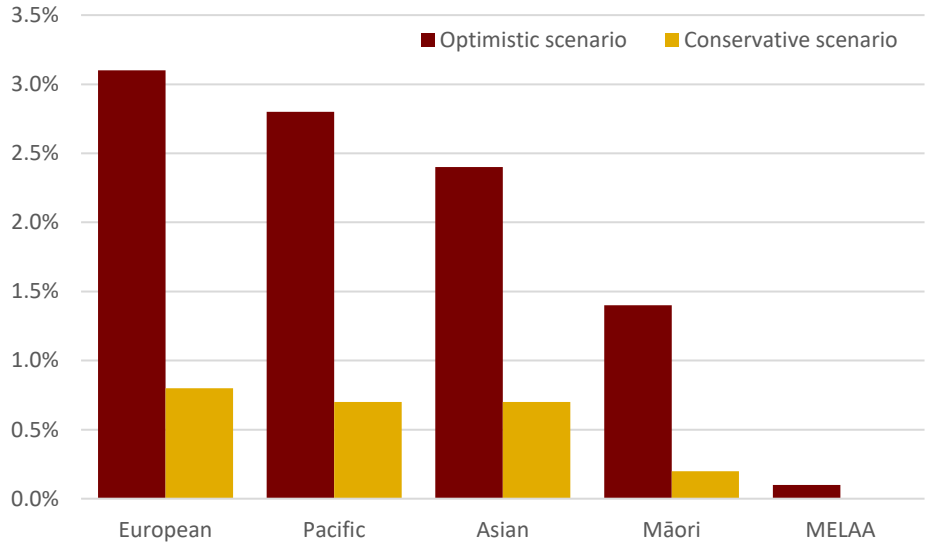
Source: Principal Economics analysis.

We simulated the impacts on the housing affordability of different ethnic groups, based on their income levels. As shown in Figure 25 the outcomes of both scenarios lead to improved

[245] If we account for the presence of investors, a high proportion of this income group will be crowded out from the market.

homeownership of the Europeans. The difference between the outcomes of the two scenarios is not the same for all ethnic groups. Particularly, the optimistic scenario leads to relatively higher homeownership rates for Māori. This is driven by the combination of income groups benefiting from the increase in housing supply and the likely location of future supply.

Figure 25 Impacts on homeownership of different ethnic groups



Source: Principal Economics analysis.

We investigated the impact of the two scenarios on household crowding[246] and the type of the dwellings. Based on the likely location of the future supply, the composition of new construction is towards less detached dwellings, with a total of 206 less detached dwellings in the optimistic scenario and 196 less detached dwellings in the conservative scenario. Consistent with this change, our estimates suggest a small increase in household crowding levels for both scenarios (of around 0.02%) if we assume that the household size does not change over time. However, given the expected decrease in household size to 2.5 by 2050, the household crowding will decrease.

5.4.1 Assumptions and limitations of our assessment

There is no perfect model of housing available to capture the impact of changes in house prices over time. To capture the changes in house prices based on the parameters in Table 30, we assumed that in absence of the NPS-UD and RM reforms the (compounded average) price growth rate over the last twenty years will happen in the next thirty years. This is equal to a compounded growth rate of 5.2%.

At the time of this analysis, we did not have information on the targets of the reform and the details of the SPA. Further details will improve the precision of our estimates.

[246] We measure household crowding using the people per bedroom measure – available from the Census. Torshizian & Grimes (2021) provide more details on the measurement of household crowding and its impact on residents' satisfaction with their living environment.

The estimates of the impact of objectives, such as the impact of transparency and MUL on land values, are based on a linear equation. This means that with improvements over time, the impacts remain constants. Earlier studies, such as Torshizian (2018), suggest the impact of policies/investments decrease as the factors of living space improve.

In the case of a responsive housing supply, the number of dwellings by 2050 should provide for the projected number of households. This is based on the projected population and the size of households by 2050. Goodyear & Stats NZ (2020) described the changes in households and housing in New Zealand using Stats NZ data. Based on Stats NZ projections, the household size is expected to decrease from 2.6 in 2013 to 2.5 in 2038. We assumed that the household size will remain at 2.5 by 2050.

Our review of the literature suggests that the available information on the impact of RM system on the housing market is limited. Further analysis of the impact of the RMA and environmental regulations (and their interactions with other factors of housing supply) will be required.

5.5 Business Impacts

Our estimation is based on the contribution of the reforms to the shift towards an elastic housing supply regime. To achieve this, we have captured the impact of improved outcomes as a result of a more transparent and permissive resource consent system. In this analysis, we do not account for the benefits from improved outcomes for businesses.

However, we note, in a parallel study to this analysis, Principal Economics estimated the impact of an elastic housing supply on the rest of the economy. That analysis relies on an earlier study by Nunns (2019) which estimates that a comprehensive removal of the housing supply constraint in New Zealand leads to an increase in per worker output by 0.8%. Principal Economics used that estimate as an input to their Computational General Equilibrium (CGE) model. Their estimate suggest that the increased labour productivity leads to a lower cost of production across different sectors of the economy and is associated with a minimum of $1.1 billion annual economic gains for the New Zealand economy. The impact of RM reforms on this potential gain depends on its contribution to achieving an elastic housing supply. This is in addition to any gains to businesses themselves from lower consenting costs.

A further potential impact of the RMA is on competition. A recent Commerce Commission report discusses how the RMA regulations may lead to increased costs for retailers to develop new stores. This leads to uncompetitive outcomes in the grocery retail sector and inefficient economic outcomes. The report also refers to the potential anticompetitive behaviour of other grocery stores that may seek to influence resource consent processes to restrict development of a new competing supermarket. They noted that the RMA was amended in 2009 to limit trade competitors' use of the objection process under the RMA and that the amendments have limited the circumstances under which supermarket operators can oppose store developments by their competitors. However, they note there may still be barriers (in terms of time and cost) created by the resource consent process in relation to supermarket development. The reforms may be able to improve the outcomes by further reducing barriers in the resource consent process and explicitly addressing the potential for anti-competitive behaviour.

5.6 Environmental Impacts of Urban Intensification

There are potential environmental impacts of urban intensification, assuming that is the outcome of regulatory liberalisation. However, the impacts need to be carefully compared with the counterfactual of potential greater urban sprawl. Impacts discussed below include loss of urban trees, air pollution, noise and discharges to water.

5.6.1 Urban Trees

Following the removal of blanket tree protection rules in the RMA that change in 2012,[247] there have been concerns about the effects on urban tree cover.[248]

There have been some studies of urban tree loss, e.g. an analysis of the Waitemata Local Board area (Auckland) found a 17% loss of tree cover over the ten years to 2016, although the authors suggested the net impact was less than this as they did not measure the incremental increases in the canopy size of the trees not cut down.[249] The reason for the loss was largely the increasing intensification of private land for housing and other uses. A more recent study assessed the changes in data collected between 2016 and 2018 compared with 2013.[250] The study for the 16 central, urban local boards in Auckland, found changes in canopy cover in individual local board areas ranging between 5% losses and 9% gains, but no detectable change in aggregate tree canopy cover for the whole area.[251] The authors noted that to fully understand the trends, a longer time series will have to be developed.

Auckland Council has established an Urban Forest Strategy that aims to increase urban tree canopy cover across the urban area.[252] It includes objectives of greater protection of trees on public land and community engagement to encourage private landowners to increase tree cover on private land.

The impacts of intensification on urban trees is this not clear. Depending on the accompanying management strategies and their implementation, levels of tree cover might be maintained or enhanced.

5.6.2 Noise

Noise disturbance or impacts in urban areas might increase in more intensive developments because of greater exposure, ie if people are living closer to each other there is a greater chance of being close to a noise-making activity. Above certain thresholds, noise exposure may lead to annoyance, sleep disturbance, and potential health effects for residents.[253] This might be balanced by some overall reduction in transport activity if people are able to shift to alternative modes, and some studies have found a reduction in noise with intensification.[254]

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[247] Resource Management (Simplifying and Streamlining) Amendment Act 2009. See: MfE (2013)
[248] For example, the Tree Council's 'Stop the Chop' campaign (https://treecouncil.org.nz/)
[249] Lawrence *et al* (2018)
[250] Golubiewski *et al* (2021)
[251] A slight increase (0.6% of 2013 canopy) in tree canopy cover was detected across all the urban local boards, but this was considered to be within the margin of error in the study.
[252] Auckland Council (2019)
[253] Salomons and Pont (2012)
[254] Salomons and Pont (2012)

Noise impacts may be capitalised into property prices.[255] On the basis of a review of the international literature, Waka Kotahi NZ Transport Agency suggests a reasonable figure for New Zealand is a 1.2% reduction in property value per dB of noise increase.[256] They suggest using an average house value "since there is no reason to suppose that noise is less annoying to those in areas with low house prices": $7680 per dB per property and $2740 per dB per resident affected (which means $495 per household or $177 per person per year).

While the impacts of higher noise levels on property value are reasonably well understood, the literature does not provide a strong basis for estimating the impacts of new development or intensification on noise levels.

5.6.3 Air Quality

Impacts of poor air quality include acute and chronic effects. Acute effects may increase from greater concentrations of people in urban areas, eg if intensive living is in busy transport corridors. However, air pollution effects are dominated by chronic impacts and total levels of exposure for the whole population might not change and might fall if intensification results in transport mode changes.

5.6.4 Water Discharges

Discharges to water are a concern when there are adverse impacts on discharges to the environment, eg wastewater discharge to streams, rivers or the sea. However, as with other issues discussed above, intensification may be associated with improvements in these impacts if intensification is accompanied by investments in water infrastructure. And we note the current proposals for major investments in three waters infrastructure across the country, as discussed in earlier sections.

5.6.5 Loss of Heritage

The protection of historic heritage from inappropriate subdivision, use and development is a matter of national importance under s6(f) of the RMA. The removal of barriers to development risks the loss of heritage buildings. Arguably, property owners, acting in their own interests, would conserve too little historic heritage.[257] This is because historic heritage has external benefits (positive externalities) for other houses in a neighbourhood. Nunns et al (2015), for example, found localised positive externalities from the proximity to old (pre-1940) buildings in Auckland using a hedonic pricing analysis of property prices. All other things equal, houses are expected to have greater value if they are surrounded by heritage houses, although the literature is inconclusive on causality.

Even if heritage houses have greater value themselves, an individual property owner may benefit from developing a piece of land with a heritage house or other building into a more intensive land use. By doing so, it increases the value of the individual site, reduces the value of other houses around it (because of the marginal reduction in the neighbourhood

[255] MRCagney et al (2016)
[256] Waka Kotahi NZ Transport Agency (2020)
[257] Bogaards (2008)

heritage value), while also having positive spill-over benefits for housing affordability by adding more to housing supply than the existing house.

This conflict between heritage housing and housing supply in areas close to the inner city in both Auckland and Wellington is an issue that is already raising local concerns. Loss of heritage buildings is irreversible, so the implications need to be considered carefully, in the same way as loss of natural heritage.

5.7 Summary

We have examined the potential costs and benefits of RM reforms on the housing market by making a starting assumption that they will result in a regime in which many barriers to development would be removed and that this would be expressed as an increase in the elasticity of response to housing demand. This is the same approach as used in recent analyses of the NPS-UD. It is unclear at this stage whether the reforms would be beyond those in the NPS-UD and our analysis, to some extent uses the same assumptions, although we also assess benefits in the form of increases in producer surplus, ie benefits for developers in addition to consumers (households).

We estimate total net annual benefits of increased affordability of $146 to $832 million.[258] This results in a PV of $2.2 billion to $12.8 billion over 30 years at 5%.

Obtaining the maximum benefits assumes the reforms maximise transparency, in the sense that RM system users have a much greater awareness of what consent applications will be successful and under what conditions, and councils are clear and consistent in the use of urban boundaries. In addition, we assume national direction provides clarity around interactions with other legislation and inconsistencies are removed.

We have examined whether there would be offsetting reductions in environmental quality resulting from the intensification of development. The analysis suggests this is uncertain. However, given the high-level nature of this analysis, we have not examined all the externalities that may result. This includes potential aesthetic impacts (which may be in either direction depending on the quality of design) and agglomeration benefits.

[258] This is net of the costs of congestion

6 Māori Participation

As alluded to above, the problems associated with Māori and the RM system identified by the Panel are essentially two-fold in nature. Firstly, at a 'governance' level, there is insufficient involvement of Māori in RM decision-making. Secondly, Māori do not interact with the system as much as could be expected. This lack of interaction is as much a capacity issue as anything; limited resources need to be allocated across multiple (often competing) issues faced by Māori and some priority ordering is needed. A consequence of the limited capacity is that Māori might miss opportunities or face costs around resource management that could and should be remedied through change. There is a Treaty of Waitangi overlay to both elements.

In this section we outline what enhanced Māori participation would mean from a practical perspective, before highlighting a conceptual framework (and relevant dimensions) for establishing wider economic benefits of such participation. The outline of a 'net benefit' assessment approach concludes the section.

6.1 Treaty principles and Te Ao Māori

For the purposes of the NBA, the definition of *Te Oranga o te Taiao* incorporates the:

- health of the natural environment;
- intrinsic relationship between iwi and hapū, and te Taiao;
- interconnectedness of the natural environment; and the
- essential relationship between the health of the natural environment and its capacity to sustain all life

The requirement to give effect to *Te Tiriti* will be realised in the new system through mechanisms like participatory rights in preparing NBA plans and RSSs, and the expectation that iwi management plans are used in the preparation of NBA plans. That is not to say that these mechanisms and expectations are instantaneously operable. Transitioning from one form of governance to another entails a period of transition and 'discovery' process as often the precise outcomes of the altered form of governance are not know with certainty.

