



Ministry for the
Environment
Manatū Mō Te Taiao

Proposed amendments to the National Policy Statement for Freshwater Management 2011

Section 32 evaluation

Ministry for the Environment

New Zealand Government

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1 Introduction

This report provides an evaluation under section 32 of the Resource Management Act 1991 (the Act) of proposed amendments to the National Policy Statement for Freshwater Management 2011 (the NPS). The evaluation has been undertaken in accordance with section 32 as amended by the Resource Management Amendment Act 2013.

1.1 Purpose

The purpose of this report is to set out the evaluation of the proposed amendments to the NPS. The amendments create standardised freshwater accounting requirements, a process for setting freshwater objectives, a common set of values and uses, two compulsory national values, associated national bottom lines, and a process to manage exceptions to national bottom lines. The amendments are intended to clarify, and provide a process for, existing actions already required under the NPS. They are proposed to improve the national consistency, efficiency and transparency of the setting of freshwater objectives and limits under existing Policy A1 and Policy B1 of the NPS.

1.2 Background – Freshwater reform 2013 and beyond

In 2009 the Government initiated a programme of work known as *A Fresh Start for Fresh Water*. This programme of work developed a new strategic direction for freshwater reform built on the earlier Water Programme of Action.

The Government has been involved in discussions and engagement with stakeholders since 2009, including the Iwi Leaders Group and its advisors. Advice has also been sought from the Land and Water Forum, which includes representatives from a range of primary industries, electricity generators, recreational groups, environmental organisations, and iwi, with active observers from regional councils and central government. With its first report released in 2010 and two subsequent reports in 2012, the Land and Water Forum arrived at a broad consensus on the way forward for water reform, based on a more active and effective management of fresh water and stronger national direction. The freshwater reform package that the Government has now developed, including the proposed amendments to the NPS, is based on and consistent with the Land and Water Forum's recommendations.

One of the forum's core proposals was the development of a national objectives framework for freshwater, and this forms a key part of the proposed amendments to the NPS. The detail of the proposed national objectives framework has been developed in conjunction with a stakeholder group – the National Objectives Framework Reference Group¹. The science which underpins the proposals has been determined by panels consisting of participants from leading research institutes, independent scientists, iwi based scientist and regional councils². There are specialist

¹ Members include fifteen stakeholders from regional councils, NGOs, Iwi Leaders Group, Horticulture NZ, Federated Farmers, Straterra, Scion, DairyNZ, Mighty River Power, and the National Institute for Water and Atmospheric Research (NIWA).

² Cawthron Institute, Landcare Research, NIWA, GNS Science, Opus, Aqualinc, ESR, AgResearch, Universities of Canterbury, Otago, Waikato and Lincoln, Iwi Advisors Group, Department of Conservation, Ministry of Health, Te Ao Marama, Ministry for Primary Industries,; regional councils (Wellington,

panels for Rivers, Lakes, and Groundwater as well as an Iwi Science Panel. All recommendations were overseen by a Science Review Panel.

The other key proposed amendment to the NPS relates to managing within quantity and quality limits by establishing freshwater accounting systems. Freshwater accounting involves accounting for all water takes (including those that are permitted) and all sources of contaminants (including diffuse sources). Accounting is needed to provide an improved information base on water takes and sources of contaminants to facilitate the setting of freshwater objectives and limits with a full understanding of resource availability. Freshwater accounting will also inform management measures for fresh water and help to identify trends in water quality and quantity over time.

1.3 Section 32 requirements

Section 46 of the Act requires that the Minister for the Environment prepare an evaluation report for the proposed NPS in accordance with section 32 and have particular regard to that report when deciding whether to notify the NPS. Section 32 of the Act states that an evaluation must examine:

- the extent to which the objectives are the most appropriate way to achieve the purpose of the Act, and
- whether the provisions (policies) are the most appropriate way to achieve the objectives, by identifying alternatives and assessing the efficiency and effectiveness of the provisions.

The assessment of efficiency and effectiveness must:

- take into account the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated
- assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

1.4 Resource Management Amendment Act 2013

The Resource Management Amendment Act 2013 (passed in September 2013), made some significant changes to section 32 of the Act. These changes include:

- a requirement to identify ‘other reasonably practicable options’ for achieving the objectives
- a requirement to summarise the reasons for deciding on the provisions (policies);
- more detail on what is required in identifying and assessing the benefits and costs that are anticipated from the implementation of the provisions, including assessing effects on economic growth and employment
- a requirement to quantify benefits and costs if practicable
- clarification that if the proposal is to amend an existing document (NPS), the evaluation must consider the provisions and objectives of the amendment. The evaluation must also consider the extent to which the existing objectives are relevant to the amendments and would remain if the amendments were to take effect.

Auckland, Canterbury, Waikato, Southland, Horizons, Hawke’s Bay), Fish & Game, Wriggle consulting, Gail Tipa and Associates, Golder Associates, Ian Kusab’s and Associates.

To provide the reader with a clear understanding of how the evaluation has been done, the sections below outline how the analysis has been undertaken consistent with the new section 32 requirements.

1.5 Evaluating the proposed NPS objectives

Section 32(1)(a) requires an examination of the extent to which the proposed NPS objectives are the most appropriate way to achieve the purpose of the Act. In undertaking this examination the purpose of the Act (section 5) and the principles that inform it (sections 6 – 8) have been used as criteria.

While section 32(1)(a) does not require options for objectives to be developed, in order to determine whether a particular objective is the ‘most appropriate way to achieve the purpose of the Act’, there is a need to compare an objective with at least one other option. Because the proposed amendments to the NPS build on existing requirements relating to setting freshwater objectives and limits, the approach adopted in this evaluation report has been to compare the proposed objectives with the status quo (ie the current NPS objectives).

The status quo and the proposed amendments have been assessed against the criteria that have been developed (from section 5 – 8 of the Act) and a determination made, as to whether the objectives address the issues identified in the problem statement. A concluding judgement is then made about which option (the status quo or the proposed amendment) is the most appropriate to achieve the purpose of the Act.

1.6 Evaluating the proposed NPS policies

Having examined the appropriateness of the objectives, the evaluation then turns to whether the policies are the most appropriate way to achieve the objectives. Section 32 of the Act provides detail on how this evaluation is to be undertaken.

By referring to ‘objectives’ and ‘provisions’, section 32 allows for provisions to be assessed as a group, rather than on an individual basis, consistent with case law³. The approach of ‘bundling’ the proposed policy amendments into groups has been taken with this section 32 analysis, partly because the proposed policies are designed to act as an integrated suite of provisions, and partly in recognition that the proposed amendments to the NPS are to be the subject of consultation in November and the exact wording of each policy is yet to be confirmed.

The principal tasks in evaluating the policies are discussed below.

1.6.1 Reasonably practicable options

Section 32(1)(b)(i) of the Act requires other reasonably practicable options for achieving the objectives to be identified as part of the evaluation. Throughout the process of developing the proposals in the *Freshwater reform 2013 and beyond* consultation paper (which in turn are based on the Land and Water Forum recommendations), a series of options were considered both in terms of the form of the amendments and the methods by which they could be

³ ‘it is not necessary that each objective individually be the most appropriate way of achieving the purpose of the Act. This is because objectives may interrelate and have overlapping ways of achieving sustainable management of natural and physical resources’. *Rational Transport Soc Inc v New Zealand Transport Agency* [2012] NZRMA 298 (HC).

implemented. These options are outlined at the beginning of each evaluation of a group of policies. Options that were considered by officials during the development of the freshwater reforms, but discounted because they were not practicable (for example, implementing the national objectives framework by way of a National Environmental Standard) are also identified, but have not been evaluated in detail here (see the draft *Regulatory Impact Statement - Amendments to the National Policy Statement for Freshwater Management 2011* for the evaluation on various regulatory options).

1.6.2 Efficiency - benefits and costs

Section 32(1)(b)(ii) of the Act requires assessing the efficiency and effectiveness of the policies. Section 32 of the Act has always required an assessment of the costs and benefits of measures introduced under the Act, with the additional requirement in the 2013 Amendment Act that these should be quantified *if practicable* and consideration should also be given to the opportunities created or forgone for economic development and employment.

1.6.3 Effectiveness

Section 32(1)(b)(ii) also requires an assessment of the effectiveness of the policies. The fundamental question for assessing effectiveness is whether the policies will achieve the NPS objectives.

A series of criteria have been used to assess the effectiveness of provisions, they are as follows:

- **Transparency**

‘Effective’ provisions (policies) assist with clarifying the impact of objectives and limit setting by providing a process. Stakeholder understanding of the impacts of value choices and choices of management approaches/rules available for managing within limits, before freshwater objectives are set in a regional plan, is increased through use of the process.

- **Practicality**

‘Effective’ provisions will cause the least disruption to current objective and limit setting in plans. They are realistically achievable given the costs, skills and capacity that will be required to implement it.

- **Treaty of Waitangi**

‘Effective’ provisions take into account the principles of the Treaty of Waitangi as required by section 8 of the Act. The option is flexible enough to allow for variance in viewpoint and values between different iwi and hapū.

- **Strength of language and understandability**

‘Effective’ provisions are clear and directive, and written in a way that is easy to understand and implement by regional councils.

These effectiveness criteria have also been used for assessing the proposed freshwater accounting provisions in section 6.2.2 of this document.

1.6.4 Reasons for deciding on the provisions

Section 32(1)(b)(iii) of the Act requires a summary of the reasons for deciding on the provisions to be provided. This has been included for each grouping of provisions, as a conclusion to the assessment of effectiveness and efficiency sections.

1.6.5 The risk of acting or not acting

Section 32(2)(c) requires an assessment of the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of provisions. The approach taken in this evaluation is first to identify whether or not sufficient and certain information exists in relation to the subject matter of the provisions. Where sufficient and certain information is available, there is no requirement to assess the risk of acting or not acting, and therefore no further analysis is undertaken. Where there is uncertain or insufficient information this is identified, and then the risk of acting or not acting is discussed in terms of the following:

- What would be the consequences if action was not taken?
- What would be the consequences if action was taken?

This analysis draws from the discussion of costs and benefits and the effectiveness of the provisions in achieving the objectives.

1.7 Information sources

The evaluation contained in this report has been based on a review of the following information: The reports of the Land and Water Forum, the draft Regulatory Impact Statement –Proposed amendments to the NPS, the discussion document *Freshwater reform 2013 and beyond* and the report of the National Objectives Framework Reference Group. The efficiency section utilises studies conducted on the economic impacts of national bottom lines (particularly case studies conducted in Southland and Canterbury), and a review conducted by NIWA of regional council methodologies for accounting systems and limit setting.

2 The problem statement

There are risks that the implementation of the NPS as currently written will not achieve the level of improvement sought in freshwater management to provide for New Zealand's economic growth and environmental management. Based on an understanding of implementation efforts to date and potential issues in the future, efficient and effective implementation requires further specificity and guidance from central Government.

Many of the implementation decisions that councils will need to make under the current NPS are significant, and have the potential to become caught up in lengthy and costly debates due to uncertainty regarding implementation.