Nevertheless, the Panel's clear intention was that decision-making is expected to be consistent with the principles of *Te Tiriti*. This is similar in direction to the final advice on emissions budgets from the Climate Change Commission (CCC), which states: [259]

> *Central and local government must ensure emissions reduction plans comply with the Treaty and do not compound historic grievances and further disadvantage Iwi/Māori. Climate action that does not support Iwi/Māori to exercise rangatiratanga, kaitiakitanga and mana motuhake over their whenua, and other cultural assets will exacerbate inequity for Iwi/Māori.*

We note the focus on equity in the CCC's advice, which is useful in the context of RM reform, especially as it pertains to land use. There appears to be a desire for policy not to worsen existing hindrances for Iwi/Māori, and potentially to improve the situation by reversing inequities. There are two distinct issues looking to be addressed in relation to

[259] Climate Change Commission (2021), p325

existing barriers faced by Iwi/Māori. The first issue relates to a stifling of Māori economic development stemming from inequities, while the second issue is the lack of propagation of customary or cultural values as a result of insufficient attention being given to Te Ao Māori principles and perspectives. Bothe of the issues need addressing to ensure that adverse impacts on Iwi/Māori wellbeing from policy change do not further entrench or exacerbate inequity:[260]

> *In working towards equitable partnerships with Iwi/Māori, it is important that government understands te ao Māori values and perspectives regarding taonga tuku iho and whenua, including land-use decision-making.*

That kind of 'partnership approach' is consistent with the recommendations of the Panel and the resulting implementation principles for the NBA, which look to recognise and provide for the:[261]

- application, in relation to te taiao, of kawa, tikanga (including kaitiakitanga) and mātauranga Māori; and

- authority and responsibility of each iwi and hapū to protect and sustain the health and well-being of te taiao.

We note that these goals, while perhaps less strongly, are already expressed in the current Act. Thus, one interpretation of the proposed changes is that they are designed to remedy existing failures in the system. In other words, the changes are about making sure that the system and the players within that system better do what they are currently supposed to do.

The economic effects of such changes for Māori can broadly be summarised as the reduced need to expend their resources looking to:

- reduce inequity/inequality, including the 'discovery costs' associated with identifying inequity/inequality;
- achieve adequate participation;
- protect rights, values and interests;
- ensure their voice is heard around government tables; and
- have cultural identity expressed in a coherent and consistent manner

These effects also 'spillover' to other parties involved in resource management decisions, such as local authorities, developers and legal and other experts, who may also face lower resource needs as a result of greater upfront Māori involvement.

6.2 How are Māori cultural values relevant to policy analysis?

As described earlier, policy decisions are informed by consideration of costs and benefits. Ideally such costs and benefits are expressed in economic terms (ie the extent to which economic welfare or wellbeing is affected). Therefore, impacts from Māori participation *in* and *with* the RM system are most useful if they have economic meaning. That is not to say

[260] Climate Change Commission (2021), p326
[261] New Zealand Government (2021)

that impacts that are not able to be expressed in economic terms have no meaning, only that the apparatus of policy assessment is set up to recognise economic effects more readily.

The notion that culture has economic value is not novel.[262] The challenge has been the extent to which social and cultural benefits can be incorporated in empirical research and practice. The main barrier to incorporation is that culture is a complex construct that embodies many issues including definition, classification and measurement.[263] Further, the prospect of placing monetary values on culture has been met with some reluctance.[264]

Notwithstanding such challenges, the move towards valuing culture is well underway. However, the focus has been on culture more generally (ie including arts and heritage) and the concept of cultural capital, rather than Māori cultural values or traditional attributes.

Miller et al (2015) claim that a significant factor motivating such a move towards inclusion is that omitting cultural values misrepresents the actual economic effect of proposed policy changes (ie the analysis and welfare implications may be incomplete or biased). Thus, there is a case for inclusion of cultural values in welfare analyses such as this one for RM reform. Indeed, some previous studies have considered diverse environmental, economic and social attributes of freshwater resources that included attributes that could be considered to overlap with Māori concepts, but did not explicitly consider the value for a traditional Māori cultural attribute.

Notwithstanding the heterogeneity of Māori and their underlying attitudes, it has been established that cultural identity (aligned with traditional values/principles) is capable of being expressed in economic terms. Moreover, respect for Māori values, including for land/natural resources, is rational and consistent within a traditional Māori system, even if they incur personal financial cost.[265] In line with so-called identity economics, strong traditional Māori allegiances and traditional Māori values may override the desire for personal pecuniary benefit.

In other words, the aspiration of a Māori identity, expressed through values, principles and traditions has value to people, even if there is no direct benefit and the potential for costs. Therefore, to the extent that such cultural values are impacting on resource allocation decisions in some way, they should be included in economic analysis[266] or practical management.[267]

In the RM realm, kaitiakitanga has been given such prominence that it is defined in the interpretation section of the Act. For this reason, some focus is placed on this particular dimension. However, our approach is to use insights from the spectrum of Māori cultural identity and values (eg Manaakitanga, Whanaungatanga, Kotahitanga, and others such as Tikanga) to inform estimates of value in assessments of the (economic) welfare effects of proposed legislative and regulatory change.

[262] Throsby (2014)
[263] Miller et al (2015)
[264] Awatere (2005)
[265] Houkamau and Sibley (2019)
[266] Throsby (2001)
[267] Klain et al (2014)

6.3 Approaching a 'net benefit' assessment

Having established that cultural values have a place in economic analysis associated with policy decisions, but that their inclusion is not straightforward, the question now becomes how to do it for the NBA? Our proposed approach is based on three key elements:

- altered direct impacts (costs and benefits) through rectification of current problems;
- expression of cultural identity through strengthening role of traditional Māori attributes and principles; and
- higher levels of trust as a result of the 'partnership' approach from enhanced recognition of Te Tiriti.

We acknowledge that identity may be best expressed in traditional (cultural) forms whereas trust, inequality and voice are related to systemic and structural issues, which may need significant change, which takes time. We group the elements as a means of simplifying the analysis.

In basic form the net benefit estimation equation is:

$$NB = \Delta Imp + CI + T$$

where:

NB = net benefit (to Māori and non-Māori)
ΔImp = change in direct impacts
CI = expression of cultural identity
T = trust levels

Table 35 provides more detail on the potential impacts of the NBA as they relate to Māori, and how they might be estimated.[268] The inputs include two New Zealand-based papers that calculated values of Māori cultural attributes for freshwater (Miller *et al* 2015) and performance of kapa haka (Meade 2021). The former used choice experiments as the estimation method, while Meade used econometric and travel cost methods. In the case of the Miller et al paper, values for non-Māori were also calculated.

These papers are valuable data points from which to extrapolate to wider expression of culture and identity. We also look to adapt other relevant sources of information, including published accounts of the nature, length and costs of disputes around resource consent conditions. Finally, we draw on values of compliance, volunteering/civic engagement, as well as academic contributions, to construct an initial value of the enhanced trust element.

[268] The focus in this section is the impact on Māori. Other effects, for instance on lowered costs for local authorities in consents processing are included in the efficiency impacts chapter earlier in the so to avoid double-counting they do not feature in this section.

Table 35 Taxonomy of potential impacts[269]

Element	Content	Manifestation	Estimation source
Direct impact change	Fewer disputes where RM decisions clash with Māori views and values	Avoided costs of disputes, occupations, and protests	Public records of costs awarded in cases such as Ihumatao, Kennedy Point Marina and other disputes; dialogue with Iwi and Hapu with experience
	Gain to Māori from better resource allocation decisions	Surplus generated due to Māori having higher WTP for altered outcomes	Adaptation of Meade (2021)
Cultural identity expression	Infusion of Māori principles, attributes, and views into RM system	Enhanced welfare from being able to protect and promulgate Māori culture and practice and greater value of Te Ao Māori	Miller et al (2015) and Meade (2021)
Trust	Treaty of Waitangi prominence gives rise to 'partnership approach'	Greater level of trust, inclusivity and equity as well as better information for decision-making	Adaptation of Knack (2001) and Treasury CBAx tool

The essence of our approach is the use of price-quantity pairs, commonly used in the construction of supply and demand curves. That is, for each of the elements above, we multiply the estimated price by the estimated quantity to determine what the impact is likely to be. This requires the specification of units and the relevant formulation of price/cost.

For example, in the case of avoided dispute costs, disputes around contravention of Māori views, values or principles are the relevant unit (implicitly linked to resource consents). If the average 'price' faced by Māori of a disputed resource consent is $150,000 and the average number of Māori-related disputes is ten a year, then in theory that gives us an upper-bound estimate of the expected avoided costs of $1.5 million per year.

However, this estimate relies on the assumption that the NBA would eliminate Māori-related RM disputes completely, and that there is no loss of welfare by the party who was the subject of the dispute (eg they can be adequately compensated for any loss of opportunity that comes from resolving the dispute). These are strong assumptions, but may be necessary in the absence of suitable data. Of course, across all of the estimation exercises, sensitivity analysis will be undertaken and results presented as a range rather than point estimate.

More generally, consideration will also need to be given to whether the policy change would give rise to offsetting or harmful effects on others (ie what would have happened in the absence of such change?). While Māori might not have to expend resources to get acceptance of values, principles and Te Ao Māori views recognised, others, mainly Councils, presumably would. There may be a reasonably fine balance to be struck. To the extent that Councils currently expend resources to resist the call for inclusion of Māori perspectives and values, then those costs would be avoided. Hence, at least in theory, a locus of gain

[269] We do not attempt to identify the timeframe over which the impacts will fully manifest. The estimated impacts are best thought of as 'steady state' in nature, acknowledging that behaviour changes can arise before legislative change is enacted, as people's expectations change.

might exist if the avoided costs to Council (and Māori) are greater than any additional burden on them from the need to factor Māori views into their decision-making.

In summary, we have the rudiments of an approach to estimating wider impacts of enhanced Māori participation in the RM system, based on three key elements. A full picture is not available in terms of relevant units and quantities, but the foundations are in place. If suitable values remain elusive or cannot be manufactured, assumptions will be necessary.

Similarly, whether there is sufficient information to support a notion of greater Māori loss aversion (and hence asymmetric effects around wellbeing as a result of altered decisions due to the NBA), it may not be possible to land on a value for the 'surplus' component of the direct impact change element.

In addition, the profile of impacts would also require some assumptions around the degree to which costs and benefits are enduring, one-off in nature, or 'lumpy' then approach a steady state. At this stage, an assumption of constant/enduring impacts seems reasonable.

6.4 Indicative Values

This section sets out what we consider to be plausible 'price-quantity pairs' for the three categories of wider potential benefits described above. To arrive at a net position, we subtract likely offsetting effects, to the extent possible.

In line with the title of this sub-section, we reiterate the indicative nature of the impact estimates that follow. We are using the *best available* information to calculate impacts, not the most relevant or perfect set of information. For the categories of impact we identify, there is no such set of values or information around what might constitute an ideal basis on which to derive estimates of impact.

Thus, we have to infer or extrapolate from available information on the basis of what seems plausible rather than best. Necessarily, this process gives rise to questions of relevance and appropriate adaptation (eg where values calculated in respect of one area of activity or expression of worth are applied in a separate area). This is unfortunate, but also unavoidable, given the novel nature of the estimation undertaken and the paucity of data and evidence for the type of impact categories we identified.

Our preference is to err on the side of 'plausible estimation' rather than not attempt the calculation process at all. That is, having identified conceivable impact categories, some attempt at quantification and monetisation is favoured over a purely qualitative treatment.

We are not saying that values calculated for one area of importance to Māori can be directly and completely equated to (unknown and missing) values in other areas. What we are saying is that it is plausible that the values used go at least some way to expressing value in ways that have not been attempted before.

6.4.1 Impacts from direct change

The transmission mechanisms for proposed changes to contribute to wider impacts are avoided costs, and increased surpluses. In the case of the former, the first question to ask is

what the relevant cost components might be. The list below provides a summary of possibilities.

- Admin and procedural costs (lawyers, police monitoring/enforcement, and government involvement)
- Holding costs
- Other opportunity costs (of occupation and the like)
- Clean-up, remediation costs

Data on the exact number, duration and nature of disputes is limited. At the highest level, cases before the Courts (Environment and High Court) are reported annually,[270] then at a lower level there are disputes around local authorities and other regulatory bodies granting approvals for projects and resource takes. There is no single source of data for those disputes, and there is likely to be additional disputes that are not publicised or are settled between the parties themselves. Therefore, we rely on assumption and extrapolation to generate plausible estimates of impact.

A list of relatively recent (and higher profile) disputes is shown in the table below. This list, gleaned from published news reports, provides the basis for the calculation process.

Dispute location	Subject matter	Iwi/Māori role
Kennedy Point, Waiheke Island, Auckland	Opposition to proposed marina development	At forefront of occupation, lasting months
Ihumatao, Mangere, Auckland	Opposition to proposed building development	Occupation of land proposed for development
Dome Valley, North of Auckland	Opposition to planned landfill site	Challenge to consents issued, on the basis of potential pollution and contamination
West Coast Lakes, South island	Proposal for rules in District Plan to stop jetboating on certain rivers	Attempt to ensure the ability to exercise kaitiakitanga, and tino rangatiratanga over the resources
Miramar, Shelly Bay, Wellington	Opposition to proposed building development	Occupation of land proposed for development
Gore, South Island	Opposition to construction of bridge and cycleway	Plea for District Council to give effect to responsibilities around consultation through a better relationship with the local runanga

Our approach is to assume that, as a central case, the publicly reported disputes represent half of the total relevant disputes, on an annual basis. That is, there would be 12 relevant disputes a year.[271] We also consider scenarios where the publicly reported disputes represent a third and two-thirds of total disputes (a range of 9-18 relevant disputes annually).

Reports on the Kennedy Point marina occupation indicated that the Court would consider the issue of costs for the developer (successful party) of $250,000. The exact composition of such costs was not reported, but it seems reasonable to assume that this amount

[270] In the case of freshwater management, 17 cases have been identified as being pivotal to understanding the Māori voice under the RMA. See Ruru (2009).
[271] We acknowledge that the Ihumatou occupation was longer than a year.

represents legal and administration costs only (i.e. commercial and opportunity costs are not included).

Assuming other costs are half the Court-considered costs suggests that costs for one party total $375,000. In addition, we can reasonably assume that the costs would be the same for the opposing party. While legal costs might be lower, opportunity costs would likely be higher, given the number of people involved and the length of time of the dispute. Thus, an approximation of costs for this dispute is $750,000.

We use a two-tier approach, in that disputes of some scale and/or duration are 'tier 1' and therefore involve costs of $750,000 apply this cost to those disputes. Lower-level disputes are considered 'tier 2' in nature, incurring only half of the costs of 'tier 1' disputes. As a result, estimated avoidable dispute costs are around **$3.4 million** per year in the central case, with a range of around **$2.5 million to $5 million** annually.

There is a similar paucity of data that would allow a precise estimate of the potential benefit (to Māori) resulting from an increase in the consumer surplus due to Māori having greater willingness-to-pay for better resource allocation decisions.

To make such an estimation, we require the share of resource allocation (consents) where iwi/Māori perspectives matter, but are not currently accounted for, the value of such consents, and the degree to which iwi/Māori preferences differ from the alternative(i.e. a differential in willingness-to-pay between Māori and non-Māori).[272]This data is not readily available, and may not be in the future.

A speculative impact estimate is possible by applying what a recent study has revealed in relation to the difference between Māori consumer surplus and the 'benchmark' figure recommended by the Ministry of Business, Innovation and Employment for use in measuring economic impacts from events. The benchmark figure is 20 per cent of the ticket sales and entry fees, which is a measure of demand.[273]

However, Meade (2021) finds that the estimated consumer surplus for a specific Māori event (Te Matatini, the national kapa haka festival) is orders of magnitude (i.e. around 20-25 times) higher than the value when applying this benchmark figure. Such an observation could reflect willingness-to-pay for Māori versus non-Māori. However, at this stage, it is not clear how and what to apply this consumer surplus/willingness-to-pay difference to, so a value estimate could be generated.

6.4.2 Impacts from expression of cultural identity

For this impact category we use derived willingness-to-pay (WTP) values for Māori cultural attributes from Miller et al (2015) and Meade (2021) and estimated relevant populations to quantify potential benefits from expression of cultural identity. We caution again, that this

[272] It is this differential that gives rise to benefits that would not otherwise have occurred. In the absence of such a differential, there is no additional benefit as any gain to Māori from greater participation is offset by the loss to non-Māori (i.e. a transfer).

[273] We acknowledge that RM decisions and related outcomes are not the same as events, but the general principle of measuring economic benefits as additional consumer surplus is consistent with microeconomic theory, and 20 per cent seems reasonable as an approximation.

estimation process and associated expression of cultural does not claim to be ideal, complete or assumes primacy relative to other possibilities. The estimation process does, however, represent a plausible estimate using the *best (only) available* information.

Miller et al (2015) calculate that Māori are willing to pay $40 per year for a specific cultural attribute associated with freshwater, namely mahinga kai. This value is separate from other recreational, social and environmental attributes of freshwater. Importantly, the authors also generate a WTP value of $28 per year for the general public to enhance Māori cultural attributes. In their view, this fining provides support for management outcomes for cultural attributes, which is valued not only by those who directly participate in this use. The calculations that follow have not accounted for any possible (offsetting) impact that might arise from inclusion of mahinga kai values in the National Policy Statement for Freshwater Management 2020. That is, like other elements of this estimation process, we assume (for the purposes of simplicity) that there any changes around the impact categories do not otherwise eventuate.

Meade (2021) derives values of between $1,400 and $1,800 for the WTP of visitor groups for access to Te Matatini, the national kapa haka festivals, which he suggests is equivalent to consumer surplus. Kapa haka performance is seen as one way to express Māori culture, though the author accepts that access to Te Matatini is only one aspect of the value of kapa haka to Māori as a cultural expression. We stress again that use of these particular values is a second-best option, given the lack of other estimated values for Māori cultural expression.

We use the midpoint of these values as a central case. For ease of comparison with the values identified by Miller *et al* (2015), we use individuals as the unit of analysis by dividing the group estimate by ten, ie a range of $140 to $180 per person, with an average of $160. Meade (2021) suggests that the emphasis on groups is due to the travel patterns of people attending Te Matatini, as well as the importance placed on extended family (whanau) by Māori.[274]

The 'quantity' component of the price-quantity pair for this benefit category is based on population estimates in 2020. Specifically, we use official figures on the usually resident population in 2020 aged 18 years and over. This age cohort, while essentially arbitrary, was our attempt to reflect the ability to pay as much as the willingness to pay. The Māori usually resident population aged 18 years and over in 2020 was 545,700. [275] Total usually resident population aged 18 years and over in 2020, 3,953,200.[276]

Using these population numbers and the values from Miller at el (2015) suggests a total central case WTP for a Māori cultural attribute of around $117 million per year. This figure is made up of around $22 million for Māori[277] and around $95 million for non-Māori.[278]

[274] We note that the range of estimated WTP figures of $40-$160 per year implied by the two studies is considerably lower than the estimate contained in Treasury's CBAx model. Treasury suggests that a one point change (in a four point scale) in being able to express cultural identity is worth $9,509 per year. The relevant population is Housing New Zealand tenants in that instance.
[275] http://infoshare.stats.govt.nz/infoshare/ViewTable.aspx?pxID=5134bc93-1025-4a41-8fd3-882f03f33643
[276] http://infoshare.stats.govt.nz/infoshare/ViewTable.aspx?pxID=119d6480-e766-4d5e-92fa-a981aa15eb7a
[277] $40 per year × 545,700
[278] $28 per year multiplied by 3,407,500, which is the total estimated population aged 18 years and over of 3,953,200 less the Māori population equivalent.

Using the same calculation basis, the Meade (2021) values suggest a central case WTP benefit of around $469 million per year for the expression of a Māori cultural attribute through the proposed reforms. This is comprised of around $87 million for Māori[279] and around $382 million for non-Māori.[280]

The estimated central case WTP benefits of $117 million to $469 million per year is a relatively wide range. Alternative scenarios will broaden even further the estimated range, though this is probably apt in such a data-poor exercise as this.

For the lower bound scenario, we assume that only 50 per cent of the relevant non-Māori population is willing to pay the estimated WTP, while in the upper-bound scenario we assume that the WTP is the highest value estimated by Meade.[281] This process generates a range of around $70 million to $528 million per annum.

6.4.3 Impacts from Te Tiriti prominence

The general idea here is that by giving more prominence to Te Tiriti, RM reforms contribute to beneficial gains in levels of trust, which in turn leads to enhanced inclusivity and consequently economic performance. A positive relationship between trust and economic performance has been posited for almost 30 years.[282]

In the New Zealand context, work done by Treasury on the 'Inclusive Economy' found: "…economic growth generally increases opportunities for active participation in the economy and in social relationships through the labour market while, at the same time, better social networks and the trust built up through economic transactions are positive for further economic growth." The potential for negative or offsetting interactions is also acknowledged, through for instance, structural change, loss of jobs and increased social tension.[283] Thus, again there is something of a balance to be struck.

More recently, the notion of trust having positive economic (and other) effects has led to the rise in prominence of so-called well-being analysis.

Empirical work has focussed mainly on national-level economic performance (ie cross-country growth comparisons), which makes direct comparisons with the other impact categories problematic (i.e. there is an additivity issue across the three impact categories). Nevertheless, the basic mechanisms at play, of 'good governance' and civic and other participation as a result of greater levels of trust lead to positive economic and well-being outcomes are sound.

According to Knack (2001), so-called 'high-radius trust' (trust in strangers) in particular, is positively and significantly related to better economic performance and well-being and

[279] $160 × 545,700
[280] $112 (= $160 × 0.7, assuming the same proportionality between Māori and on-Māori found by Miller et al), multiplied by 3,407,500 which is the total estimated population aged 18 years and over of 3,953,200 less the Māori population equivalent.
[281] WTP of $180 rather than the midpoint of $160 for Māori and $126 for non-Māori, representing the same proportion as previously
[282] Knack (2001)
[283] Treasury (2001), p.7.

efforts to bring about change through reform in terms of high-radius trust are of major interest to researchers. On the other hand, so-called 'low-radius trust' (trust *within* a group) is negatively associated with national economic performance and well-being, though it may of course improve the welfare of members of the group).

Adapting observations from this branch of empirical work to the situation at hand in a quantitative and monetised is not straightforward. Nevertheless, such beneficial impacts are at least plausible and useful in considering what the wider economic impacts of the proposed reforms, as they relate to Māori participation.

6.5 Summary and Caveats in the analysis

In this section we have attempted to value the benefits of increased Māori participation in monetary terms. This has used a mix of reductions in costs, eg for disputes and occupations, and WTP for better processes and outcomes amongst Māori and others. Table 36 summarises the estimates of benefits. The benefits that we have speculatively quantified add to a total of $120 to $474 million per annum. This would add to a present value of $1.8 to $7.2 billion over 30 years at 5%.

Table 36 Potential net benefits of greater Māori participation

Element	Description	Estimated benefit ($ per annum)
Direct impact change	Avoided costs of disputes, occupations, and protests	$3.4 million (in range of $2.5 - $5 million)
	Surplus generated due to Māori having higher WTP for altered outcomes	ND
Cultural identity expression	Enhanced welfare from being able to protect and promulgate Māori culture and practice	$117 - $469 million
Trust	Greater level of trust, inclusivity and equity as well as better information for decision-making	ND
Total	Quantified benefits only	$120 - $474 million

The analysis in this section is novel in nature, based on limited available data and information. As such, it is somewhat speculative, and caution should be exercised in relying on the precision of the estimates presented. The estimated values are best described as indicative approximations.

Other than the general caveat above, there are other limitations. In particular, the analysis:

- is desk-based in nature, as we have not yet had a chance to validate the concepts and resulting estimates with iwi/Māori;
- assumes rather than proves full attribution and is not able to fully articulate possible offsets from existing actions that might no longer be required (in other words, it compares a perfectly functioning reform environment with an imperfect status quo);
- applies, in a somewhat blunt fashion, values across cultural attributes that differ in nature;

- treats all estimated impacts as additional, when some may be achievable under existing legislation.

Notwithstanding these caveats, the estimates are based on mechanisms that are plausible, and extend somewhat the domain in which assessments of impact for RM-related reform take place. On that basis, they provide a basis to work from, rather than 'the final word' on such impact analysis.

7 Conclusions

7.1 Summary

This report has analysed the expected costs and benefits of proposed reforms to the RM system. To do so it has had to make assumptions about the expected impacts because much of the detail is still to be developed, and the benefits of the reforms will depend on the physical outcomes that result.

We have focussed more on understanding the nature of costs and benefits under the different domains and how these are expected to change at the margin. To make this more tangible, we have made some assumptions about how the reforms might change practical outcomes. These are both speculative and somewhat hypothetical, but are made in the absence of additional and necessary information for a full CBA. We make this clear in the analysis. Often these are based on assumptions and do not represent Government policy.

7.1.1 System Efficiency

There are expected to be net cost reductions for RM system users, including business and householders. This includes annual net process cost reductions for users of $149 million in addition to average process cost reductions of $83 million, balanced by expected increases in net costs for central and local government. In aggregate there are expected to be annual cost reductions of approximately $168 million or close to $2.6 billion as a present value (PV) over 30 years (Table 9).

Table 37 Summary of expected changes in net process and compliance costs

Party	Net Process Cost change	Compliance costs	Total	PV
Central government	$19		$19	$292
Local government	$43		$43	$661
Users	-$149	-$83	-$232	-$3,573
Total	-$85	-$83	-$168	-$2,589

PV = 30 years @ 5%

There are expected additional benefits to users from changes to approaches to resource allocation and from the wider use of economic instruments.

Changes to resource allocation will enable resources, including water, to be allocated to the users that most value the resource. We are unable to quantify these net benefits as it depends partly on the extent to which gains have already been made in Canterbury through limited water permit trading.

Greater use of economic instruments is expected to yield benefits from increased flexibility in compliance. For example, in reducing emissions of a pollutant, this would include changes in who makes emission reductions, when and by what method. Research suggests there are significant potential cost savings available from wider use of EIs.

7.1.2 Natural Environment

Freshwater environments

Many of New Zealand's native freshwater fish species and ecosystems are under threat. Freshwater quality has deteriorated in New Zealand from factors that include run-off or leaching of nitrogen, phosphorus, sediment and pathogens (particularly *E coli*). Changes to the physical form of waterbodies and their flows can make places unsuitable for some species to live, while climate change is expected to exacerbate the pressures currently facing our freshwater species and ecosystems.

Current national direction includes the National Policy Statement for Freshwater Management (NPS-FM), the National Environmental Standards for Freshwater (NES-FW) and Section 360 stock exclusion regulations. In combination these constitute the Essential Freshwater (EFW) programme. It follows an approach similar to that envisaged under the reforms; it is led by central government to produce national direction, and involved extensive consultation with a wide range of stakeholders resulting in significant changes to take account of sectoral concerns.