Uncertainty about interpretation and implementation of the NPS

The NPS is open to wide interpretation on some matters, particularly the narrative objectives such as those relating to life-supporting capacity and the requirement to maintain or improve water quality across a region. A survey conducted by the Ministry for the Environment in December 2012 asked what issues councils were having with interpreting the NPS. All councils cited difficulties with 'defining life-supporting capacity' and seven of the 16 councils cited uncertainty regarding the difference between numeric objectives and limits. Half of all councils cited issues with capability and capacity with regard to resourcing the technical investigations and science required to inform freshwater objective and limit setting.

Narrative objectives in the NPS are supported by policies which require freshwater objectives and limits to be set to achieve them. The intent is that freshwater objectives need to be more than overarching outcomes to be effective. Under the NPS councils may take very different approaches to freshwater objective and limit setting, because the NPS does not direct the use of any specific approach or methodology. The variation in approaches has been demonstrated in implementation programmes that 13 of the 16 regional councils have publicly notified. There is also the potential for inconsistency in providing for national values.

Councils individually conducting the scientific and technical work required to underpin freshwater objective setting results in unnecessary repetition of effort, particularly for values that have been identified as applying nationally. Setting freshwater objectives on a region by region basis with no national direction may also lead to each council having to defend its science and technical work through the courts, which is costly for both councils and communities. These factors result in a risk of inefficiency, if debate about values and the science behind the objectives is duplicated in multiple catchments and regions; and ineffectiveness, if objectives and limits are set at a level that does not safeguard the life-supporting capacity of water bodies, or are set unnecessarily high without regard to the social and economic impacts.

There is a risk that decisions on plan changes may not reflect community values, or may not be informed by suitably rigorous analysis of the implications (including economic) of all limit setting options to meet objectives for the relevant values. Plan advocacy costs are also likely to be incurred by submitters and stakeholders needing to re-litigate the same issues around the country.

The size, magnitude and incidence of these problems will vary considerably across different regions and different plan changes. The causes of these problems are the lack of specific direction in the NPS, the considerable variation in council approaches, both because of their

capacity and resourcing, and the different nature of water resources and pressures in each region. National direction on nationally agreed values and the levels of attributes that are needed to maintain these values would significantly reduce the risks posed by the current uncertainty about interpretation and implementation of the NPS.

Difficulty of implementation

Freshwater objectives and limits should be measurable in order to be effective. To achieve this they must be underpinned and supported by a comprehensive information base on water takes and sources of contaminants (termed collectively ‘freshwater accounting’). Effective freshwater accounting is viewed as a critical first step in setting effective objectives and limits. There are currently few incentives for councils to carry out adequate freshwater accounting, especially for water quality, which is relatively undeveloped in New Zealand.

The accounting systems developed to date by individual councils for water quantity are generally good, but vary in their levels of sophistication, reflecting resource pressures, capability, capacity and data availability. Councils are collecting information on consented takes⁴, although the frequency and method of reporting (ie, telemetry vs manual reporting; annual records vs ‘on request’) means the information can be variable. Permitted takes (either under section 14 of the Act or under permitted activity rules in regional plans) are not typically monitored, although some councils do model the volume of water likely to be taken through permitted activities.

In contrast, most councils are in the early stages of accounting for all sources of contaminants (accounting for quality). Information is generally gathered on major point source discharges, but not on more minor discharges, and rarely on diffuse source discharges. Examples of source analysis on diffuse source discharges include work by Environment Waikato in four Hauraki catchments, Horizons Regional Council in the upper Manawatu River catchment, Tasman District Council in the Waimea and Motupipi catchments, and Auckland Council’s development and application of a Catchment Load Model.

As a result of the different approaches and stages at which councils are at, accounting is inconsistent between regions and in some cases between catchments (especially for accounting for quality). Information cannot be compared and consolidated to inform decision-making. This increases the likelihood of ineffectiveness and inefficiency. For example:

- freshwater objective and limit setting decisions may be made with inadequate or incorrect accounting information on existing water takes and sources of contaminants, resulting in poorly informed limits being set
- decisions on approaches to managing within limits may be ineffective if they are based on inaccurate accounting information, resulting in limits being breached (or targets not being achieved)
- the economic costs of meeting targets may be distributed inequitably eg, if sources of contaminants are incorrectly identified
- if accounting information is not available then a national or regional picture cannot be developed to show consolidated long term trends.

⁴ In accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.

3 Status quo

A suite of amendments to the NPS is proposed to address some of the problems identified in section 2 of this report. To provide some context for the consideration of the proposed amendments, a brief outline of the status quo for each of the two groups of amendments is provided below.

3.1 Freshwater objective and limit setting

The NPS objectives require life-supporting capacity, ecosystem processes and indigenous species, including associated ecosystems to be safeguarded in:

- sustainably managing the use and development of land and of discharges of contaminants (Objective A1), and
- sustainably managing the taking and use of freshwater (Objective B1).

Objective A2 requires the overall quality of freshwater within a region to be maintained or improved.

These objectives are supported by Policies A1 and B1 which require regional councils to establish freshwater objectives and set freshwater quality limits and environmental flows and/or levels for all bodies of fresh water. Policy A2 requires that where a water body does not meet freshwater objectives a council can specify targets and using regulatory and non-regulatory methods can meet those targets over a defined timeline.

Policy E1 gives regional councils the choice of either completing implementation of the NPS by 31 December 2014, or if the council considers that 'impracticable', setting freshwater objectives and limits by no later than 31 December 2030. Regional councils adopting the latter option must formally adopt, and have publicly notified by November 2012, a 'programme of time limited stages by which it [the NPS] is to be fully implemented'. While councils must have freshwater objectives and limits in place by 2030 the NPS does not stipulate when these must be met.

A survey of regional council progress against the requirements of the NPS was conducted in December 2012. It showed three councils intended to fully implement the NPS by 2014 (Horizons, Taranaki and Otago) and that the remainder had notified a progressive implementation plan.

Freshwater objective and limit setting is not currently subject to any detailed national guidance, and as a result there is uncertainty that objectives and limits will be set in regional plans as intended.

3.2 Freshwater accounting

A requirement for freshwater accounting is currently implied through the duties imposed on local authorities by sections 35(1) and 35(2) of the Act. Section 35(1) requires local authorities to gather such information as is necessary to effectively carry out their functions under the Act. For regional councils those functions include the control of the taking, use, damming and diversion of water, and of the quantity, level and flow of water in any water body (section 30(1)(e)) and the control of discharges of contaminants into or onto land or water (section 30(1)(f)). Section 35(2)(d) requires local authorities to monitor the exercise of resource

consents. For regional councils this will include the exercise of water permits to take water, and discharge permits to discharge contaminants to land or water.

Consultation with a number of regional councils has indicated that most accounting systems developed for water quantity are generally good, though vary in their levels of sophistication. In contrast, most councils are in only the early stages of accounting for all sources of contaminants, and the approaches used vary widely.

4 Proposed amendments

For the purposes of this evaluation the proposed amendments to the NPS have been divided into two broad groups:

- Inclusion of the national objectives framework – provides a nationally consistent process for objective setting, contains a reference set of values, including two compulsory values with associated national bottom lines, a process to deal with exceptions to national bottom lines and an approach for how freshwater objectives should be monitored.
- Freshwater accounting –provisions to require water quality and water quantity accounting systems to be developed and in operation prior to limits being established in accordance with Policies A1 and B1 of the NPS, to improve the information base on water takes and sources of contaminants.

4.1 National objectives framework

Provisions relating to the national objectives framework are proposed to be inserted into the NPS as a new section CA. This section consists of one objective and three policies. In addition, references to the national objectives framework are in proposed amendments to the Preamble, Objective A1 and Policies A1, A4 and B1. Appendices 1 and 2 referred to in section CA are also included. A number of definitions are also proposed to be included.

The aim of the amendments, as outlined in Objective CA1, is to provide for a nationally consistent approach to establishing freshwater objectives (required under Objective A1) for national values and any other values or uses, while recognising regional and local circumstances.

Objective CA1 is proposed to be implemented by three policies. Policy CA1 sets out the process for councils to use in developing freshwater objectives. This process is to be conducted by:

- identifying values of freshwater bodies, which must include the compulsory national values identified in Appendix 1
- for each of the identified values, identifying measureable characteristics of a freshwater body (known as attributes) that support that value
- where the attributes are contained in Appendix 2 of the NPS, assigning a state (from the range contained in Appendix 2) to which the attribute is to be managed, which must be above the national bottom line
- formulating freshwater objectives based on the selected attributes, using the selected state from Appendix 2 for those attributes where it is available, or developing numeric or narrative objectives where a defined range of states for an attribute is not available.

Policy CA1 also sets out matters that are to be considered in developing freshwater objectives under the process outlined above.

Policy CA2 provides for exceptions to bottom lines in specific circumstances. It requires every regional council to ensure that freshwater objectives for the compulsory values of ecosystem health and human health are set at or above the national bottom line, unless:

1. **natural conditions** result in water quality below a bottom line for a water body, for example due to a significant native bird colony, or

2. **historical activities** have created impacts that have caused the water quality to be below a bottom line and the reversal of those impacts is not reasonably practicable, either physically or ecologically, even in the long term, for example, the effects of historical mining, or
3. where the effects of significant **existing infrastructure** means bottom lines will unlikely be met.

The first two grounds for exceptions would be decided regionally as part of the planning process. The third ground for an exception would be decided nationally through an amendment to the NPS and public consultation. The amendment would provide for certain water bodies to be listed in Appendix 3 of the NPS. Proposed criteria for having a water body listed in the appendix are:

- a. the need for an exception must arise because of limited management options as a result of significant existing infrastructure
- b. the significant existing infrastructure affecting the water body must enable economic benefits that have a significant impact on national or regional GDP, and
- c. the economic benefits can only be realised if the freshwater objectives for the water body are set below bottom lines (that is, setting a long term objective at or above bottom lines will not provide that same or similar economic benefit).

Policy CA3 provides a transitional period where a council and community may temporarily set a freshwater objective below national bottom lines. This transitional period will only apply where agreed through an amendment to the NPS. The transitional period identified in the NPS would then provide relief for a community concerned about the impacts of adjusting to national bottom lines by temporarily allowing objectives in the identified water body to be set below a national bottom line. Following any agreed transitional period, a new plan would be required to set freshwater objectives that comply with national bottom lines. The length of any transitional period and the area to which it applies would be decided on a case by case basis.

The proposed change to Objective A1 would include human health (for secondary contact with water) as a national value, alongside the existing reference to life-supporting capacity that is contained in the objective. Amendments proposed to Policies A1 and B1 would provide a link to section CA of the NPS. Amendments proposed to Policy A4 would require consent authorities to have regard to the effects of activities on the health of people and communities when considering an application for consent.

A new section – CB Monitoring Plans, is also proposed to be included. The amendment consists of one objective and one policy. Objective CB1 provides an approach to the monitoring of progress towards, and achievement of, freshwater objectives established under Policies CA1 – CA3. Objective CB1 is supported by Policy CB1 which requires regional councils to develop a monitoring plan that establishes methods for monitoring progress toward freshwater objectives using a representative range of sites and relying on long-term trends.