To analyse the potential effects of the reforms, we assume there is greater national input to the timing of response such that implementation is brought forward. As an example, bringing forward the changes by ten years would be expected to produce annual net benefits of $6 million; the PV over 30 years at 5% is $92 million.

Coastal and Estuarine Environments

An estimated 30% of New Zealand's biodiversity is in the sea but many species are at risk. In addition, there are problems with water quality in many locations close to towns and cities, with impacts on recreational use and ecosystems. aquaculture permits have been fixed in space and duration, which has limited their value compared with a mopre flexible system of permitting.

National direction is provided currently via the New Zealand Coastal Policy Statement (NZCPS); it covers the coastal marine area (CMA) but not the wider coastal environment that affects the CMA. It is expected that revised national direction will take a more integrated approach that includes the whole environment affecting the marine area.

For analysis, we have assumed that the reforms will lead to greater integration of planning and controls on this wider area, with potential improvements in marine water quality. In addition, we have examined the potential net benefits of greater national direction leading to increases in marine protected areas (MPAs)[284] and more flexibility in aquaculture permits.

- A significant increase in MPAs is widely proposed internationally and by New Zealand scientists. They have costs to existing users of marine space, including commercial and recreational fishers, who are expected to have increased costs for fishing elsewhere. This would be balanced by the improvements in marine

[284] This is consistent with assumptions in biodiversity protection that national direction will include steps towards the Global Deal for Nature target of 30% of land and sea areas being protected.

biodiversity in the MPAs, potential for more high value recreation (eg diving), existence benefits and potential positive spillovers to fished areas.

- Flexible aquaculture permits would provide greater scope for changes in location, however the net benefits are highly uncertain and would need to be further researched in New Zealand.

- Improvements in marine water quality are expected to be high cost and may be driven significantly by changes already underway as part of the widescale three waters reforms, but improvements in water quality are expected to yield positive net benefits.

Air Quality

Air quality problems include human health effects, reduced visibility and discolouration of air, and nuisance and amenity effects, including dust, smoke, materials damage and odour.

Currently national direction consists of the National Environmental Standards for Air Quality (NES-AQ). These were originally introduced in 2004, amended in 2011, with further amendments proposed in 2019.

The impacts of the reforms on air quality are uncertain. However, we assume that the reforms would result in tighter air quality standards and potentially in the introduction of national level instruments, including economic instruments.

For analysis of the costs and benefits we have assessed existing CBAs of air quality standards and policies. These suggest significant positive net benefits from improvements, although this depends on the policy instruments adopted. Air quality may be a domain where economic instruments could be used to yield net benefits at least cost.

Soils

Environmental issues that are affected by the quality of soil resources include:

- Impacts on the ecosystem services that rely on soil quality;
- Hazardous substances and contaminated sites; and
- Loss of highly productive soils.

Currently national direction includes the National Environmental Standard for assessing and managing contaminants in soil to protect human health (NES-CS) and the National Environmental Standards for Storing Tyres Outdoors (NES-STO). In addition, there is a proposed National Policy Statement for Highly Productive Land (NPS-HPL). The requirements are somewhat piecemeal, especially the inclusion of a NES for outdoor tyres rather than a more comprehensive set of hazards and contaminants.

The exposure draft of the NBA requires environmental limits to be set for soils. For analysis we assume that limits are set, and that national direction is provided more comprehensively covering all aspects of soil quality. This will include the use of Regional Spatial Strategies.

Good quality soil has very high value but there are few studies of the costs and benefits of soil conservation. However, we would expect well-specified soil conservation policies to yield positive net benefits. A CBA of the NES-CS suggested benefits in the same order of magnitude as costs, but with many environmental benefits unquantified.

There appears to be a potential market failure resulting in building on highly productive land on urban fringes, but this needs further analysis and the case for intervention needs to be made from a revised assessment of costs and benefits, which are expected to vary widely by location.

Biodiversity, Habitats and Ecosystems

There are urgent calls for biodiversity protection internationally, recognising the fundamental dependence of humans on nature for services that include the significant loss of insects pollinating crops and of plants with potential for provision of medicines, in addition to the feedback effects on climate change and loss of species valued in their own right. The Review Panel suggested New Zealand's biodiversity (native plants, animals and ecosystems) is under significant threat. It is particularly vulnerable because of the percentage of indigenous species found nowhere else.

The Aotearoa New Zealand Biodiversity Strategy (ANZBS) is a government strategy that provides the basis for ambitious improvements in biodiversity conservation, achieved via a collaborative approach with widespread community participation. In addition, there is a proposed National Policy Statement on Indigenous Biodiversity (NPS-IB). It is intended to achieve more consistency in councils' monitoring and management approaches, and resulting in better outcomes for biodiversity.

The RM reforms are expected to reinforce rather than replace this approach, and in particular, to see the adoption of something similar to the NPS-IB. They may include additional direction to councils, particularly relating to the assessment and management of biodiversity on private land.

It is not possible to draw any domain-wide conclusions on the net benefits of biodiversity improvement as the benefits and costs are highly site, type or ecosystem specific. Nevertheless, the existing literature suggests the high value of biodiversity and provides examples of significant positive net benefits, even when many benefits cannot be quantified in monetary terms. The draft CBA of the NPS-IB speculates on positive net benefits.

7.1.3 Built Environment

We have examined the potential costs and benefits of RM reforms on the housing market by making a starting assumption that they will result in a regime in which many barriers to development would be removed and that this would be expressed as an increase in the elasticity of response to housing demand. This is the same approach as used in recent analyses of the NPS-UD. It is unclear at this stage whether the reforms would be beyond those in the NPS-UD and our analysis, to some extent uses the same assumptions, although we also assess benefits in the form of increases in producer surplus, ie benefits for developers in addition to consumers (households).

Obtaining the maximum benefits assumes the reforms maximise transparency, in the sense that RM system users have a much greater awareness of what consent applications will be successful and under what conditions, and councils are clear and consistent in the use of urban boundaries. In addition, we assume national direction provides clarity around interactions with other legislation and inconsistencies are removed.

We estimate total annual benefits of increased affordability of $146 to $832 million. This results in a PV of $2.2 billion to $12.8 billion over 30 years at 5%.

We have examined whether there would be offsetting reductions in environmental quality resulting from the intensification of development. The analysis suggests this is uncertain. However, given the high-level nature of this analysis, we have not examined all the externalities that may result. This includes potential impacts on heritage, other aesthetic impacts (which may be in either direction depending on the quality of design), crime, and agglomeration benefits.

7.1.4 Māori

We have attempted to value the benefits of increased Māori participation in monetary terms. This has used a mix of reductions in costs, eg for disputes and occupations, and WTP for better processes and outcomes amongst Māori and others. Table 36 summarises the estimates of benefits. The benefits that we have speculatively quantified add to a total of $120 to $474 million per annum. This would add to a present value of $1.8 to $7.2 billion over 30 years at 5%.

The analysis in this section is novel in nature, based on limited available data and information. As such, it is somewhat speculative and caution should be exercised in relying on the precision of the estimates presented. The estimated values are best described as indicative approximations.

7.2 Summary Table

Table 38 summarises the overall expected impacts of the reforms for the issues covered in this report.

Table 38 Summary of impacts

Domain	Comment	Impact ($million)[1]	Evidence certainty[2]
System Efficiency			
Process and Compliance costs			
RM system users	Ongoing reduction in process and compliance costs: average annual benefit over 30 years, and Present value (PV)	Average annual net benefit: Process costs: $149 m Compliance costs: $83 m Total: $232m PV $3,573m	Medium
Regulators: central government	Net increase in process costs:	Average annual net cost: $19m PV $292m	High
Regulators: local government	Net increase in process costs:	Average annual net cost: $43m PV $661m	Medium
Total	Net reduction in process and compliance costs	Average annual net benefit: $168m PV $2,589m	Medium
Other efficiency improvements			
Resource allocation	Potential for efficiency gains (reduced costs and allocation to highest value uses)		High
Economic instruments	Wider use of economic instruments has potential for minimising costs of environmental improvements through flexibility in response.		High
Natural environment			
	Positive net benefits assumed where this is accompanied by CBA to justify additional intervention. Significant scope for beneficial improvements.		
Freshwater	Expected improvements in water quality from full implementation of EFW programme. Increased net benefits if implementation brought forward or if standards tightened.	Brought forward 10 years: Average annual benefit: $6m PV: $92m	Low
Marine & estuaries	Improved water quality expected to have benefits for active water users (eg swimmers) and existence values		Low
Air quality	Existing CBAs suggest positive net benefits if air quality improves.		Low
Soils	Net benefits expected from comprehensive set of limits covering all aspects of soil quality. Improvements assumed to soil conservation, contaminated soil and protection of highly productive land.		Low
Biodiversity	Significant benefits expected via national direction under the		Low

Domain	Comment	Impact *($million)*[1]	Evidence certainty[2]
	NPS-IB. Reforms expected to reinforce this.		
Housing supply	Increased land supply through spatial planning can better enable the market to respond to housing demand. Reforms are expected to reduce the barriers to consenting and to development, and to make housing supply more responsive to demand.	Benefits: conservative scenario: $146m pa PV: $2.2 billion Optimistic scenario: $832m pa PV: $12.8 billion	Low
Māori Participation	Iwi/Māori would have increased participation in decision making, greater control over outcomes and wider promulgation of ideas and culture.	Benefits of $120m to $474m pa PV: $1.8 to $7.2 billion	Low

[1] 30 years @5%;

[2] "Evidence certainty" refers to our assessment of the evidence base for the magnitude of each impact category.

8 Glossary

8.1 Abbreviations

ACE	Annual catch entitlement
BCR	Benefit Cost Ratio
BPA	Benthic protection area
CAA	Climate Adaptation Act
CBA	Cost benefit analysis
CCC	Climate Change Commission
CCRA	Climate Change Response Act 2002
CMA	Coastal marine area
COMEAP	Committee on the Medical Effects of Air Pollutants (UK)
DoC	Department of Conservation
EEZ	Exclusive Economic Zone
EFW	Essential Freshwater
EI	Economic instrument
ETS	Emissions Trading Scheme
FIFS	First-in, first-served
FNZ	Fisheries New Zealand
GDP	Gross domestic product
GHG	Greenhouse Gas
GST	Goods and Services Tax
HAIL	Hazardous Activities and Industries List
HAPiNZ	Health and Air Pollution in New Zealand
LEZ	Low emission zones
LWRP	Land and Water Regional Plan (Canterbury)
MBIE	Ministry of Business, Innovation and Employment
MCI	Macroinvertebrate community index
MfE	Ministry for the Environment
MHWS	Mean high water springs
MMPA	Marine Mammals Protection Act 1971
MOG	Ministerial Oversight Group
MPA	Marine protected area
MPI	Ministry of Primary Industries
MSY	Maximum sustainable yield
NBA	Natural and Built Environment Act
NBEA	Natural and Built Environment Act
NES	National Environmental Standard
NES-AQ	National Environmental Standards for Air Quality

NES-CS	National Environmental Standard for assessing and managing contaminants in soil to protect human health
NES-FW	National Environmental Standards for Freshwater
NES-STO	National Environmental Standards for Storing Tyres Outdoors
NIWA	National Institute of Water and Atmospheric Research
NPS	National Policy Statement
NPS-FM	National Policy Statement Freshwater Management 2014 & 2020
NPS-HPL	National Policy Statement for Highly Productive Land
NPS-IB	National Policy Statement for Indigenous Biodiversity
NPS-UD	National Policy Statement on Urban Development 2020
NPS-UDC	National Policy Statement on Urban Development Capacity 2016
NZCPS	NZ Coastal Policy Statement
PCE	Parliamentary Commissioner for the Environment
PM	Particulate Matter (PM_{10} & $PM_{2.5}$ = particles smaller than 10 and 2.5 micrometres respectively)
PSLU	Productive and Sustainable Land Use package
QMA	Quota management area
QMS	Quota management system
RM	Resource Management
RMA	Resource Management Act 1991
RSS	Regional Spatial Strategy
RUB	Rural urban boundary
SP	Stated preference
SPA	Strategic Planning Act
SQ	Status Quo
US EPA	United States Environmental Protection Agency
VoLY	Value of Life Year
VoSL	Value of Statistical Life
WTP	Willingness to pay

8.2 Māori Words and Phrases

Hapū	Clans
Iwi	Tribes
Kaitiakitanga	Guardianship and stewardship
Kawa	Māori protocol and etiquette
Kotahitanga	Unity or solidarity
Mahinga kai	Customary gathering and consumption of food
Manaakitanga	Hospitality, generosity
Mana motuhake	Self-determination
Manu whenua	Customary authority exercised by an iwi or hapu in an area
Mātauranga Māori	Māori knowledge

Mauri	Life force or spiritual essence
Rangatiratanga	Chieftainship, authority, autonomy and leadership
Taonga tuku iho	Treasures passed down from the ancestors
Te ao Māori	The Māori world
Te Mana o te Taiao	The mana (authority and power) of the environment
Te Oranga o te Taiao	The health of the environment
Te Tiriti o Waitangi	The Treaty of Waitangi
Tikanga	Customary lore and practices, Māori protocols
Whānau	Family groups
Whānaungatanga	relationship, kinship, sense of family connection
Whenua	Land

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Annex 1: Panel Proposals and Proposed Changes