4.2 Freshwater accounting

Provisions relating to freshwater accounting are proposed to be inserted into the NPS as a new section CC. The amendments consist of one objective and two policies.

The objective of the amendments, as outlined in Objective CC1, is to improve the information base available nationwide on water takes and sources of contaminants. Objective CC1 envisages that this information base will:

- ensure the necessary information is available for limit setting and other management processes under the NPS
- ensure information is available to resource users to allow them to assess the availability of any given resource, and
- enable data to be used on a regional and national basis for water management and monitoring.

Objective CC1 is proposed to be implemented by two policies. Policy CC1 would require regional councils to establish both water quality and water quantity accounting systems for freshwater management units where freshwater objectives and limits are being set or reviewed. Policy CC1 also recognises that the accounting systems established should be at a scale that corresponds with the significance of the issues in each freshwater management unit. Policy CC2 would require regional councils to ensure that the information gathered through freshwater accounting systems was available in five-yearly intervals for sources of contaminants, and in one-yearly intervals for water takes.

4.3 Minor amendments

A series of more minor amendments are also proposed to the objectives and policies of the NPS, including:

- updating provisions for outstanding freshwater bodies to ensure there is consistent reference to values
- clarifying that Policy C2 applies to effects of the use and development of land and fresh water on coastal water, consistent with Objective C1, and that councils must have regard to the connections between freshwater bodies and coastal water when setting freshwater objectives and limits under Policies A1 and B1
- referring to freshwater management units as the spatial scale at which freshwater objectives and limits are to be set (rather than water bodies), to be consistent with freshwater accounting
- updating Policy E1 to clarify that programmes of staged implementation of the NPS are to be reviewed and revised if necessary to be consistent with the proposed amendments to the NPS.

Additional text is proposed to be included in the Preamble to outline the context of the national objectives framework, the link between the NPS and the New Zealand Coastal Policy Statement, the notion of Te Mana o Te Wai and clarification of the maintain or improve requirement. Relevant definitions are also proposed to be included.

The minor amendments have not been assessed in this report as they are not considered to significantly alter the current NPS.

5. National objectives framework

The proposed amendments to the NPS for freshwater objective setting stem directly from the work and recommendations of the Land and Water Forum. The first report of the Land and Water Forum recommended that central Government should define national objectives for the state of New Zealand's water bodies. The second report of the Land and Water Forum reiterated the need for national objectives and recommended the establishment of a national objectives framework with a limited number of national bottom lines which would apply to all freshwater bodies. The forum provided a number of options for how this could be achieved at the national level. Officials then worked with a series of science panels and a National Objectives Framework Reference Group to build on the forum's recommendations, specifically to develop and test a national objectives framework and national bottom lines.

The concept of a national objectives framework with national bottom lines was described in the *Freshwater reform 2013 and beyond* discussion document released for public comment in March 2013. General support for the concept was expressed, with a number of parties suggesting that further information on the details of the proposal would be useful and offering assistance with its development.

5.1 Appropriateness of Objectives CA1, CB1 and A1

This section addresses the requirements of section 32(1)(a) of the Act, by providing an evaluation of the extent to which the proposed objectives are the most appropriate way of achieving the purpose of the Act. Objective CA1 is proposed to provide for a nationally consistent approach to setting freshwater objectives, for national values, and other values and uses. Objective CB1 is proposed to provide guidance on how councils should monitor progress toward, and achievement of freshwater objectives, which will also assist in providing a nationally consistent approach.

Existing Objectives A1 and B1 identify national priorities of water, being life-supporting capacity, ecosystem processes and indigenous species (including their associated ecosystems). The Land and Water Forum and further consultation processes identified that human health should also be a national priority for water bodies throughout the country. The proposed amendments to Objective A1 will make this explicit.

5.1.1 Options

The current Policies A1 and B1 of the NPS require the setting of freshwater objectives and limits. The aim of the proposed amendment (Objective CA1) is to provide a process for how to set freshwater objectives. Because of the existing requirements under Policies A1 and B1, only two options are considered to be possible in relation to Objective CA1. One option is to provide direction by introducing a national objectives framework through regulation to assist councils. The other option is to maintain the status quo where each council individually develops a process and undertakes the science to set freshwater objectives.

Objective CB1 provides for an approach to monitor *progress towards, and achievement of freshwater objectives*. Neither the Act nor the NPS currently require monitoring of the implementation of an NPS. The new Objective CB1 – is proposed to make it explicit how the freshwater objectives required by the NPS are to be monitored and achievement toward them

assessed – in short how they are being implemented. It is considered there is no alternative other than to include Objective CB1.

With respect to proposed changes to Objective A1, consultation in April 2013 through the *Freshwater reform 2013 and beyond* discussion document revealed wide consensus for human health as a national value of fresh water. It is therefore considered that there is no alternative other than to amend Objective A1 to incorporate human health.

5.1.2 Appropriateness assessment

Section 32(1)(a) of the Act requires an assessment of whether a proposed objective is the most appropriate way to achieve the purpose of the Act. The assessment of Objective CA1 and the status quo against the purpose of the Act (s5) is given in Table 1 below. An evaluation can then be made about whether the proposed objective is the most appropriate means to achieve the purpose of the Act.

Table 1: Assessment of Objective CA1 and the status quo against the purpose of the Act

	Achievement of the purpose of the Act	
	Objective CA1	Status quo
Purpose of the Act (s5)		
Enable people and communities to provide for their social, economic and cultural well-being (s5(2))	<p>The proposed national objectives framework contains social, economic and cultural, values and uses for water. Taking a nationally consistent approach to describing these values and uses will provide certainty for people, communities and resource users and allow a consistent platform for discussion about the regional and local expression of values.</p> <p>It will also increase the transparency of the discussions between communities and councils because the national values will be clearly linked to the associated freshwater objectives and the effect of the consequent limits will be more apparent. This allows for a more comprehensive discussion of the effects of limits on social, economic and cultural well-being.</p> <p>The ability for the regional and local expression of values will enable people and communities to provide for their social, economic and cultural well-being through a locally mediated and derived process.</p>	<p>National values of water are currently identified in the Preamble to the NPS, but don't have statutory force. Objectives set on a region by region basis will enable people and communities to provide for their social, economic and cultural well-being through a locally mediated and derived process, but may be inconsistent across the country.</p>

	Achievement of the purpose of the Act	
	Objective CA1	Status quo
Enable people and communities to provide for their health and safety (s5(2))	The proposed national objectives framework contains national values and uses relating to the health and safety of communities, including human health (human health, recreation and water supply).	Freshwater objectives set regionally will enable people and communities to provide for their health and safety, using national guidance.
Sustain the potential of natural and physical resources to meet needs of future generations (s5(2)(a))	The proposed national objectives framework includes national values that relate to sustaining the potential of natural and physical resources (ecosystem health, natural form and character). The mandatory national bottom lines for ecosystem health will ensure that irreversible change does not occur, thus sustaining natural resources to meet the needs of future generations.	Freshwater objectives set regionally will recognise local circumstances in managing resource availability for future generations.
Safeguard the life-supporting capacity of air, water, soil and ecosystems (s5(2)(b))	<p>The proposed national objectives framework specifies sets of nationally agreed attributes that contribute to the protection of life-supporting capacity.</p> <p>The mandatory bottom lines for ecosystem health will ensure that the life-supporting capacity of water and ecosystems is safeguarded.</p>	Freshwater objectives set regionally should safeguard life-supporting capacity, but there are identified problems with defining what the narrative term ‘life-supporting capacity’ means. If high level narrative objectives continue to be set, and achievement of these objectives is expected to be attained through resource consent decisions, then continued degradation of water bodies could continue.
Avoid, remedy or mitigate adverse effects of activities on the environment (s5(2)(c))	The thresholds set for each of the attributes are based on avoiding or mitigating the effects of activities.	Setting objectives and limits and then managing to them will help to ensure that adverse effects of activities are avoided, remedied or mitigated, but may not be as effective if relevant values, including national values have not been considered.
Principles of the Act (ss6 – 8)		
Matters of national importance (s6)	Section 6(a) of the Act requires the Minister to recognise and provide for the preservation of the natural character of wetlands, and lakes and rivers and their margins. The proposed national objectives framework includes natural form and character as a national value, with an associated description. This will provide a consistent approach to give effect to the requirements	Objectives set regionally will provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, but may lead to an inconsistent approach across the country and greater or lesser levels of protection depending on the attributes and states selected.

Achievement of the purpose of the Act		
	Objective CA1	Status quo
	<p>of section 6(a) of the Act in setting freshwater objectives and limits.</p> <p>Section 6(c) of the Act requires the Minister to recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna. The proposed national objectives framework specifies attribute states for ecosystem health that range from “A”, which is approximately pristine, down to “D”. The “A” state recognises the importance of significant habitats of indigenous fauna and where this state is selected this matter will be provided for.</p> <p>Section 6(e) of the Act requires the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga to be recognised and provided for. The national objectives framework proposes national values for mahinga kai, kei te ora te mauri, wai tapu, and tauranga waka. The framework provides a more consistent approach to recognising Māori values, and further definition of these values is still possible at a local level.</p>	<p>The objective and policy in section D of the NPS requires the involvement of iwi and hapū in the management of fresh water and ecosystems. Setting objectives on a region by region basis will therefore recognise and provide for the relationship of Māori with water, but may result in greater uncertainty if there is a lack of understanding of different Māori values, or if local iwi lack resources to be involved in multiple processes to define values.</p>
Other matters (s7)	<p>Sections 7(a), (c), (d), (f), (g) (h) and (j) are relevant to a consideration of Objective CA1.</p> <p>The proposed national objectives framework includes national values that relate to these parts of section 7 of the Act (mahinga kai, wai tapu, recreation, natural form and character, ecosystem health, fishing, hydro electric power generation), and sets out (or will set out) attributes and states that will ensure they are provided for consistently throughout the country.</p>	<p>Setting freshwater objectives and limits regionally will still require councils to have regard to each of the relevant matters listed in section 7, however an element of uncertainty remains in ensuring the definition of objectives and limits for these matters because of the narrative nature of the existing provisions in the Act.</p>

	Achievement of the purpose of the Act	
	Objective CA1	Status quo
Treaty of Waitangi (s8)	Including mahinga kai and wai tapu as national values with descriptions agreed by iwi, provides a platform for further discussions with tāngata whenua through the objective and limit setting processes, and explicitly provides for Treaty principles such as active protection and partnership to be taken into account.	The objective and policy in section D of the NPS directs councils to involve iwi and hapū in the management of fresh water and ecosystems. Councils will still be required to take into account the principles of the Treaty of Waitangi when setting objectives and limits on a region by region basis.

In summary, including the national objectives framework in the NPS provides greater certainty that section 5(2)(b) of the Act can be achieved by specifying minimum states for ecosystem health and the health of communities (for secondary contact recreation). It also provides greater certainty for people and communities about the minimum states that will apply for other national values, and the limits within which they may be able to provide for their social, economic and cultural wellbeing. The greater consistency arising from the application of the national objectives framework in a statutory instrument is also likely to result in more effective objectives and limits setting, and consequently a more effective achievement of the purpose of the Act than the status quo.