Panel proposals		Changes
Chapter 1 Integrating land use planning and environmental protection		
1.1	An integrated approach for land use planning and environmental protection, encompassing both the built and the natural environments, should be retained in reformed legislation.	New NBEA
Chapter 2 Purpose and principles		
2.1	The RMA should be repealed and replaced with new legislation to be called the Natural and Built Environments Act.	New NBEA
2.2	The purpose of the Natural and Built Environments Act should be to enhance the quality of the natural and built environments to support the wellbeing of present and future generations and to recognise the concept of Te Mana o te Taiao.	New purpose in NBEA
2.3	The purpose of the Act should be achieved by ensuring: positive outcomes for the environment are promoted; the use, development and protection of natural and built environments is within environmental limits; and the adverse effects of activities on the environment are avoided, remedied or mitigated.	New purpose in NBEA
2.4	The environment should be defined broadly to include: (i) ecosystems and their constituent parts; (ii) people and communities; (iii) natural and built environments whether in urban or rural areas	New purpose in NBEA
2.5	There should be a requirement to give effect to the principles of Te Tiriti o Waitangi.	Must give effect to the principles of the Treaty (NBEA)
2.6	Current matters of national importance should be replaced by positive outcomes specified for the natural and built environments, rural areas, tikanga Māori, historic heritage, and natural hazards and the response to climate change.	Positive outcomes specified for environments, tikanga Māori, and responses to climate change
2.7	Mandatory environmental limits should be specified for certain biophysical aspects of the environment including freshwater, coastal water, air, soil and habitats for indigenous species.	Mandatory environmental limits set for biophysical aspects
2.8	Ministers and local authorities should be required to set targets to achieve continuing progress towards achieving the outcomes.	Targets set to achieve NBEA outcomes
2.9	There should be greater use of mandatory national direction, including the identification of features and characteristics that contribute to the quality of both natural and built environments, and to respond to climate change.	Development of more National Directions
2.10	Principles to guide implementation should be identified.	NBEA implementation principles developed
2.11	Any conflicts in achieving the outcomes should be resolved through national direction or, in the absence of such direction, in combined plans.	Development of more National Directions
2.12	Indicative drafting of the new purpose and principles identified in this chapter along with associated definitions are provided in appendix 1 of this report.	New NBEA
Chapter 3 Te Tiriti o Waitangi me te ao Māori		
3.1	The concept of 'Te Mana o te Taiao', should be introduced into the purpose of the Natural and Built Environments Act to recognise our shared environmental ethic.	Incorporation of 'Te Mana o te Taiao' and outcomes for 'tikanga Māori' (NBEA)

3.2	Specific outcomes should be provided for 'tikanga Māori', including for the relationships of mana whenua with cultural landscapes.	Incorporation of 'Te Mana o te Taiao' and outcomes for 'tikanga Māori' (NBEA)
3.3	The current Treaty clause should be changed so that decision-makers under the Act are required to 'give effect to' the principles of Te Tiriti o Waitangi.	Must give effect to the principles of the Treaty (NBEA)
3.4	A national policy statement should be required on how the principles of Te Tiriti will be given effect through functions and powers exercised under the Act.	New NPS outlining how to give effect to the principles of the Treaty
3.5	A more effective strategic role for Māori in the system should be provided for, including representation of mana whenua on regional spatial planning and joint planning committees.	Māori representation on spatial planning and joint planning committees
3.6	A National Māori Advisory Board should be established to monitor the performance of central and local government in giving effect to Te Tiriti and other functions identified in the report.	Establish National Māori Advisory Board
3.7	The current Mana Whakahono ā Rohe provisions should be enhanced to provide for an integrated partnership process between mana whenua and local government to address resource management issues.	Integrated partnership between mana whenua and local government through strengthened Mana Whakahono a Rohe provisions
3.8	The current legislative barriers to using the transfer of power provisions and joint management agreements should be removed and there should be a positive obligation on local authorities to investigate opportunities for their use.	Obligation on local authorities to explore opportunities for transfer of power and joint management agreements (NBEA)
3.9	The current definitions of the terms 'iwi authority' and 'tangata whenua' should be replaced with a new definition for 'mana whenua'.	New Definition of mana whenua (NBEA)
3.10	Provision should be made for payment of reasonable costs where Māori are undertaking resource management duties and functions in the public interest.	Support for Māori in resource management duties
3.11	The funding and support options recommended in this chapter should be implemented.	Support for Māori in resource management duties
Chapter 4 Strategic integration and spatial planning		
4.1	There should be a new Strategic Planning Act to promote the social, economic, environmental and cultural wellbeing of present and future generations through the long-term strategic integration of functions exercised under the Natural and Built Environments Act, LGA, LTMA and CCRA.	New SPA
4.2	The Strategic Planning Act should provide a framework for mandatory regional spatial planning for both land and the coastal marine area.	Framework guiding spatial plans
4.3	Regional spatial strategies should set long-term objectives for urban growth and land use change, responding to climate change, and identifying areas inappropriate to develop for reasons such as their natural values or their importance to Māori.	Framework guiding spatial plans
4.4	There should be flexibility for: (i) the responsible Minister to determine sequencing, timing and priorities for preparation of these strategies; and (ii) spatial strategies to cover two or more regions or to focus on sub-regions in response to particular issues.	Framework guiding spatial plans
4.5	Regional spatial strategies should set a strategic direction for at least the next 30 years, informed by longer-term data and evidence as appropriate, such as 100 year plus projections for climate change.	Framework guiding spatial plans
4.6	Regional spatial strategies should be strategic and high level with project and site-level detail provided through separate implementation agreements and subsequent combined planning and funding processes.	Implementation agreements on spatial plans

4.7	Regional spatial strategies should be prepared and approved by a joint committee comprising representatives of central government, the regional council, all constituent territorial authorities in the region, mana whenua and an independent chair.	Development of mandatory regional spatial plans
4.8	There should be significant stakeholder and community involvement in the preparation of these strategies, including through public submissions and a process similar to the special consultative procedure under the Local Government Act.	Significant stakeholder participation in development of spatial plans
4.9	Joint committees should seek consensus, but dispute resolution procedures should be provided including a facilitated mediation process and power for the Minister to resolve any remaining disputes.	Spatial Plan mediation process including a process and power for Minister
4.10	Regional spatial strategies should be consistent with national direction under the Natural and Built Environments Act.	Framework guiding spatial plans
4.11	Combined plans and regional and local funding plans should be consistent with spatial strategies.	Framework guiding spatial plans
4.12	Regional spatial strategies should be fully reviewed at least every nine years with flexibility for review within that period when required.	Spatial strategies are reviewed every nine years
Chapter 5 A more responsive system: addressing status quo bias		
5.1	The principles that should guide the design of a more responsive resource management system are: (i) sustainability, (ii) fairness and equity, (iii) early notice and adequate time for transition, (iv) balancing responsiveness with certainty for investment.	New design principles at the base of the RM system
5.2	The protections generally afforded to existing uses and consented activities should be retained except that: (i) the powers of regional councils to modify or extinguish regional consents should be strengthened to achieve agreed outcomes and be more responsive (ii) the powers of territorial authorities should be extended to enable them to modify or extinguish existing land uses and land use consents in specific circumstances. These should be confined to: where necessary to adapt to climate change; or b) where there is high risk of harm to health, property or the natural enviornment	New powers for local authorities to modify consents
Chapter 6 Climate change and natural hazards		
6.1	Outcomes should be introduced for the following matters in the purpose and principles of the proposed Natural and Built Environments Act: i) reduction of risks from natural hazards, ii) improved resilience to the effects of climate change, including through adaptation, iii) reduction of greenhouse gas emissions, iv) promotion of activities that mitigate emissions or sequestrate carbon, and v) increased use of renewable energy.	New purpose in NBEA (climate change focus)
6.2	Mandatory national direction should be required for: (i) climate change mitigation consistent with the emissions reduction plan under the CCRA and in a way that aligns with and supports emissions pricing; and (ii) climate change adaptation and reduction of risks from natural hazards consistent with the national climate change risk assessment and national adaptation plan under the CCRA.	Introduce Climate change national direction
6.3	Regional spatial strategies developed under the proposed Strategic Planning Act should be used to address at a strategic level: (i) climate change mitigation, informed by the emissions reduction plan under the CCRA; and (ii) climate change adaptation and natural hazard risk reduction, informed by the national adaptation plan under the CCRA.	Framework guiding spatial plans
6.4	Reducing greenhouse gas emissions, climate change adaptation and reducing risks from natural hazards should be included in the functions and powers of both regional councils and territorial authorities under the proposed Natural and Built Environments Act.	Responding to climate change is now a function of local and regional authorities in the NBEA

6.5	Combined plans should be used to regulate land and resource use to give effect to the national direction and implement spatial strategies. This would include provisions under the proposed Natural and Built Environments Act to allow for adaptive planning measures.	Develop new combined plans implementing spatial strategies
6.6	Powers under the Natural and Built Environments Act to modify established land uses should be used to address climate change adaptation and reduction of risks from natural hazards.	Power to modify established land uses to address climate change adaptation concerns
6.7	A Managed Retreat and Climate Change Adaptation Act should be introduced to: (i) provide for managed retreat, powers to change established land uses and to address liability and options for potential compensation (ii) establish an adaptation fund to enable central and local government to support necessary steps to address climate change adaptation and reduction of risks from natural hazards.	New MRCCAA
Chapter 7 National Direction		
7.1	The current forms of national direction should be retained: national policy statements, national environmental standards, national planning standards and regulations.	
7.2	The present functions of the Minister for the Environment and the Minister of Conservation should be continued, including the mandatory requirement for a New Zealand Coastal Policy Statement.	Implement a New Zealand Coastal Policy Statement
7.3	The purpose for national direction should be setting objectives, policies, limits, targets, standards and methods in respect of matters of national significance to give effect to the purpose and principles in the Natural and Built Environments Act and to resolve any conflicts between these matters.	Purposes of national direction defined
7.4	Mandatory national direction should be required on the topics specified in section 9(3) of the purpose and principles of the Natural and Built Environments Act.	Mandatory national direction on topics specified in section 9(3) of the NBEA
7.5	The power for the Minister for the Environment to issue discretionary national directions should be retained with some modification of the matters to be taken into account before deciding whether to do so.	Modification to the matters the Minister for the Environment must consider before issuing discretionary national direction
7.6	There should be a single board of inquiry process for the preparation and review of both national policy statements and national environmental standards, except for minor changes for which an alternative process can be adopted.	Board of inquiry process for preparing and reviewing NPS and NES
7.7	All existing and new national direction should be brought together into a coherent combined set and any conflicts between them resolved.	Resolve any conflicts between existing and new ND so that they are coherent
7.8	National directions should be reviewed every nine years, but intermediate changes should also be allowed for as necessary.	National directions reviewed every nine years
7.9	The respective roles of national policy statements and national environmental standards should be clarified and provision should be made for them to be issued separately or in a single instrument.	Purposes of national direction defined
7.10	The making of regulations should generally be confined to their traditional role of dealing with administrative matters but regulations to address substantive issues should be allowed in limited circumstances and subject to appropriate safeguards.	Regulations permitted to address substantive issues (in limited circumstances)
7.11	National planning standards should have a more confined role and should be established by a process overseen by an expert advisory group which would make recommendations to the Minister for the Environment.	NPS are established by a National Planning expert advisory group which recommends directly to the Minister for the Environment
7.12	To improve responsiveness to national direction:	

	(i) the ability to review existing regional permits and consents should be strengthened	Increased ability to review existing permits and consents in light of national direction
	(ii) land use consents granted by territorial authorities and existing land use rights should be able to be reviewed but only in exceptional circumstances. These should be confined to:	
	(a) where necessary to adapt to the effects of climate change or to reduce risks from natural hazards, or	
	(b) where there is high risk of significant harm or damage to health, property or the natural environment, for example by the breach of an environmental limit.	
Chapter 8 Policy and planning framework		
8.1	There should be a mandatory plan for each region combining regional policy statements and regional and district plans.	Each region must develop a combined plan (combining regional policy statement and plans, and district plans)
8.2	The functions of regional councils and territorial authorities should be clarified in the way described in this chapter.	New NBEA
8.3	The combined plans should be prepared by a joint committee comprising a representative of the Minister of Conservation and representatives of: i) the regional council, ii) each constituent territorial authority in the region, and iii) mana whenua	Combined plans developed by joint committee (includes Minister of Conservation, regional council, territorial authorities and mana whenua)
8.4	The role of combined plans in the new system should be to demonstrate how the outcomes set out in the purpose of the Natural and Built Environments Act will be delivered in a region, including resolution of any conflicts or tensions between outcomes (if not resolved through national direction).	Each region must develop a combined plan (combining regional policy statement and plans, and district plans)
8.5	The joint committee should have authority to prepare and notify the combined plan and to make all decisions relating to the plan and subsequent processes without the need for ratification by the constituent local authorities.	Combined plans developed by joint committee (includes Minister of Conservation, regional council, territorial authorities and mana whenua)
8.6	The joint committee and the secretariat supporting it should be funded by the constituent local authorities.	Local authority funding for joint committee and secretariat
8.7	The evaluation process currently undertaken under section 32 of the RMA should be retained under the Natural and Built Environments Act but should be modified in the way described in this chapter.	
8.8	Prior to notification the Ministry for the Environment should undertake an audit of the plan.	MfE must audit combined plans
8.9	After notification and receipt of submissions by interested parties, including the constituent local authorities and mana whenua, a hearing should be conducted by an independent hearing panel chaired by an Environment Judge.	Independent hearing on combined plans by a panel chaired by an Environment Judge
8.10	The independent hearing panel should make recommendations to the joint committee which should have authority to decide which recommendations to accept or reject.	Independent hearing on combined plans by a panel chaired by an Environment Judge
8.11	In respect of any recommendation rejected by the joint committee there should be a right of appeal to the Environment Court on the merits by any submitter. Where recommendations are accepted by the joint committee the right of appeal should be to the High Court and limited to questions of law.	Right to appeal to the EC and HC by any submitter regarding recommendations accepted by join committee
8.12	This process should also apply to plan changes with some variation to account for the nature, scale and complexity of the change.	Right to appeal to the EC and HC by any submitter regarding plan changes
8.13	The preparation of combined plans should usually be undertaken after the preparation of a spatial strategy for the relevant region and reviewed at least every nine years with flexibility to review more often.	Combined plans are reviewed every nine years

8.14	Private plan changes should still be possible but with greater constraints on when and in what circumstances that may occur.	Constraints on private plans
8.15	These new provisions should replace all plan-making processes available under current legislation including the current Schedule 1 process, and streamlined processes and collaborative planning.	
Chapter 9 Consents and approvals		
9.1	Current resource consent types should remain: land use and subdivision consents, and water, discharge and coastal permits.	
9.2	The current list of activities should remain, except for the non-complying category which should be removed.	Consents can no longer be granted for non-complying activities
9.3	The current rules on notification of consent applications should be substantially changed by removing the 'no more than minor' effects threshold and replacing existing provisions with a combination of presumptions and plan provisions specifying when notification is to occur and in what form.	the 'no more than minor' effects threshold is removed
9.4	Information requirements should be proportionate to the nature, scale and complexity of the issue.	Information requirements for consents now proportionate to issues
9.5	The matters to be considered on an application for resource consent should be amended in various respects including shifting the focus to identified outcomes and removing the 'subject to Part 2' reference and the permitted baseline test.	Applications for resource consent must state outcomes
9.6	The direct referral process should be modified. Where the relevant consent authority declines to consent to the referral the Environment Court should be permitted to approve direct referrals on stated criteria.	Environment Court has power to approved referrals where a consent authority has refused
9.7	An alternative dispute resolution process should be established for controlled or restricted discretionary activities in prescribed circumstances. Parties to the process should still be able to exercise rights of appeal but only by leave of the Environment Court.	Consent and approval dispute resolution process set up
9.8	An 'open portal' for consent applications should be established to coordinate agency responses and encourage the bundling of applications.	Open portal for consent applications (IT)
9.9	Proposals of national significance should remain but with a simplified process involving Ministerial referral to the Environment Court in accordance with prescribed criteria.	Simplified process for proposals of national significant
Chapter 10 Designations		
10.1	Eligibility to exercise designation powers should be centred on public-good purposes.	Designation powers must be centred on public-good purposes
10.2	Those eligible should include:	Procedural changes to designations
	(i) a list of approved requiring authorities in the legislation: Ministers of the Crown, local authorities, and network utility operators that meet specified criteria	
	(ii) other requiring authorities approved by the Minister for the Environment based on specified criteria.	
10.3	A new default lapse period of 10 years should be available for all designations, with extensions of up to another 10 years subject to specified criteria.	Procedural changes to designations
10.4	There should be two stages in the designation process:	Procedural changes to designations
	(i) a notice of requirement defining the designation footprint	
	(ii) a construction and implementation plan confined to addressing construction and operational effects.	
10.5	Flexibility to combine these two stages should be provided.	Procedural changes to designations

10.6	The relevant considerations for a designation requirement should be modified to also include:	Designation requirement must be consistent with spatial strategy and outcomes identified in any Act, National direction or plan
	(i) consistency with the regional spatial strategy	
	(ii) its contribution to the outcomes identified in the Act, any national direction and the combined plan	
	(iii) the opportunity for co-location of infrastructure within the designation.	
10.7	Requiring authorities should prepare a construction and implementation plan. This should consider the environmental effects of the construction and implementation of the work and the appropriate controls to manage those effects.	Mandatory construction and implementation plans
10.8	Notices of requirement should continue to be publicly notified with appeal rights retained.	
10.9	The construction and implementation plan should be available for public and territorial authority comment prior to construction works commencing.	Mandatory construction and implementation plans
10.10	Consideration should be given to extending designations into the coastal marine area.	Policy work to explore extending designations into coastal marine areas
Chapter 10 Heritage orders		
10.11	The Ministry of Culture and Heritage should continue its Strengthening Heritage Protection project as part of resource management reform. This work should include: (i) investigating potential provisions for national direction on heritage, (ii) reviewing heritage order provisions, (iii) exploring options for dealing with 'demolition by neglect' issues.	MCH policy work into "Strengthening Heritage Protection" continues
10.12	This work should also investigate the interface between the Natural and Built Environments Act and the Heritage New Zealand Pouhere Taonga Act 2014 to provide greater clarity about which agency has primary responsibility for which aspects of heritage protection.	
10.13	Subject to the outcomes of the review above one option for heritage orders could be to provide interim protection for a heritage site while more enduring solutions are explored.	
Chapter 10 Water conservation orders		
10.14	The water conservation order process should be included in the Natural and Built Environments Act, retaining the current purpose, but with the following changes:	Simplified water conservation orders process
	(i) applications should be heard by the Environment Court in a one-stage process, with a draft order and recommendations made by the Court and referred to the Minister for the Environment for final decision-making	
	(ii) applications should include a statement of proposed changes to the relevant planning documents which would be required to give effect to the order	
	(iii) the Court's recommendations should include changes to relevant planning documents to give effect to the order	
	(iv) ministerial approval of the order would include changes to planning documents which would give direct effect to the order without further process	
	(v) hearings should be held at the closest practical location to the water body in question	
	(vi) the application and hearing process should include mana whenua	
	(vii) any relevant planning documents should 'give effect' to any order	

	(viii) once an order is made it should be a matter for consideration in any consent applications that may impact on the water body.	
10.15	Further work should be undertaken by the Ministry for the Environment and the Department of Conservation to investigate and develop policy on the effectiveness of water conservation orders as discussed in this chapter.	MFE and DOC policy work on water conservation orders
Chapter 11 Allocation of resources and economic instruments		
11.1	The Natural and Built Environments Act should retain the current allocative functions for resources in the RMA.	Allocative principles of sustainability, efficiency and equity included in NBEA
11.2	Allocation principles of sustainability, efficiency and equity should be included in the new Act to provide greater clarity on the outcomes sought and a consistent framework for the development of more detailed measures.	Allocative principles of sustainability, efficiency and equity included in NBEA
11.3	The allocation principles should not be included in the purpose and principles of the Natural and Built Environments Act but should be in a part of the Act focused on allocation.	Allocative principles of sustainability, efficiency and equity included in NBEA
11.4	A combination of regulatory and market-based mechanisms is needed to allocate resources. These should be enabled under the Natural and Built Environments Act and developed in the context of specific resources through strategic planning, national direction and combined plans.	Regulatory and market-based allocation mechanisms enabled through NBEA and plans
11.5	To enable sustainable, efficient and equitable allocation of resources, the Natural and Built Environments Act should adopt a more balanced approach to the prioritisation of existing users in resource consent processes. This includes:	
	(i) encouraging shorter permit durations, with flexibility to provide longer-term permits for major infrastructure	Shorter permit durations, with flexibility for longer term permits for major infrastructure
	(ii) providing stronger powers to review and change consent conditions	Increased ability to review and change consent conditions
	(iii) providing for a wider range of matters to be considered in consent renewal processes	Increased ability to review and change consent conditions
	(iv) providing powers to direct common expiry of permit terms.	Increased ability to review and change consent conditions
11.6	To promote more competitive urban land markets, national direction should be used to require the use of data on urban land prices, analysis of regulatory stringency, and a clear and flexible approach to urban land use regulation.	National direction for data on urban land prices
11.7	Further work should be undertaken to explore the use of targeted rates to capture uplift in land values as a result of public works.	Policy work exploring targeted rates
11.8	To encourage greater use of economic instruments:	
	(i) future legislation should ensure there is a broad mandate for the use of tradeable rights and permits, incentives and environmental taxes and charges	
	(ii) central government should provide institutional support for the development and use of economic instruments by local authorities through a combination of national direction, guidance, and support for capability.	Central government support to local authorities encouraging use of economic instruments
Chapter 12 National environmental monitoring system		

12.1	The Ministry for the Environment should establish in consultation with other agencies a comprehensive, nationally coordinated environmental monitoring system with the following features:	Establish comprehensive Environmental Monitoring System (EMS)
	(i) it should incorporate and build on the current National Monitoring System, with improvements to be more systematic about the data it collects and to make it easier for councils to use	
	(ii) it should be supported with sufficient resourcing to improve the capacity and capability of central and local government, including science and data capability.	
12.2	The Minister for the Environment should provide national direction on how the system should be implemented, including national direction developed with Māori on how to incorporate Māori perspectives and mātauranga Māori into the system.	National direction on environmental monitoring system and the role of Māori
12.3	The Ministry for the Environment should be responsible for implementing the system and monitoring performance of the system at a national level.	MfE implement and monitor EMS
12.4	Local authorities should continue to have primary responsibility for the collection of data and the monitoring of system performance at local government level.	Local authorities responsible for collecting and monitoring
12.5	Combined plans should provide for monitoring and reporting.	Local authorities responsible for collecting and monitoring
Chapter 12 Environmental Reporting		
12.6	The Ministry for the Environment and the Government Statistician should continue to be responsible for regular reporting to the Minister for the Environment on environmental outcomes at a national level.	
12.7	There should be clear links between the Natural and Built Environments Act and Environmental Reporting Act.	
12.8	Local authorities should be required to report regularly to the Ministry for the Environment on the state of the environment in their regions and districts.	Local authorities responsible for collecting and monitoring
12.9	Reports on the state of the environment should be made publicly available.	State of the environment reports publicly available
Chapter 12 Oversight of system performance		
12.10	The Ministry for the Environment should have primary responsibility for oversight of the effectiveness of the resource management system, including the effectiveness of the Natural and Built Environments Act and national direction made under it.	MfE is primarily responsible for oversight and effectiveness of the RM system
12.11	The combined planning joint committees should have oversight of the performance and effectiveness of combined plans.	Joint committees have oversight over combined plans
Chapter 12 - Auditing of system performance and responding to evidence of poor outcomes		
12.12	The Parliamentary Commissioner for the Environment's role should be expanded to include a more formalised and independent auditing and oversight role of the performance and effectiveness of the resource management system and on the state of the environment.	PCE auditing and oversight role expanded
Chapter 12 Auditing of system performance and responding to evidence of poor outcomes		
12.13	The Parliamentary Commissioner for the Environment should be required to provide regular reports to Parliament on the performance and effectiveness of the resource management system and on the state of the environment.	PCE auding and oversight role expanded
12.14	These reports should be made publicly available and the Minister for the Environment should be required to identify steps to be taken to respond to issues identified.	PCE auding and oversight role expanded

12.15	Local authorities should also be required to state how they will respond to issues identified that relate to their regions and districts.	Local authorities mandatory response to PCE identified issues
Chapter 13 Compliance, monitoring and enforcement		
13.1	System links should be established between compliance monitoring, state of the environment monitoring and monitoring progress towards outcomes.	System links (IT most likley)
13.2	New regional hubs should be established to undertake resource management compliance, monitoring and enforcement options.	Establish Regional Hubs
13.3	The offence and penalties regime should be strengthened, including by:	Strengthened penalties under NBEA
	(i) increasing the maximum financial penalties	
	(ii) deterring offending by extending the circumstances in which commercial gain may be taken into account in sentencing	
	(iii) adjusting the maximum imprisonment term so most prosecutions may be heard as judge-alone trials	
	(iv) prohibiting insurance for fines and infringement fees under the Natural and Built Environments Act	
	(v) enabling creative sentencing options	
	(vi) developing new Solicitor-General prosecution guidelines for environmental cases.	
13.4	A number of new compliance, monitoring and enforcement measures should be introduced and existing measures improved, including by:	Expanded compliance, monitoring and enforcement measures
	(i) enabling regulators to recover costs associated with permitted activity and unauthorised activity monitoring	
	(ii) amending the power to require disclosure of information about those carrying out the allegedly contravening activity	
	(iii) creating a new offence for contravention of a condition of consent	
	(iv) enabling abatement notices for the contravention of a consent notice, or any covenant imposed by condition of consent	
	(v) establishing a new power to allow a regulator to apply for a consent revocation order in response to serious or repeated non-compliance	
	(vi) providing for enforceable undertakings.	
Chapter 14 Institutional roles and responsibilities		
14.1	Additional resourcing should be provided to the Ministry for the Environment to undertake its expanded role, including providing support for local authorities and mana whenua.	Expanded resourcing for MFE (includes supporting local authorities and manawhenua)
14.2	Additional resources should be provided to the Office of the Parliamentary Commissioner for the Environment to enable the Office to undertake expanded oversight and auditing roles.	PCE auditing and oversight role expanded
14.3	Participation by mana whenua in resource management processes should be supported by central government and local government funding and capability-building assistance.	Fiscal and capability support to mana whenua
14.4	The Ministry for the Environment should work with professional institutes and organisations to ensure those administering the reformed RMA are appropriately equipped and upskilled to implement it.	MfE public outreach
14.5	The Ministry for the Environment should provide easily accessible public guidance on all the essential aspects of a reformed RMA.	MfE public outreach