Objective CB1 has not been assessed against s5 of the Act. The requirements of Objective CB1 are more closely aligned with section 35(2)(b) of the Act. This section requires councils to monitor the efficiency and effectiveness of their policies, rules and other methods. The proposed Objective provides an approach for monitoring *progress toward and achievement of freshwater objectives*. As such this is considered complementary but additional to the requirements of the Act. Objective CB1 is therefore considered appropriate to achieve the purpose of the Act.

In terms of the proposed amendments to Objective A1, safeguarding the health of people and communities as part of sustainably managing the use and development of land and the discharge of contaminants will ensure that the purpose of the Act will be achieved.

5.1.3 Appropriateness of objectives conclusion

On the basis of the comparison between Objective CA1 and the status quo outlined in Table 1, and the discussion above, it is considered that of the available alternatives, Objective CA1 and the proposed amendments to Objective A1 are the most appropriate way of achieving the purpose of the Act. Objective CB1 is considered to be an appropriate way of achieving the purpose of the Act.

5.2 Appropriateness of Policies CA1 – CA3

Section 32(1)(b) of the Act requires an assessment of whether the ‘provisions’ (in this case the policies) are the most appropriate way of achieving the proposed Objectives. The Act requires that the evaluation should identify other reasonably practicable options (5.2.1) and assess the effectiveness (5.2.2) and efficiency of the policies (5.2.3), the risk of acting or not acting (5.2.4), as well as a summary of the reasons for deciding on the policies (5.2.5). These evaluations have been undertaken at a level of detail which corresponds to the scale and impact of the proposal as required by section 32(1)(c).

As required by section 32(3)(b) the appropriateness of the policies has been assessed against both the objective proposed to be included by the amendments (Objective CA1) and the existing objectives of the NPS (Objectives A1, A2, B1 and B4).

5.2.1 Options (section 32(1)(b)(i))

When the current NPS was gazetted the Government agreed that additional measures were needed to achieve effective implementation of its policies. Suggested additional measures included guidance on the process of freshwater objective and limit setting, development of scientific tools and models, and further regulation if required. The Government asked the Land and Water Forum to provide recommendations on what supporting measures should comprise. The Land and Water Forum provided recommendations in its second report (April 2012), among which were several options around greater national guidance and further options around the detail and implementation of a national objectives framework.

Section 32(1)(b)(i) requires identifying other reasonably practicable options for achieving the objectives. Options to promote a nationally consistent approach to the setting of freshwater objectives (Objective CA1) and safeguarding the health of people and communities (Objective A1) can be categorised into three types:

- alternatives to the national objectives framework (section 5.2.1.1)
- alternative structures for the national objectives framework (section 5.2.1.2)
- implementation alternatives (section 5.2.1.3).

5.2.1.1 Alternatives to the national objectives framework

Alternatives to the national objectives framework considered included:

- a. the status quo (ie, relying on the narrative national standards in sections 70, 107 and Schedule 3 of the Act, and the requirement under Policy A1 and Policy B1 that freshwater objectives and limits be set)
- b. national processes, methods and toolkits for regional setting of objectives, limits and adjustment timeframes.

a) The status quo

Issues with the status quo have been discussed in section 2 of this report. In terms of the relevant parts of the Act that would support the status quo, Schedule 3 is a classification of water quality classes based on the uses for which water may be managed. Some classes specify measureable parameters (eg, temperature and pH) to ensure water quality will support the uses it is being managed for. However many classes contain only narrative descriptors to support the class objectives (eg, ‘no undesirable biological growths’ for swimming) and use of these classes then relies on additional technical guidance to create quantitative objectives. Schedule 3 of the

Act has some elements similar to the proposed national objectives framework, but it has relatively low statutory weight and has not been updated to reflect scientific advances since the Act was first promulgated in 1991.

b) National processes, methods and toolkits

National processes, methods and toolkits to support regional objective and limit setting would provide detailed guidance on the process to set objectives and limits. The provision of information and decision-support tools has the potential to assist in providing certainty, transparency and national consistency in objective and limit setting. However, its non-statutory nature means the risk that life-supporting capacity and human health would continue to be provided for inconsistently across the country would remain. Additionally the regional plan provisions that provide for these national values can still be challenged through the planning process, and decided ultimately by the courts.

5.2.1.2 Alternatives within the national objectives framework

Options relating to the structure of the national objectives framework that were considered include:

- a. recommended numeric attributes that apply to particular national values
- b. setting timeframes for meeting national bottom lines.

a) Recommended attributes for national values

Under this option attributes in the national objectives framework would produce a recommendation. A council could choose an alternative value where they determined the recommended attribute wasn't locally appropriate and if so would need to undertake scientific work to develop regionally specific attributes.

This option would reduce national consistency and leave councils open to legal challenge on locally developed attribute ranges, particularly in terms of whether those ranges give effect to the compulsory values. Science costs would be increased as councils undertake the work to develop alternatives to the national defaults. Having attributes as recommendations risks the benefits of national bottom lines being lost if they were rarely used or there was debate through planning processes about whether they were appropriate.

b) Setting timeframes for meeting national bottom lines

Setting timeframes within which national bottom lines must be met was also considered, with allowance for exceptions based on defined criteria (envisaged as being broader than just circumstances where natural conditions make it impossible to meet bottom lines). Timeframes for meeting bottom lines would be different to the NPS timeframe for setting objectives and limits by 2030.

Any setting of timeframes must deal with:

- the date at which the freshwater objective must be set
- the date at which the limit to meet the freshwater objective is achieved, and
- the date at which the desired water quality is achieved (possibly even longer than achieving the limit given possible lag effects from groundwater contribution).

The major issue with setting timeframes for meeting national bottom lines is that it cannot easily allow for lag times in water quality effects from historical practices (legacy issues). Additionally, it risks producing an 'economic shock' due to the reduced ability to spread

adjustment costs over time. The effectiveness of setting timeframes is also questionable, for example a timeframe for ‘good water quality’ met by 2015 is a requirement of the EU Water Framework directive, but the result has been a glut of applications for exceptions based on inability to meet timeframes, rather than a meeting of the requirement for ‘good water quality’ to be met.

5.2.1.3 Implementation alternatives

The proposed amendments represent a regulatory approach to implementing the national objectives framework. Five other alternatives were considered:

- a. the status quo (discussed above)
- b. guidance (non-regulatory)
- c. a National Environmental Standard
- d. amending Schedule 3 and Section 69 of the Act, and
- e. an alternative regulatory instrument under section 360 (or other) of the Act.

All the above options are canvassed in the *Regulatory Impact Statement – Amendments to the National Policy Statement for Freshwater Management*, so are only briefly discussed below.

b) Guidance

The guidance option would involve building on the existing guidance by including the national objectives framework, which can then be used by councils and communities to assist with choosing freshwater objectives. Guidance material would also identify which values within the framework relative to the narrative bottom line objectives in the NPS are expected to apply to all water bodies.

Guidance has the potential to speed up plan development processes (by reducing the time necessary to research each value on a regional basis) and reduce the basis for appeals (through provision of transparent information on values in the national objectives framework). However, there is uncertainty about the universal uptake of guidance material, and this will impact on the national consistency of freshwater objective setting. Additionally, the matters covered by guidance would still be subject to litigation, resulting in little improvement in the short term efficiency of the objective setting process, and potentially ineffective objectives or objectives set by the courts.

c) National Environmental Standard

The intention is to address national inconsistency and inefficiency of freshwater objective setting already required by the NPS. If a National Environmental Standard (NES) were to be used, it could only regulate the two values defined as compulsory national values because they are the only values held by all water bodies in the country. An NES primarily impacts the resource user and are effectively rules that stipulate when a consent is required and its conditions. The intention is that freshwater objectives are identified in regional plans and the best way to achieve them be determined at the local level via plan provisions. An NES is not a feasible option for improving freshwater management while recognising regional differences.

d) Amending Schedule 3 of the Act

Schedule 3 of the RMA is a set of water quality classes based on the uses for which water may be managed. While schedule 3 could be expanded to include the numeric attribute states for each value, and so address the problem of plans adopting various thresholds for swimming for example, it could not provide a process for how the plan should set objectives based on those

assigned values. Replacing Schedule 3 was therefore discarded as a feasible option for addressing the problem.

e) New regulatory instrument

Developing a new kind regulation not currently provided for in the RMA was considered when an NES approach was rejected. Such an instrument could be tailor-made to suit the national objectives framework but would need to be sufficiently differentiated from what existing regulatory tools (NPS/NES) provide. A new instrument would have required repealing the NPS and incorporating aspects of it within the RMA itself. This option was rejected because it was determined that an NPS can include direction on a processes or method, therefore developing a purpose-made regulation was not necessary.

5.2.2 Effectiveness (section 32(1)(b)(ii))

Section 32(1)(b) of the Act requires an assessment of whether a policy is effective in achieving the objectives. Policies CA1 – CA3 would put in place a process for setting freshwater objectives. The effectiveness of the policies should therefore be assessed against Objective CA1 (and its requirement for a consistent national process) and the relevant objectives in sections A and B of the NPS, which provide the policy requirement to safeguard life-supporting capacity and human health (as affected by secondary contact with fresh water) by setting freshwater objectives.

The policies provide a framework and set clear direction for the *process* of setting freshwater objectives. By specifying ecosystem health and human health as compulsory national values, setting national bottom lines for them, and requiring regional councils to identify other attributes that may be necessary to provide for them, both life-supporting capacity and the health of people and communities (as affected by secondary contact recreation) will be safeguarded, thereby achieving Objective A1 of the NPS. Setting freshwater objectives in accordance with Policies CA1 – CA3 will also contribute to achieving Objective B1 of the NPS. Policies CA1 – CA3 set out a transparent process that can be integrated with regional councils' existing work programmes to establish freshwater objectives, and can take into account the principles of the Treaty of Waitangi through the identification of iwi values as part of the objective setting process. It is therefore concluded that the Policies will be effective in achieving the Objectives of the NPS.

A detailed analysis of the effectiveness of Policies CA1 – CA3 in achieving Objectives CA1, A1, A2, B1 and B4 is outlined in Table 2 below.