14.6	A climate change adaptation fund should be established, and hazard risk management guidance provided by central government, to enable local authorities to take pre-emptive adaptation action on climate change effects.	Climate change adaptation fund
Chapter 14 Environment Court		
14.7	A sitting or retired Environment Judge should chair boards of inquiry on proposed national direction.	Environment Judge for boards of inquiry on proposed national direction
14.8	A sitting Environment Judge should chair independent hearing panels considering combined plans.	Combined plan independent hearing panel and appeal process
14.9	The Environment Court should continue to have all its present jurisdiction and a new appellate role in the combined plan/independent hearing panel process.	Combined plan independent hearing panel and appeal process
14.10	The Environment Court should hear all applications for proposals of national significance.	Environment Court hears all applications for proposals of national significance
14.11	Consideration should be given to a potential role for the Environment Court under separate legislation on managed retreat.	Policy work exploring role of EC in managed retreat legislation
14.12	The changes recommended in this chapter to improve access to justice should be adopted.	No cost awards and applicants pay for opposing parties legal costs
14.13	The number of judges, commissioners and registry staff at the Environment Court should be increased as necessary to ensure the Court has sufficient capacity to carry out the increased range of functions we propose.	Resourcing for Environment Court
Chapter 15 Reducing complexity		
15.1	The RMA should be repealed and replaced by the Natural and Built Environments Act to reduce complexity and improve overall coherence of the legislation.	New NBEA
Chapter 16 Transition to a reformed system		
16.1	Work on developing transitional arrangements as part of implementing the reforms we propose in this report will need to balance stability and a smooth transition with implementation of the reforms as soon as practicable.	Develop a transition plan to implement the reforms
16.2	The key components of the transition are:	Develop a transition plan to implement the reforms
	(i) the timing and sequencing of national direction, regional spatial strategies and combined plans	
	(ii) the impact on existing processes, consents and activities under the RMA	
	(iii) the financial and resourcing implications to develop and implement the reformed system	
	(iv) supporting the change in culture.	
16.3	Work should commence as soon as possible on the preparation of the Strategic Planning Act, the Natural and Built Environments Act and the Managed Retreat and Climate Change Adaptation Act.	Develop a transition plan to implement the reforms
16.4	The Strategic Planning Act should come into effect before or at the same time as the Natural and Built Environments Act, but the Managed Retreat and Climate Change Adaptation Act could come later.	Develop a transition plan to implement the reforms
16.5	The new legislation for the reforms we propose should be in place by the time the proposed COVID-19 recovery legislation expires.	Develop a transition plan to implement the reforms

16.6	We would expect mandatory national directions to be completed within three years of the introduction of the Natural and Built Environments Act.	
16.7	We would expect the overall transition process to be completed within 10 years of the introduction of the Strategic Planning Act and the Natural and Built Environments Act.	Develop a transition plan to implement the reforms
16.8	Some work should commence immediately, such as data collection and analysis to establish a robust evidence base for setting targets and limits.	Establish comprehensive Environmental Monitoring System (EMS)
16.9	The Minister should select one region to develop the first regional spatial strategy, followed by development of the combined plan, to provide a model for other regions to follow.	First spatial plan and combined plan

Source: Ministry for the Environment

Annex 2: Cost Benefit Analysis

Basis in Welfare Economics

The approach used to analysis in this report is primarily that of welfare economics. The decision principle used in welfare economics and cost benefit analysis (CBA), and the underlying utilitarian philosophy, is that a good decision is one in which the community is made better off in aggregate. Although initial ideas of what represented a good decision suggested everyone should be made better off and no one worse off (the Pareto principle),[285] most changes usually make some people better off while making others worse off. For example, establishing a marine protected area (MPA) may involve shifting resources from providing private benefits, eg for commercial fishers, to providing social benefits, eg conservation of resources for the benefit of all.

Addressing these issues, the compensation principle suggested independently by Kaldor[286] and Hicks[287] establishes an alternative decision criterion in which a good decision is one which most increases total net aggregate wellbeing.[288] This accepts that, as a result of a policy or legislative change, there may be those who lose as well as those who gain, but the principle does not state that compensation must be paid, only that it *could* be paid.[289] The test is simply whether society is made better off in aggregate. The underlying notion is that there may be numerous policies and projects, all of which will make some people better off and others worse off, but in aggregate across all projects/policies, all are expected to be made better off. And alternatively, the Government might periodically intervene with wellbeing enhancing measures aimed at the losers.

CBA assesses whether an option, eg a new government policy, shifts resource use towards an optimal state in which resources produce the most wellbeing. This state is regarded as efficient in the sense that there is no waste; there is no other allocation of resources that would produce more wellbeing.

Analysing Costs and Benefits

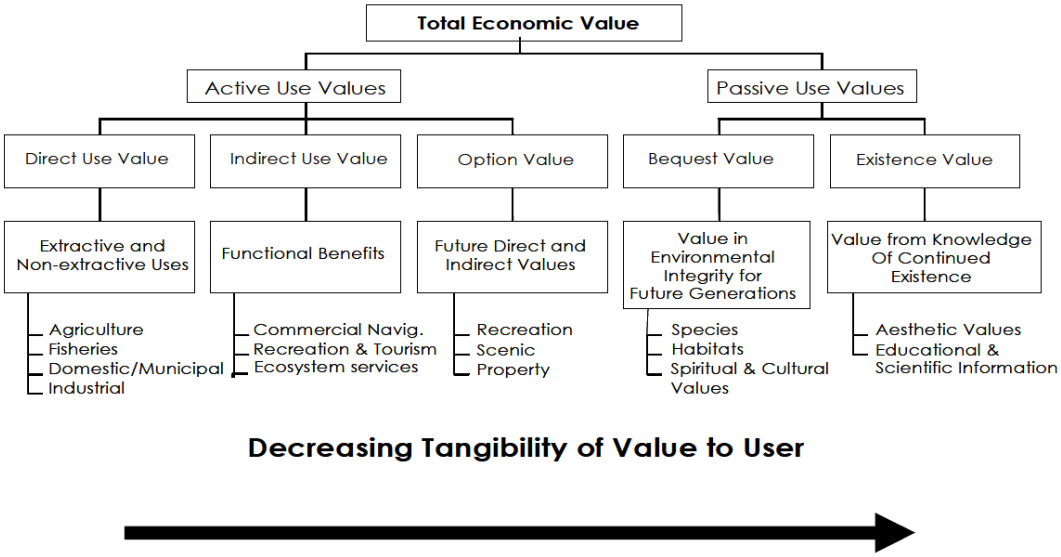
Analysing the costs and benefits of environmental improvement uses analytical techniques that stem from welfare economics as discussed above (Section 0). CBA assesses all effects of a policy or project, but benefit valuation of environmental improvement is more difficult than in most areas of policy because many of the benefits are not readily expressed in monetary terms.

[285] After the Italian economist Vilfredo Pareto
[286] Kaldor (1939)
[287] Hicks (1939)
[288] Under the Kaldor criteria there is a net gain if the winners can both fully compensate the losers for their loss and still have a gain for themselves. Alternatively, under the Hicks criteria there will be a net gain from the change, if the losers cannot bribe the winners to prevent the change occurring, before the change is made.
[289] Johansson (1991)

Total Economic Value

Often the concept of Total Economic Value (TEV) is used to identify and classify the full range of values that people derive from the environment or a specific resource (see Figure 26). It can be used as a way to ensure that all effects are taken into account within a CBA.

Figure 26 Total Economic Value



Source: EVRI (2009) in Bell et al (2009)

TEV includes:[290]

- **active use** values that involve direct interaction with the resources, eg the impacts of flooding on properties that are occupied or used for business activities, and the benefits (eg expressed as a WTP) of recreational uses of water bodies; and

- **passive use** (or non-use) values that pertain more to the fact of existence (the value from knowing that a particular ecosystem exists even if you never visit it) or its value for future generations (the value arising from the desire for certain resources to be available for one's heirs or future generations in general, eg notable landscapes or indigenous species).

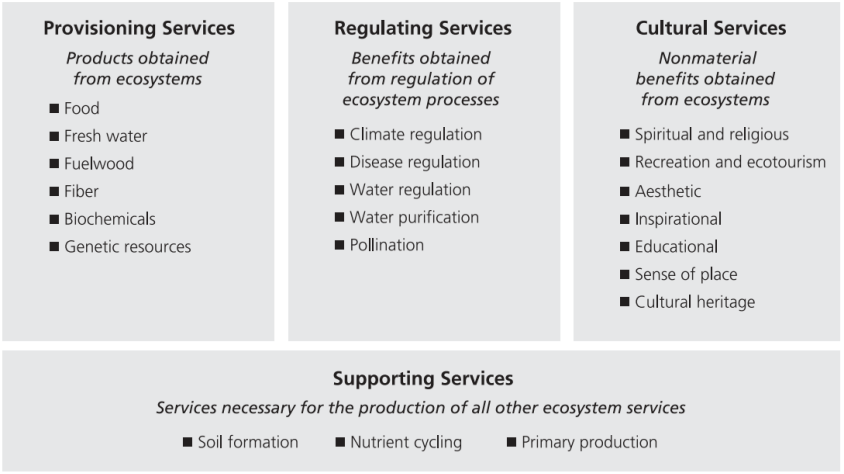
Ecosystem services

Ecosystem services is another concept often used in environmental valuation literature to describe the different components of value (eg Pascual et al, 2010). The Millennium Ecosystem Assessment defined *ecosystem services* as "the benefits that people obtain from ecosystems"[291] and categorised them into four groups (Figure 27).

[290] Although these categories of value are widely discussed in the literature, in practice it may not always be possible to separate them out. Passive uses, in particular, are often combined into a single existence value category. Sharp and Kerr (2005) note, for example, that survey respondents in studies to estimate values may not be able to separate out passive (non-use) and direct use values. And this approach of limiting the number of categories has been used by others, including Batstone et al (2008) in their analysis of the impacts of Auckland stormwater outflows on coastal ecosystems.

[291] Millennium Ecosystem Assessment (2005)

Figure 27 Ecosystem Services



Source: Millennium Ecosystem Assessment (2005)

The provisioning, regulating and cultural services are equivalent to the active use values of TEV, with the supporting services an earlier stage in the process enabling the production of the other services.[292]

Valuation

In this study we express as many effects as possible in monetary values, although we are significantly limited both by the availability of data and the uncertainty over the effects of the reforms. Monetary valuation of the environment is distasteful to many people, so it is important to understand why it is being undertaken. The fundamental aim of this approach is not to suggest the environment can be reduced to a monetary equivalent, but to understand the trade off against other things that people value:[293] what would people be willing to give up to gain improved environmental quality? This is necessary when there are limited resources. As a society (and as individuals) what we want is greater than we can obtain; we are limited by time or money or other resources. So, we have to make choices amongst limited resources. And, in very general terms, if we want more environmental quality, we need to have less of something else.

Valuation techniques for non-market values of the environment use a mix of revealed and stated preference techniques to estimate relative values.

- **Revealed preference** techniques observe how people behave and use the results as a measure of relative preferences. For example, analysts measure how far people will travel and how much they expend, to visit a site with high aesthetic value, and how much more they spend to visit a site with higher quality than another.

- **Stated preference** techniques rely on surveys in which people are asked to state their relative preferences, often in terms of willingness to pay. The more sophisticated approaches use choice experiments in which a clear payment method

[292] Patterson and Cole (2013)
[293] Turner et al (2003)

is shown and trade-offs are demonstrated, ie having more of one thing means having less of another.

Because valuation studies have not been undertaken for all environmental values in all places, analysis often relies on numbers derived in another time or place (benefit transfer). This raises some difficulties with the validity of the values affecting the similarities of the policy site to the study site.[294]

[294] Harris *et al* (2016); Rolfe *et al* (2015); Kerr and Sharp (2003); Sharp and Kerr (2005)

Annex 3: Benefit Valuation: Auckland Beaches

Context

This Annex includes an assessment of the benefits of water quality improvement at inner Auckland harbour beaches resulting from reduced wastewater discharges to the area around Herne Bay and St Mary's Bay.

Value of Water Quality Improvements

Swimming

The main recreational value that would be improved is the extent to which the water can be used for swimming. Suitability for swimming is estimated from *enterococci* or *E coli* counts in marine and fresh waters respectively (see Table 39). Reductions in these counts would enable more frequent swimming or would reduce the risk of infection if someone chose to swim.

Table 39 Suitability for swimming

Test	Marine waters (enterococci/100 mL)	Freshwaters (E coli/100 mL)	Result
No single sample greater than:	140	260	Surveillance/Green Mode very safe for swimming
Single sample greater than:	140	260	Alert/Amber Mode satisfactory for swimming
Two consecutive single samples greater than:	280	550	Action/Red Mode could be health risk for swimming

Source: based on Ministry for the Environment (2003)

Several New Zealand studies have assessed the value of improving water quality to enable swimming.[295] The values are expressed per household per year and reflect the change in values for those that visit the site and for those that do not. These are therefore not pure recreational values, but some combination of values for active recreational use and passive (existence) use. Only one (Williamson 1997) is for sea water swimming, but it is highly relevant to this analysis. It examined the benefits of improvements in water quality in Orakei Basin (Auckland) from being suitable only for boating to being suitable for swimming. The study used a contingent valuation survey and included respondents who visited Orakei Basin and those who did not. Despite the water quality improvements being stated in terms of swimmability, people responded on the basis of anticipating an increase in a range of activities (Table 40) and because it included non-visitors, will be based on a combination of use and non-use values.

Respondents included a sample of Auckland City residents and another sample of locals (living within 3km of Orakei Basin); the WTP values derived were approximately double for locals ($20/household pa) as they were for Auckland city residents ($11/hh pa) and were higher ($22/hh pa) for members of the Auckland Water Ski Club (AWSC).[296]

[295] Marsh and Phillips (2012); Marsh (2010); Kerr & Swaffield (2007); Williamson (1997); Sheppard et al (1993)
[296] All in 1997 dollar values. Equivalent 2021$ values (inflated using CPI) are: $11 = $18; $20 = $32; $22 = $36

Table 40 Changes in Recreational Usage with Improved Water Quality - stated response of Auckland residents

Activity	More	Less	Same	Don't Know	% more
Walking	70	3	204	38	22%
Running	27	1	235	52	9%
Sailing	20	0	235	60	6%
Rowing	16	1	235	63	5%
Canoeing	22	1	229	63	7%
Water-skiing	26	0	227	62	8%
Spectating at event	48	3	204	60	15%
Swimming	53	3	204	55	17%
Fishing	28	3	222	62	9%
Other	9	0	50	256	3%

Source: Williamson (1997)

Table 40 shows the stated intentions of Auckland city residents of how their recreational activity would change following the change in water quality. If actual behaviour reflects these stated intentions, water quality improvements would lead to an increase in activities both in and out of the water, with the greatest increases in walking (22%) and swimming (17%).