Table 2: Effectiveness of Policies CA1 – CA3 – assessment of the national objectives framework policies

	Objectives of the NPS (new and amended)		
	Objective CA1 national consistency recognition of regional and local circumstances providing for national values	Objectives A1 and A2 safeguarding life-supporting capacity safeguarding human health maintaining or improving the overall quality of fresh water	Objectives B1 and B4 safeguarding life-supporting capacity protecting values of wetlands and outstanding freshwater bodies
Do the proposed policies achieve the purpose of the proposed NPS objectives?	<p>Policy CA1 sets out a process for all regional councils to follow in developing freshwater objectives. Councils must give effect to this policy in their regional plans thereby achieving national consistency.</p> <p>Policy CA1 (a)(ii) also provides for regional councils to identify ‘other values’ as part of establishing freshwater objectives, consistent with Objective CA1’s requirement for regional and local circumstances to be recognised.</p> <p>Policy CA1(a) requires that all freshwater bodies (as part of freshwater management units) have objectives set for the compulsory values of ecosystem health and human health. It also requires that all the other national values be considered as to how they may be locally/regionally relevant. Policy CA2 requires regional councils to ensure that freshwater objectives for the compulsory values are set at or above national bottom lines unless very specific circumstances apply. The policies will achieve a nationally consistent approach to providing for ecosystem health and human health by setting clear expectations for the minimum state to which these values must be managed.</p>	<p>Policy CA1(a) requires that the compulsory values of ecosystem health and human health are identified for all freshwater bodies (as part of freshwater management units). Policy CA2 requires that freshwater objectives for these values be set at or above the national bottom lines specified in Appendix 2. Policy CA1(b)(i) requires regional councils to identify not only the attributes listed in Appendix 2 of the NPS that apply to those compulsory values, but also any other attributes that are considered to be appropriate. Together, the national bottom lines specified in Appendix 2 and other attributes selected by regional councils will allow regional councils to develop freshwater objectives that will safeguard the life-supporting capacity of freshwater bodies, and achieve Objective A1(a). The national bottom lines specified in Appendix 2 will ensure that the health of people and communities (as affected by their secondary contact with fresh water) will be safeguarded, achieving Objective A1(b).</p> <p>Policy CA2 provide for exceptions to national bottom lines in specified circumstances where it may not be possible to achieve Objective A1. Policy CA3 provides for a transitional timeframe to meet bottom lines. Notwithstanding this, the appropriate freshwater objectives set in accordance with Policy CA1 must still achieve Objective A2 (maintain or</p>	<p>Policy CA1(a) requires regional councils to set freshwater objectives using the attributes that are appropriate to the value.</p> <p>Through the process set out in Policy CA1(a), (b) and (d) freshwater objectives that safeguard life-supporting capacity through the maintenance of appropriate flows and levels of water will be able to be developed, thus achieving Objective B1. The same process also provides for the identification of significant values for freshwater bodies, and in combination with Policy B1 will enable these values to be protected, achieving Objective B4.</p>

	<p>While Policy CA2 provides for exceptions to the requirement to provide for the compulsory values above national bottom lines, it does so in limited circumstances and provides a nationally consistent framework for those exceptions.</p> <p>Policy CA3 provides for a transitional but limited timeframe for moving toward bottom lines.</p> <p>Policy CB1 requires councils to develop plans for monitoring progress towards and achievement of freshwater objectives, and provides some national guidance about the expectations for monitoring that will help to achieve a nationally consistent approach. By noting that regionally representative sites should be selected, the policy also recognises regional and local circumstances.</p> <p>Together, Policies CA1 – CA3 and CB1 achieve the three key requirements of Objective CA1 – national consistency, provision for national values and recognition of regional and local circumstances.</p>	improve the overall quality of fresh water within a region).	
Criteria for assessing effectiveness (from section 1.6.3)	<p>Objective CA1</p> <ul style="list-style-type: none"> - national consistency - recognition of regional and local circumstances - providing for national values 	<p>Objectives A1 and A2</p> <ul style="list-style-type: none"> - safeguarding life-supporting capacity - safeguarding human health - maintaining or improving the overall quality of fresh water 	<p>Objectives B1 and B4</p> <ul style="list-style-type: none"> - safeguarding life-supporting capacity - protecting values of wetlands and outstanding freshwater bodies
<p>Transparency</p> <p>Impact of freshwater objectives and the choice of management approaches is clear and understood</p>	<p>The proposed amendments to the NPS set out the process by which national values and freshwater objectives to maintain those values are to be set. Clear descriptions of each national value (and for some, the associated attribute states) will ensure that all participants in the planning process have a clear understanding of what each value means and what is required to provide for it. For ‘other’ values, the proposed amendments would require councils to specify the attributes necessary to manage each of those values (in either numeric or narrative form) again ensuring that a clear understanding of the meaning of the value is provided to the community.</p> <p>A consistent set of nationally agreed values and attributes will provide a transparent information base on which a community discussion about the values of any given water body or catchment can take place, with the attributes providing a direct connection between the value and its associated objectives so that the consequent limit required to achieve the objective is more obvious. This will allow the community to better consider the impact of the value on the community. Policy CA1 will require councils to consider the implications of the values they select and the states to which they wish to manage those values.</p>		

	<p>Establishing the framework through the NPS means that there is statutory direction that ecosystem health and the health of people and communities (as affected by secondary contact recreation) are national values that are to be provided for throughout the country, and that there are national bottom lines which cannot be breached.</p> <p>The development of monitoring plans required by Policy CB1 will ensure that the impact of management approaches selected for freshwater bodies will be apparent to the community when changes to the water body take place over time.</p>
<p>Practicality Least disruption to current freshwater objective and limit setting, and realistically achievable</p>	<p>Most councils have adopted a programme of staged implementation of the objective and limit setting requirements of the NPS. Within this context the use of the national objectives framework can be matched to each stage of an implementation programme. Three councils have identified that they will have the objective and limit setting requirements of the NPS completed by 2014, and some additional work may be necessary for those councils if the objectives and limits set are not consistent with the national objectives framework.</p> <p>Monitoring requirements under Policy CB1 reinforce the requirements under section 35 of the Act, and should therefore not be significantly onerous for councils.</p>
<p>Treaty of Waitangi Takes into account the principles of the Treaty of Waitangi and is flexible enough to provide for variation in views</p>	<p>The proposed amendments to the NPS insert the national objectives framework national values and attributes as appendices. The proposed national objectives framework includes the guiding principle of Te Mana o te Wai and the national values include tāngata whenua values (eg, mahinga kai). Describing the values allows local expression of iwi values through locally set attributes and provides a platform for discussions with tāngata whenua through the freshwater objective and limit setting processes. Monitoring progress towards and achievement of freshwater objectives will demonstrate the level to which tāngata whenua values are being activity protected.</p>
<p>Strength of language and understandability</p>	<p>All of the policies are directive and require the national objectives framework to be given effect to, consistent with the requirements of Objective CA1 for a nationally consistent and administratively efficient approach to the setting of freshwater objectives.</p> <p>The level of detail in the value and attribute tables makes the process of explaining how to implement these through policies inherently complex. The Government has identified that further work will be undertaken to provide councils and practitioners with guidance materials and tools to assist them to implement an amended NPS. It is critical to effective implementation of the proposed amendments that the provisions are clear and understandable. The consultation period on the detail of the amendments provides an opportunity to assess the clarity of the provisions and amend them as necessary.</p>

5.2.3 Assessment of efficiency (the costs and benefits of the national objectives framework) (section 32(1)(b)(ii) and section 32(2))

5.2.3.1 Approach

An evaluation under section 32(2) of the Act requires identification and assessment of the benefits and costs of the environmental, economic, social and cultural effects that are anticipated from the implementation of the policy change. Section 32(2)(a) also requires identification of the opportunities for (i) economic growth and (ii) employment that are anticipated to be provided or reduced. If possible, the benefits and costs are to be quantified, but section 32(2) doesn't stipulate the use of a particular method to assess costs and benefits. There is a range of available economic methods to compare costs and benefits, including cost-benefit analysis (CBA), cost-effectiveness analysis or multi-criteria analysis.

Efficiency will depend on the relative scale and value of benefits and costs of implementing the national objectives framework through an amended NPS. This will include:

- benefits expected to be conferred by the incremental changes in NPS from the current version, comprising:
 - non-market value gain for recreation and cultural uses
 - non-market value gain for non-use values
 - reduced expected cost of litigation for councils and the public
 - reduction in cost of plan delays for the wider economy
 - reduced cost of scientific research and determination of freshwater objectives by councils
 - reduced cost of compliance for those subject to the NPS
- costs of implementing changes from the current NPS:
 - administrative costs for regulatory agencies of central government and regional councils
 - compliance costs for those facing new regulatory requirements, including users of water consents, territorial local authorities who may need to adjust their operations and planning, the general public and iwi, all of whom may face new consultation procedures to provide information, and
 - wider opportunity costs from implications for public use of water, economic development and growth opportunities.

An aggregated national estimate of the benefits and costs of the proposed amendments to the NPS is difficult for two principle reasons:

- there is no national level information on the opportunity costs of establishing the national objectives framework and requiring compliance with the national bottom lines for ecosystem health and human health
- there are no nationwide economic impact studies on the costs and benefits of meeting bottom lines (regional case studies have been done where monitoring shows bottom lines are not currently met).

National estimates are therefore limited to some of the direct administrative and engagement cost impacts. These are estimated as annual averages and are necessarily highly stylised, given the limitations of information. Given these information limitations, no attempt has been made to quantify the wider impacts. However, some of the direct administrative and consultation costs are relatively straightforward and relatively fixed:

- the cost to Government of introducing the NPS will be similar to the introduction of the NPS in 2011
- the costs of a plan change in a regional plan are relatively easily identifiable albeit for the whole plan change and not just one aspect such as freshwater objective setting
- consultation costs are expected to be similar to the 2011 NPS, as councils, tāngata whenua and the general public collaborate on how to meet bottom lines.

Some limited analysis has been done on a national basis in relation to the impact meeting national bottom lines might have on employment. This was done by modelling where water quality does not meet bottom lines for nitrate toxicity and *E. coli* and determining the employment proportion of a region potentially affected by being required to meet bottom lines.

In the absence of nationally aggregated data on the opportunity costs and overall benefits and costs of implementing the national objectives framework, detailed case studies were carried out in Southland and Canterbury to assess the potential impacts of meeting proposed national bottom lines for ecosystem health and human health. The Ministry for the Environment, the Ministry for Primary Industries and the Department of Conservation commissioned work to examine the potential regional impact of meeting the proposed national bottom lines. The work was undertaken in collaboration with the relevant regional council and multiple research institutions. Southland and Canterbury were chosen as case studies because they:

- face challenges with water quality
- are at an appropriate stage of developing regional plan changes
- have significant dairy expansion underway, and
- are likely to be the most impacted by proposed national bottom lines.

The research has taken over a year to complete, and entailed close cooperation with stakeholders. It has been the first attempt to understand the potential economic, environmental, social and cultural choices for achieving national bottom lines. In spite of the work done to date, additional work is needed to fill in remaining gaps.

Further work is ongoing in the Waikato as part of a partnership between the Waikato Regional Council, Waikato River Authority, DairyNZ, and Central Government. The partnership is commissioning a series of studies to evaluate the potential impacts of bottom lines, and other water quality objectives, in the Waikato River Catchment.

To date, no other research has been undertaken to demonstrate the national impact of imposing water quality bottom lines in a consistent framework such as the national objectives framework. Work has been done, or is underway, on some water bodies which are recipients of the clean-up fund (such as Lake Taupō and Rotorua Lakes). However, this work is specific to the water body in question and cannot be aggregated to describe a national picture.⁵ The studies done to date have revealed how much needs to be done, to support communities calculating the impacts of their value choices for water bodies.

⁵ It does illustrate why bottom lines are needed ie, to forestall future clean-ups.

In the following sections the national level analysis is presented first, in order to give an overall picture of the potential costs and benefits of the national objectives framework that can currently be determined at a national level. The regional case studies are then presented to provide some indication of potential opportunity costs and identifiable costs and benefits of requiring national bottom lines for ecosystem health and human health, and the identifiable costs and benefits of the requirement under Objective A2 of the NPS to maintain and improve overall water quality.

5.2.3.2 Results available at a national level

The introduction of the national objectives framework through the amended NPS requires councils to consider the values contained within it, set freshwater objectives according to the process prescribed and have a plan in place by 2030 to achieve bottom lines for the compulsory values where they are not already met. It does not impose a timeframe for meeting bottom lines or prescribe a means of getting to that point, and communities may choose a timepath that defers the cost of meeting targets into the indefinite future when the present value of costs is relatively low. However, if implementation costs are deferred, so too will be the costs of improved water quality, for amenity, cultural appreciation and other current uses such as recreation. The national objectives framework will retain flexibility for local councils and their communities to respond in ways that suit their circumstances, while relieving them of some of the costs of scientific research and debate on what local freshwater objectives should be.

Overall the amended NPS will have the following impacts:

- Costs:
 - Industry, eg, primary sector, hydro generation, in certain catchments may face costs in meeting bottom lines.
 - Welfare⁶ losses if bottom lines are higher than desired by certain catchments.
 - Set-up and any additional monitoring costs over and above what the NPS currently would require.
 - Agricultural employment (dairy, sheep and beef, and horticulture) is a small percentage of total employment so impacts, if any, incurred to employment will be low.
- Benefits:
 - Improved non-market values, including recreational, cultural, spiritual, existence and bequest values.
 - Reduced appeal/legal costs – the national objectives framework and national bottom lines reduce the scope of challenge, benefiting regional government and would-be appellants.
 - Marginally reduced future costs of legacy clean-ups, since the current NPS will already achieve reduced future legacy clean-ups.
 - Less duplication of research since councils avoid the need to formulate their own bottom lines.
 - Consistency.
 - Certainty for industry and municipal bodies.

⁶ Refers to the level of prosperity and living standards of either an individual or a group of persons.

The proposed changes to the NPS will result in low magnitude costs for regional councils on planning, for Government on NPS preparation and for stakeholders / regional councils on consultation, while producing medium to high benefits in reducing costs for regional councils and resource users on existing activities, improving investment certainty and delivering positive planning outcomes for Māori/iwi, communities, the general public, exporters and the tourism sector.

Requiring councils to give effect to the national objectives framework in their regional plans would probably entail low cost to regional councils and stakeholders on planning and consultation, given that what is required is an incremental change to a process of implementing the NPS that is happening in any case. Isolating the incremental adjustment in council implementation costs to accommodate the proposed NPS changes is difficult to do, given variations in the planned implementation across each of the 16 regional and unitary councils. But judging by a selection of councils which are planning to spend on average \$0.7 million a year each until 2021 on implementing the NPS, an incremental adjustment is unlikely to be a major imposition on council activities. Regional councils and unitary authorities have wide variation in their ratepayer base, the size of their regions, and variations in the existing states of the water bodies in their regions, but incorporating the national objectives framework into an amended NPS by itself should not present major costs.

In contrast, there are substantial benefits in costs that can be averted or reduced by implementation of the amended NPS, due to the reduction in legal challenges to regional provisions once national bottom lines are adopted. Currently a significant number of submissions on regional plans are heard at hearings and all regional councils have had at least one provision in the plan appealed to the Environment Court, so a reduction in causes for legal challenge could produce substantial savings across the 16 regional authorities. Horizons Regional Council spent \$6.5 million on hearings and submissions and a further \$3.3 million on appeals on its proposed One Plan. Environment Waikato spent \$1.5 million in implementing a single plan change, which went to two hearings at the Environment Court and a High Court appeal. The experience of Horizons Regional Council, along with Waikato and some others, may be the exception. A survey of 49 territorial authorities suggests their costs incurred in resolving appeals were just under \$0.6 million on average. However, even a small proportionate decrease in challenges in such cases could result in appreciable savings for councils. Reduction in such challenges would also result in savings for private sector submitters and appellants.

A bigger cost reduction is likely to come from reducing the delay on appeals being resolved. Environment Court hearings, mediation and negotiation on the interim decision and appeals to the High Court have added 3 – 5 years to the time taken to bring some plans to operative stage. This creates costs for participants in such actions, but more important are the hidden costs of delay to the wider economy, in the uncertainty around future options and the deferment of investment that could support economic growth and employment.

Table 3 below presents a summary of annualised costs from the national objectives framework. summarises the sources and assumptions for the quantified estimates. The implementation of the national objectives framework has been combined with the implementation of freshwater accounting, because the benefits of the NPS are to some extent jointly provided and difficult to attribute to these two parts. The figures are estimated as annual averages and are necessarily drawn at a highly stylised level, given the limitations of information on the categories of cost and benefit for the different affected parties.

The quantifiable costs amount to \$5.25 million a year. There are also a number of unquantifiable costs. While significant benefits are able to be identified, they have generally been unable to be quantified, for the reasons discussed in Table 3.

Table 3: Annualised costs and benefits of the national objectives framework

Cost/Benefit	Who/What	Comment/assumptions/sources	NPS implementation of NOF \$m/yr	Freshwater accounting \$m/yr	Totals \$m/yr
Administrative costs (NVP 8%, \$m/yr)	Regional councils	Applies average plan change cost (applies with or without current amendments) and top end estimate of additional accounting required	1.76	3.29	5.05
	Government	Cost of updating and implementing	0.20		0.20
Total costs			1.96	3.29	5.25
Benefits	Non-market recreation	Positive benefit			
	Non-use values: public	Positive benefit			
	NZ reputation: tourism, product marketers	Positive benefit			
	Reduced appeals: RCs	Savings on experts			
	Reduced appeal costs: other parties	Reduced due to certainty in plan development			
	Reduced future clean-up costs	Not quantified			
	Reduced RC scientific research	Used for other purposes (economic/social)			
	Reduced costs from poor decisions	Positive benefit			
	Reduction in delays	Certainty			
	Water supply sector	Certainty			
	Primary sector	Certainty			
	Hydro electricity	Certainty			
	Other industries	Certainty			

On the benefits side there could be substantial value from reduction in delays and the associated improvement in certainty for investment purposes, which can be expected to be positive for all the main water-using industries – water supply, agriculture, hydro generation and other industries. The certainty comes from knowing what the limits on resource use are in advance (rather than relying on a ‘first in first served’ basis), thus encouraging investment plans to proceed with innovative uses for water. The benefit of this is inherently unpredictable and not quantified, but provides a fundamental condition for dynamic efficiency over time.

Non-market value could also be substantial in some circumstances, and would be implicit in the benefits to Māori from restoring the quality of particular water bodies. Deferment of water quality improvement will of course also defer benefits and it should be noted neither the NPS nor the proposed amendments stipulate when objectives must be achieved. An analysis of a number of non-market values was undertaken in Southland but the results cannot be extrapolated nationally due to these being particularly location specific (ie, due to differences in environment, climate, population size, demographic characteristics and values of the local population of a region).

Some information is available on the costs to councils to defend a plan through the Schedule 1 process. However, it is difficult to separate out the savings that might occur due to the removal of one aspect being a matter for debate, and therefore to quantify the potential benefits. Where the savings are more easily quantified is in the costs spent on experts to argue the numeric freshwater objectives in a plan that are necessary to achieve the narrative bottom lines in the Act and the NPS.

Exact estimates of private parties' costs in relation to plan appeals are unknown nationally, although as an example, Horticulture NZ has spent \$21.5 million on 57 distinct actions with councils in the past five years. Some savings are expected from certainty of plan provisions at the time of development and the consequently reduced ability for those with the financial wherewithal to litigate for the outcome they desire.

Total national clean-up costs for specific water bodies have totalled \$495 million to date, spread over various time periods. The amended NPS is expected to have a small but significant impact on reducing future clean-up costs, but no basis to quantify the reduction in future clean-up costs has been developed as yet.

The potential research savings for local government is unknown, but this saving would potentially be diverted to other research topics or council functions, so may not represent an overall reduction in council spending.

Non-quantifiable benefits for industry water users primarily relate to the clearer framework provided and the consequently clearer definition of growth opportunities that can and cannot be exploited. Clearer information provides the opportunity for these parties to plan (and potentially innovate) with greater certainty.

To address the requirements of section 32(2)(a)(ii) analysis has been undertaken on the impact that meeting bottom lines might have on employment. Table 4 below shows the total employment figures for 2012 by region and the percentage for three sectors: dairy; sheep and beef; and horticulture.

Modelling revealed where water quality does not currently meet bottom lines for nitrate toxicity and *E.coli*. From this, the employment proportion of a region potentially affected by not meeting bottom lines was able to be determined. Analysis of the model uncertainty provided an upper and lower range of water quality estimates. Model validation using measured data revealed that the model failed to identify the worst sites; however, the upper range significantly over-estimated the areas that would fail. This suggested that the model estimate is appropriate for regional scale analysis and national aggregation, while measured data should be used in more detailed catchment analysis.

The next step was to identify what proportion of employment in each agricultural sector might be affected by water bodies that do not currently meet bottom lines for nitrate toxicity and

E.coli. Using the modelled data, results show 0 per cent, or close to zero per cent, impact for the employment share across all regions for *E.coli* and nitrate toxicity.

If the measured data used for modelling is analysed we find that, of the approximately 700 water quality measuring sites⁷, just 17 sites will currently fail bottom lines for *E.coli*; four of those are within three urban areas (Wellington, Nelson and Auckland) and therefore are unlikely to greatly affect employment. The remaining sites are in Southland, Canterbury and Waikato.

Similarly for nitrate toxicity, of all the 681 measured data sites, just 4 fail the median bottom line for nitrate toxicity and these are within one region. Two of those four sites occur within Hinds, an area which was the focus of an economic impact study detailed elsewhere in this evaluation. Statistics New Zealand 2012 data shows that the total number of farms⁸ within New Zealand engaged in agriculture is 60,683 and Hinds has 1170 of these or less than 2 per cent (1.9 per cent). Of the total 1170 farms in Hinds, dairying comprises 24 per cent and has 900 dairy farm employees. This illustrates the number of employees in the dairy industry in Hinds that could potentially be affected by the nitrate toxicity bottom line, although as discussed elsewhere, this will also depend on the mitigation solutions selected by councils and communities.