The difficulty with using these values is that the water quality improvements as communicated to respondents was for a permanent shift from being suitable only for boating to being suitable for swimming. The issue of concern for water quality improvements resulting from fewer discharges associated with rain events, is for swimming being possible more often, rather than shifting from not possible to possible, ie an increase in the number of swimmable days.

The other concern is with the validity of the answers from Auckland City residents. They were asked their WTP for improvements in the quality of water for swimming for Orakei Basin. It is not clear what result would have been derived if they had been asked the same question subsequently for other locations.

The other possible approach to valuation is using studies which have examined the WTP for swimming trips. Several studies have identified monetary values for recreational use (active and passive) of individual water bodies; usually these are for freshwater.[297] But to use these results requires an estimate of the change in the number of swimming trips from a change in water quality. We are not aware of such studies. Such studies would also need to assess the impacts on substitute sites.[298]

Fishing

Kerr and Latham (2011) identified the value of a recreational fishing day from US studies and values per marine recreational fishing trip, while noting that the values reported differed by more than an order of magnitude, particularly as a result of differences in

[297] Bell & Yap (2004): Cocklin, Fraser & Harte (1994); Meyer (1994); Sandrey (1986); Harris & Meister (1981)
[298] Phillips (2014)

methodology used. They also noted that the availability of substitutes is an important determinant of site value.

In New Zealand studies have examined the value of sea fishing on a per fish caught basis,[299] per fisher,[300] per fishing day[301] or per trip.[302] However, applying these values to estimate a benefit of improved water quality in a specific marine area Herne Bay requires an estimate of changes in activity levels or of fish caught. Such estimates are not available to our knowledge.

Passive Use Values

Surveys of the general public on the value of improvements in water quality include those of users of the water and non-users. A person surveyed who is a regular sea swimmer would be expected to express a different value from someone who rarely visits the beach or the sea but values the knowledge of seawater being cleaner. Batstone and others examined the WTP of Auckland residents for improvements in the marine environment resulting from stormwater system alternatives (see Table 41).[303] They found that people had a higher WTP for environmental quality in an Outer Zone, consisting primarily of the main swimming beach locations, than for other parts of the Auckland coast, eg the inner harbour.

Table 41 Household Willingness to Pay ($/year) for Environmental Quality – average of 2 models

Harbour Location	Attribute	Level change	Average (2009$)	Average (2021$)
Outer 	Ecological Health	Low - Medium	$144	$165
		Low - High	$189	$217
	Water Quality	Low - Medium	$214	$245
		Low - High	$304	$348
	Underfoot Conditions	Low - Medium	$132	$151
		Low - High	$186	$213
Middle 	Ecological Health	Low - Medium	$89	$102
		Low - High	$116	$133
	Water Quality	Low - Medium	$58	$66
		Low - High	$99	$113
	Underfoot Conditions	Low - Medium	$61	$70
		Low - High	$62	$71
Upper 	Ecological Health	Low - Medium	$65	$74
		Low - High	$87	$99
	Water Quality	Low - Medium	$43	$50
		Low - High	$103	$118
	Underfoot Conditions	Low - Medium	$61	$70
		Low - High	$64	$74

Source: Batstone *et* al (2008); Batstone and Sinner (2010); Batstone (2010). 2021$ values using CPI

[299] Wheeler and Damania (2001)
[300] Kerr *et al* (2003)
[301] Kaval and Yao (2007)
[302] Schischka and Marsh (2008)
[303] Batstone (2010); Batstone *et al* (2008); Batstone and Sinner (2010)

The results were expressed as household WTP for environmental quality improvements from low to medium or high levels, although these are not clearly defined or explained in the reports. In Table 41 we summarise the results as the average of two (statistical) models used in the study. These were combined with total numbers of households in the Auckland region to estimate the value of improvements.

An alternative approach is that used by van den Belt and Cole (2014) who estimated the value of the ecosystem services provided by New Zealand's marine protected areas on a hectare basis.[304] This built on aggregate numbers used by Costanza et al (1997) in valuing ecosystem services for the world. We have more confidence in using the NZ-specific data based on WTP studies (as per Table 41).

Ecosystem Services

Improvements in sea water quality are expected to result in reduced contamination of shellfish and seawater habitats. This has impacts both on people's ability to harvest shellfish but also on their role in filtering water to improve quality and clarity.[305]

These can be significant local and regional benefits, even if people do not perceive the value of these services.[306]

Values for Analysis

Published studies include those that have valued:

- Improvements in water quality to swimmable levels;
- The value of swimming trips;
- Marine areas, particularly for fishing; and
- The generalised value of improvements in water quality (existence value).

Both Williamson (1997) and Batstone (with others, hereafter *Batstone*) (Table 41) provide values based on the WTP of residents for improvements in water quality in the Inner Harbour area. Both reflect the WTP for improvements that cover a spectrum of values, including different recreational uses and passive use values.

The Williamson study is for a specific area (Orakei basin), but the values might be applicable to Herne Bay/St Mary's Bay because both are in the inner harbour. The Batstone study is for improvements across the whole inner harbour area (in addition to separate values for outer and upper harbour areas).

The values derived from these studies are for improvements in water quality from non-swimmable to swimmable (Williamson) and from low to medium or high quality (Batstone). The values are based on surveys conducted in 1997 and 2009.

[304] Thrush et al (2013) identified ecosystem services associated with estuarine ecosystems but did not value them.
[305] Hauraki Gulf Forum (2019)
[306] Barbera (2012)

Before making the calculations, we make the following comments (and acknowledging the general issues with benefit transfer).[307]

There are reasons why **the values may be under-estimates of current values**.

- Issues of sea water quality have been more discussed in the media since 1997 and there is a greater awareness of water quality issues. Williamson (1997) found that, in 1997, 53% of Auckland city residents were aware of water quality problems (and 93% of Orakei residents). In contrast, a 2019 survey found that 80% of members of an online panel of Aucklanders think checking water quality before swimming is important.[308]

- There has been considerable growth in numbers of people participating in sea water swimming events, which is likely to be an indicator of growth in total demand for clean sea water.[309]

However, there are other reasons why the values **may be over-estimates of value**.

- The sea water at Herne Bay is currently swimmable some of the time and the end point after the separation projects will mean that it is swimmable most of the time. In contrast the Williamson study is for WTP for a shift from not swimmable to swimmable. And the Batstone study is for a not well-defined shift from low or medium to high quality. The change in quality envisaged for Herne Bay appears to be a shift within the range used by Williamson and is not readily related to the changed envisaged by Batstone.

- There are potential biases in the values derived. This includes hypothetical bias when values are over-stated in surveys because respondents do not believe that they will actually have to pay. This is a bias which is increasingly addressed through improved non-market valuation techniques, but we are limited by the data available from existing studies.

Given these uncertainties, the values provide, at best, a ballpark estimate of the value of water quality improvements. We provide sensitivity analysis to take account of this uncertainty.

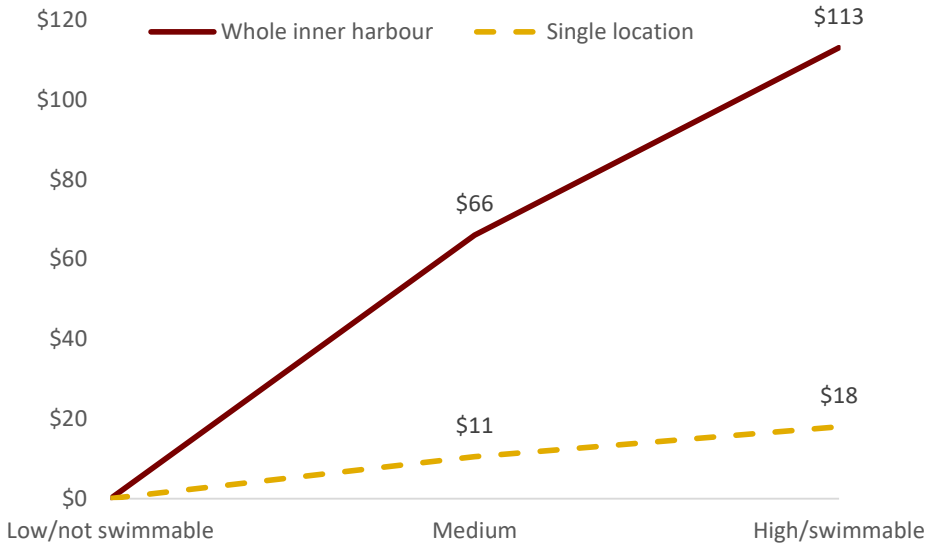
Values for Use in Analysis

Figure 28 shows a possible summary of the values that are usable. In very broad terms they represent the value of improving water quality from low to high. We assume that not swimmable (as used by Williamson) is equivalent to low quality (as used by Batstone) and we assume the declining marginal WTP (as found by Batstone) applies to the Williamson results also, which means there is some medium position with a WTP of $11/household pa. The differences in value are from the differences in area; Batstone's WTP values are for the

[307] Rolfe et al (2015); Barbera (2010); Sharp and Kerr (2005)
[308] Rangsivek *et al* (2019)
[309] Participants in the Ocean Swim Series (oceanswim.co.nz) have increased in number from approximately 300 in 2004 to average approximately 6,500 in more recent years, with over 2,500 participants in Auckland events (Scott Rice, personal communication).

whole of the inner harbour area, whereas Williamson's are for Orakei only. Assuming the end point following the implementation of the separation project is high water quality, to use these values we need to have some understanding of the starting point, eg is it equivalent to medium water quality (swimmable some of the time) or somewhere between medium and high.

Figure 28 Value of Water Quality Improvements - Inner Harbour (2019$/household pa)



Applying these numbers requires an assumption about the relevant population also. We use two estimates (Table 42).

- The Williamson study measured WTP for the Auckland city population. For this we use population projections for Waitemata, Whau, Albert-Eden, Puketapapa, Orakei and Maungakiekie-Tamaki local board areas.[310] This is used to estimate that Auckland City comprises an average of 36% of the Auckland region population; we then combine this percentage with projections of Auckland region households for a longer time period.[311]

- We also test the effects of assuming that only the local population would express a WTP; this is assumed to be the residents of the closest area units, ie those bounded by SH16, SH1 and the sea.

Table 42 Population assumptions (household numbers)

Year	Auckland City	Local
2020	18,452	208,029
2025	19,664	226,323
2050	24,645	344,946
2075	29,107	484,359

Source: derived from StatsNZ projections

[310] NZ.Stat Subnational household projections, by household type, 2013(base)-2038 update
[311] Through to 2069 (source: Stats NZ).

To obtain a range of values, we use different values with these population assumptions.

- With the Auckland city population, we use the assumed marginal WTP from medium to high using the Williamson numbers ($18 - $11 = $7/household pa); and

- With the local population, we use the assumed marginal WTP from medium to high using the Batstone numbers ($113 - $66 = $47/household pa)

Results

The results are shown in Table 43. They are based on simplifying assumptions about the current and future state of water quality relative to the categories used in published studies. Values of water quality improvements per household per annum are combined with projected numbers of households. The results include the annual benefits that are assumed to start in 2025 and the present value (PV) of benefits from 2025 to 2075 (estimated in 2021) using two discount rates: 3% and 5%.

Table 43 Total benefits - annual (in 2025) and present value to 2050 ($ million in 2021$ values)

	Value pa ($/household)	Households (2025)	Average pa population growth	PV (3%)	PV (5%)
Local residents	$47	19,664	0.80%	$26 m	$17 m
Auckland city residents	$7	226,323	1.56%	$52 m	$33 m

Other Benefits

The stated benefits quantified above as a comprehensive value estimate, will cover most of the benefits perceived by Aucklanders associated with improved water quality at Herne Bay.

The missing benefits will be those which are not perceived, or which fall more widely on other New Zealanders. These include:

- The benefit from improvements to marine ecosystems in the inner harbour, which will have spillover effects on the marine ecosystem more widely. We are unable to quantify these effects. These are not included in the comprehensive value estimates above because often people do not perceive the benefits.[312]

- The potential benefit from avoiding a reduction in New Zealand's or Auckland's environmental reputation. Deteriorating water quality and more frequent bathing beach closures has the potential to affect perceptions of Auckland and New Zealand with spillover impacts on the value of exports, including tourists coming to New Zealand. This is also not quantifiable and, from a marginal change in one area of Auckland, it is likely to be a small benefit if any. Nevertheless, it is a potential benefit.

These wider benefits, particularly the ecosystem services provided by marine habitats and species are likely to be substantial and with effects throughout the Waitemata Harbour.

[312] As noted by Barbera (2012)

Summary

We estimate a maximum quantifiable benefit for water quality improvement in Herne Bay/St Mary's Bay will have a PV to 2050 of $26 - 52 million at a 3% discount rate. This is similar to the estimated project costs.

There are additional benefits that are not quantifiable, particularly those associated with the ecosystem services provided by marine species that are currently affected by water contamination.

The analysis would improve significantly with site-specific valuation of the benefits of improving water quality in Herne Bay. Ideally, this would use choice modelling valuation techniques, as used by Batstone and his co-authors (Batstone 2010; Batstone *et al* 2008; 2010; Batstone and Sinner 2010).