Table 4: Regional employment 2012

Region	Total employment ⁹	Dairy farm share of regional employment	Sheep and beef farm share of regional employment	Horticulture share of regional employment
Auckland region	642940	0%	0%	0%
Bay of Plenty region	109460	1%	0%	2%
Canterbury region	256560	2%	1%	1%
Gisborne region	19720	0%	9%	6%
Hawke's Bay region	73390	0%	3%	8%
Manawatu-Wanganui region	95190	2%	3%	1%
Marlborough region	20700	1%	1%	7%
Nelson region	24890	0%	0%	1%
Northland region	52370	3%	1%	2%
Otago region	97640	1%	3%	3%
Southland region	48300	6%	5%	1%
Taranaki region	49150	5%	1%	0%
Tasman region	18180	2%	2%	15%
Waikato region	166760	4%	1%	2%
Wellington region	235460	0%	0%	0%
West Coast region	15570	6%	0%	0%

⁷ Data from Regional Council state of the environment monitoring sites.

⁸ The numbers refer to geographic units. One farming business may cover more than one geographic unit. Data source: Statistics New Zealand (<http://nzdotstat.stats.govt.nz>).

⁹ Employment excludes working proprietors.

(Data source: <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE2310>)

In conclusion it is considered the percentages of total employment per sector are sufficiently low that impacts, if any, incurred to employment will also be low. This applies equally whether the impact is viewed through a national lens or regional perspective, but increases slightly if viewed at an individual catchment level, in those few catchments that do not meet bottom lines.

National analysis conclusions

In attempting to undertake a national level consideration of costs and benefits there are some key assumptions that have been made on both the cost and benefit side of the proposal. As with many cost benefit analyses, the costs are up front and real, while the benefits will take time to arrive and are less amenable to quantification, for example valuing the benefits of achieving better water quality outcomes.

In general, administrative and compliance costs as a result of the implementation of an amended NPS are relatively low. Effects on employment are not anticipated to be significant.

However, there is an information gap in relation to the opportunity cost of the requirement to meet national bottom lines for ecosystem health and human health, as the national information is currently incomplete. To address this information gap, and provide an indication of the likely costs and benefits of the national objectives framework and national bottom lines to inform consideration of the proposed NPS amendments, detailed case studies were carried out. These were conducted in those regions which modelling and measured data showed have some sites which fail the bottom lines. The information currently available from the case studies conducted to date is presented below.

5.2.3.3 Detailed regional results

The purpose of the regional case studies has been to assess the potential impacts of setting national bottom lines for ecosystem health and human health. The economic impact studies evaluate the potential impacts on the agricultural, industrial and municipal sectors and on non-market values in Southland; and the agricultural sector in the Hinds and Selwyn-Waihora zones in Canterbury. In both studies, central Government worked in close cooperation with regional councils and the research institutions.

Southland economic impact study

Context

Southland was identified as an appropriate region to test the impacts of meeting proposed national bottom lines, as the region:

- is in the early stage of developing regional plan changes, which include addressing the expansion of dairying in their region
- water quality is an important regional issue
- was considered as likely to be one of the most impacted regions by proposed bottom lines
- monitors a large number of water bodies (eg, 73 rivers and streams and significant lakes such as Lake Te Anau, and Lake Manapouri), and
- has economic activity that relies on high water abstraction, discharge and nutrient loadings, ie, has experienced a surge in dairy intensification.

Approach

The total economic value (TEV) approach was used as the overall framework for the Southland economic impact studies. Total economic value identifies and quantifies (where possible) the marginal impacts of setting water quality limits on economic, environmental, social and cultural values of fresh water. Therefore, it was considered broad enough to give an appropriate order of magnitude for cost and benefit estimates of meeting bottom lines in the Southland region.

A series of inter-related studies were undertaken, encompassing science, economics and policy to assess the potential impacts of proposed bottom lines for ecosystem health and human health. In these studies, ecosystem health is measured by nitrate toxicity and periphyton (slime) and human health is measured by *E.coli*.

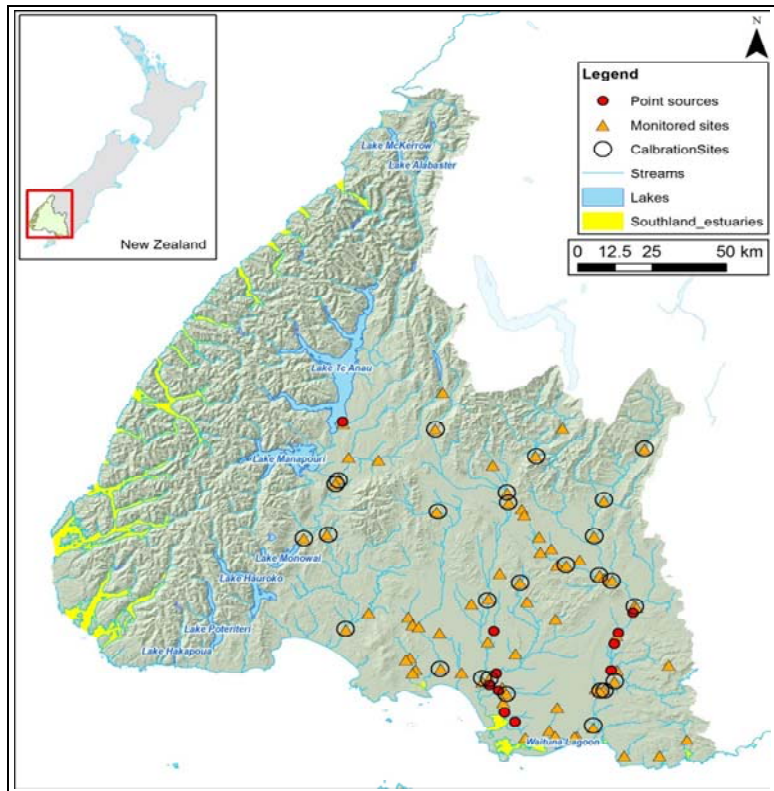
The studies undertaken include:

- ***a regional analysis*** that provides an overview of the contribution and the value of water to the outputs of key economic sectors in the region (Market Economics and Nimmo Bell 2013)
- ***an aggregate farm level modelling study*** that evaluates the marginal costs and benefits of scenarios¹⁰ to reduce nutrient discharges at farm level and resultant changes to nitrate and phosphorus loss (NZIER and AgResearch 2013)
- ***hydrological modelling*** that aggregates the estimated agricultural and point source contaminant discharges to downstream water quality concentrations for 73 monitored sites in Southland to determine whether the scenarios modelled at farm level can achieve national bottom lines for nitrate toxicity, periphyton and *E. coli* (NWIA 2013, Aqualinc 2013)
- ***a non-market value study*** that identifies non-market values associated with fresh water and provides a first step in assessing the marginal impact of improving water quality on some of those values (Covec 2013)

¹⁰ A combination of mitigations bundles under a variety of scenarios including: uniform nutrient discharge caps; non-uniform nutrient discharge caps; grandparenting with proportionately equal reductions in discharges and mandated mitigation actions across all dairy, sheep and beef farms.

- **municipal and industrial case studies** that identifies the value and use of water by those sectors and estimates the mitigation costs of improving water quality (Market Economics 2013).

Map 1: Southland area showing 73 State of the Environment river monitoring sites



Southland results – Impact of meeting bottom lines on agriculture

Modelling had a baseline assumption that without action to reduce nutrient discharges, the total value of agricultural production was forecast to double in real terms to \$4.6 billion per year by 2037. Concurrent nitrogen and phosphorus nutrient losses would increase (under this assumption) by 16 per cent and 28 per cent respectively.

The proposed national bottom lines for ecosystem health in rivers that were tested in Southland are currently met and do not impose costs. Water quality will be maintained above bottom lines for periphyton (slime) and nitrate toxicity (median value) under all scenarios tested, including some that allow for dairy growth.

The proposed national bottom line for human health in rivers (5 per cent or greater risk of infection during secondary contact recreation) is breached at five monitoring sites tested for *E.coli*. Specific on-farm mitigation practices aimed at reducing at *E.coli* concentrations are required to meet the bottom line for human health. In Southland, mitigation measures on dairy farms only will not be sufficient to ensure the *E.coli* national bottom line is met. However, fencing of waterways on surrounding sheep and beef farms as well as on dairy farms, would address *E.coli*. The majority of costs for this mitigation would be met by sheep and beef farms, as most dairy farms already have fencing in place.

The status quo requires councils to maintain or improve overall water quality for their regions. Water quality could be maintained or improved (overall) in Southland, with some scenarios allowing for further dairy growth.

Impacts of improved water quality on non-market values

The non-market values study¹¹ is a first step in assessing the marginal impact of improved water quality on non-market values in Southland. The total marginal impact is unknown as not all values could be quantified. The results indicate that improved water quality would result in a marginal benefit for recreational use (fishing, swimming and kayaking) and existence value of between \$0.1 and \$2.3 million per year.

The total marginal benefit of improved water quality to meet bottom lines would be greater than the estimated results for two reasons:

- A number of significant non-market values, including cultural values (including unique Māori values¹²), bequest values and some existence values (eg, ecosystem health, diversity and aesthetics and amenity values) have not been quantified due to data limitations. It can reasonably be expected that the unquantified values are likely to be positively correlated with improved water quality.
- The results are based on improvements to water quality resulting from uniform nutrient discharge caps at farm level¹³. This scenario meets the bottom line for ecosystem health and results in maintained or improved ecosystem health overall. This scenario does not meet the bottom line for human health at a small number of sites, but results in improvements in *E. coli* levels overall. As an improvement in *E-coli* is likely to increase the non-market values for recreation and kayaking, it is expected that meeting the bottom line for human health at all sites would result in a greater overall non market benefit.

A non-market value study is currently underway in the Waikato Region, which will add to the development of a more complete understanding of non-market values.

Impacts of improved water quality on municipal and industrial value

Four case studies were undertaken to estimate the mitigation costs of reducing discharges at municipal and industrial sites that are point sources of contaminants, in order to improve water quality. It is important to note that the study assesses the impact of improving water quality independently of whether national bottom lines are met. Key findings include:

- proposed bottom lines would not result in costs to Invercargill municipal water supply, as the Ministry of Health standards for drinking water are more stringent
- reducing key contaminant concentrations in stormwater and wastewater to improve water quality could cost councils, residents and businesses.

Limitations of the Southland studies

A risk with any modelling exercise is that models are by definition a simplification of reality. The results are not intended to be specific predictions of exact benefits or costs. They provide an indication of the magnitude of impacts on agricultural, industrial and municipal sectors and a

¹¹ Non-market values include recreational and cultural values, existence values, option values and bequest values.

¹² Covec (2013) worked closely with Ngāi Tahu in Southland to understand Māori values associated with fresh water. For Ngāi Tahu, and potentially other iwi, there are three uniquely iwi values related to water, which have been identified as additional to the non-market values captured by the overall theoretical framework. These values are: reciprocity; knowledge gained from sustainable use; and cultural identity associated with particular water bodies.

¹³ Other policy scenarios were not analysed due to time constraints.

partial analysis of non-market values of fresh water to support community decision making and inform policy development.

The results cannot be extrapolated to other regions or at a national level, due to differences in geographies, climates, types of freshwater bodies, farming practices and the assumptions made in the modelling which are unique to Southland.

The key limitations of the Southland studies include the following:

- **Overall:** It was not possible to gather primary data for the three studies outlined, given the timeframe to carry out such assessment. Further work is required.
- **Farm level modelling:** Mitigation bundles used in the modelling include practices such as improved nutrient management and improved animal productivity which are aimed at reducing nutrients levels (N and P). Most mitigation actions have little effect on *E.coli* levels. Practices such as fencing, aimed at reducing *E.coli* to meet the human health bottom line result in costs, but these costs are hidden in the overall benefit of the mitigation bundles.
- **Non-market value:** Not all non-market values were quantified due to significant gaps in the data. The study is based on secondary data sources, and values have been transferred from sites in different parts of New Zealand. There are a number of limitations that result from such a benefit transfer process and primary research is required for a more complete understanding of non-market values. The TEV framework may not be suited to evaluate iwi non-market values.
- **Municipal and Industrial:** The approach of the municipal and industrial study evaluates the impact of improved water quality rather than directly assessing the impact of meeting proposed national bottom lines. The results are based on four case studies and do not reflect the potential impacts on the sectors at a regional level.

Summary

The findings from the Southland series of studies confirm that how bottom lines are achieved will have a significant impact on the costs and benefits of a limits-based approach to freshwater management. The results of the Southland study suggest that communities would have a wide range of economic and environmental choices in managing freshwater quality of rivers. This emphasises the importance of councils testing a range of options to achieve bottom lines during the plan development stage. The key conclusion from the studies is that national bottom lines for ecological health and human health can be achieved for rivers in Southland over a 25 year period to 2035 at a low or no cost to agriculture and a gain in non-market values.

Canterbury case study results

Context

Selwyn-Waihora zone and Hinds (part of the Ashburton zone) are two water management zones in Canterbury and encompass a large part of the Canterbury plains. Irrigated dairy, sheep and beef and arable farming are the predominant land uses in each zone and drive the local economies. Significant land area has been converted to dairy farming from sheep and beef and arable over recent years. The number of dairy cattle in Canterbury as a whole has increased by over four times in the past 20 years.

This intensification is expected to continue with the expansion of irrigation through extensions to the Rangitata Diversion Race and the establishment of the Central Plains Water Enhancement Scheme. Environment Canterbury (ECan) is currently running several collaborative processes within an overarching regional plan to set freshwater objectives and limits by 2022. In the zones used for the Canterbury case studies, rivers and lakes currently meet the proposed national bottom lines for *E.coli*¹⁴. However, four sampling sites on spring fed streams and hill fed rivers currently fail the national bottom line for nitrate toxicity. Nationally, Canterbury is the only region with sites (four) below the median nitrate toxicity bottom line for ecosystem health. Continuing intensification of agriculture is likely to result in further areas failing the bottom line:

- a. Monitoring sites (two) in the Hinds zone currently fail the proposed bottom line and further intensification through irrigation expansion without mitigation is likely to exacerbate this.
- b. Monitoring sites in the Selwyn-Waihora zone currently meet the bottom line for nitrate toxicity but without mitigation some are likely to fail with further intensification of agriculture. The current Selwyn-Waihora zone committee 'solutions package'¹⁵ is consistent with the proposed bottom line, therefore the proposed bottom line imposes no additional costs.

Canterbury was selected for study because of the:

- significant increase in dairying particularly with the increasing use of irrigation
- challenges it faces with water quality, and
- likely impact of proposed bottom lines - nationally the only four sites that fail the nitrate toxicity (median value) bottom line are in Canterbury (see Map 2).

Approach

Two Canterbury farming case studies were undertaken to evaluate the impact of meeting proposed bottom lines in the Hinds area (subset of the Ashburton zone). Landcare Research (2013) modelled the costs of meeting human health and ecological health bottom lines through a combination of catchment mitigations under a variety of policy scenarios.

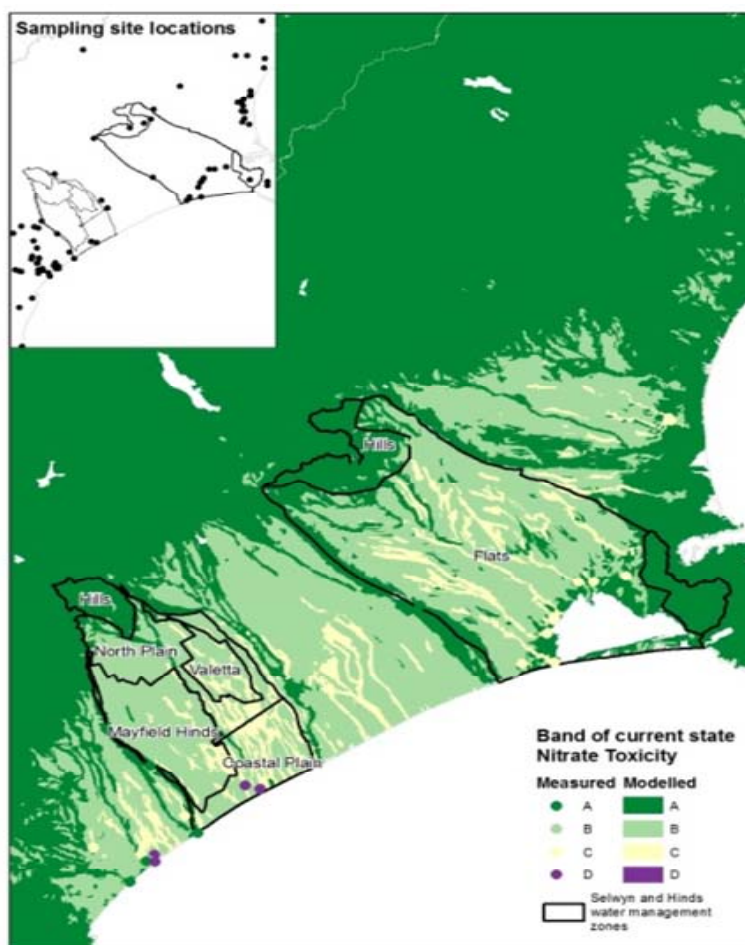
The scenarios modelled are the current land use (which represents the zones today), the development scenarios (which represents the zones 2038 without the proposed nitrate toxicity bottom line), and the three policy scenarios to meet the proposed nitrate toxicity bottom line¹⁶.

¹⁴ There are two sites in Canterbury which currently do not meet the proposed bottom line for *E.coli* (for secondary contact recreation) but neither site is in the case study areas.

¹⁵ ecan.govt.nz/publications/General/zip-addendum-at-150613-v6.pdf.

¹⁶ The three policy scenarios were: complete uptake of mitigation practices, allocating nutrient discharge allowances via grandparenting with trading, and equal cap without trade (as modelled in Southland).

Map 2: location of Selwyn-Waihora zone and the Hinds area (in the Ashburton zone)



Results

In Canterbury, the Hinds and Selwyn-Waihora zones were studied. The proposed human health national bottom line is currently met in both zones. However, a number of water bodies in Hinds currently fall below the nitrate toxicity national bottom line for ecosystem health.

The Hinds zone contains the most significant breaches of the nitrate toxicity bottom line in the country and has two out of four of the monitored sites in New Zealand that currently breach the proposed threshold (median measure¹⁷). Meeting national bottom lines in Hinds will require a 45 per cent reduction in nitrate leaching after the expansion of irrigation in the zone and dilution through the release of water from alpine rivers into the catchment. The additional cost of the proposed national bottom line in the Hinds zone is estimated to ultimately be \$22 million per annum or 7 per cent of the zone's projected agricultural net income. This is based on a policy of nutrient trading. Less efficient policies would increase the cost. On farm mitigation is insufficient to meet the restrictions imposed by the proposed bottom line threshold; these restrictions would likely drive land use change with some of the anticipated dairy conversion not proceeding.

¹⁷ If the 95th percentile measure is used then sites that currently do not meet the nitrate toxicity bottom increase by one in Canterbury - to a total of five (in two catchments), with an additional site in Southland, making a national total of six sites in three catchments in two regions.

In Selwyn-Waihora current plan proposals are consistent with meeting nitrate toxicity national bottom lines.

Under the three modelled policy scenarios¹⁸ it was found that:

- mitigation potential is high by improving irrigation efficiency (upgrading border dyke to pivot irrigators) and off-paddock grazing/feedpads¹⁹
- for Hinds, a significant reduction in nitrate toxicity is required to meet national bottom lines. Hinds will require a 45 per cent reduction in nitrate leaching *after* the expansion of irrigation currently planned for the zone. The modelling included the impact of dilution by an additional 3.6 cumecs of water being released from a planned irrigation scheme. The cost of meeting the nitrate toxicity bottom line is substantial, estimated at \$22 million per annum or 7 per cent of the zones agricultural net income
- one additional zone within Canterbury is likely to require mitigation to meet the national bottom line for nitrate toxicity. The cost likely to be of the same magnitude as the Hinds zone.

Caveats

The costs presented here are not a just reflection of the costs of meeting the bottom lines. The status quo requirement is that water quality be maintained or improved across a region and over allocation of quality is to be addressed. Therefore, these costs reflect a gradient from first meeting the current NPS requirement to maintain or improve and address over allocation, followed by the proposed new requirements of national bottom lines. Zone committees are currently in the process of deciding just what acceptable nitrate levels will be.

In all case study scenarios, the mitigation costs fall in the immediate future whereas in reality councils can choose transition measures to spread these costs over time. Additionally, the timeframe and mitigation measures modelled within each scenario significantly impact the costs. For example, the Hinds modelling achieves the bottom line by 2038 at a cost of \$22 million per annum from 2038. Discounting these costs at 8 per cent and annualising, brings this to \$4.6 million per annum. If reaching the bottom line is delayed by ten years this discounted annualised cost is reduced to \$2.1 million per annum.

Peer-review from primary industry groups for the economic analysis in the Hinds catchment in Canterbury have raised concern that the study may have overestimated the amount of cheap mitigation of nitrate losses. If the on-farm costs have been underestimated, costs in the Hinds zone could rise significantly.

Limitations

The key limitations of the Canterbury case studies are as follows:

- Results are for two out of the ten catchment zones in Canterbury. Estimates for the other zones in Canterbury may provide different results.
- The model used does not include administrative and transaction costs of implementing policies and does not include the costs of releasing additional water into the catchment

¹⁸ The scenarios were: complete uptake of mitigation practices, allocating nutrient discharge allowances via grandparenting with trading, and equal cap without trade (as modelled in Southland).

¹⁹ Based on work by MacFarlane's Rural Business commissioned for Environment Canterbury.

- Climate, technology, input costs and output costs are all held constant through the period.²⁰
- The main focus of the modelling process is on nitrogen and phosphate leaching. The researchers acknowledge that other factors may also be important in changes in water quality, such as sediment and microbial pathogens.

5.2.3.4 Summary of results

The following provides a summary of what is known on the full extent of measured sites in New Zealand that will not meet the proposed bottom lines. In New Zealand, proposed national bottom lines for nitrate toxicity (median measure) are breached at 4 out of 681 monitored sites, and all are in Canterbury. Currently there is limited data on the number of sites that breach proposed bottom lines for periphyton. Partial data indicates that some sites are below the threshold for periphyton in Horizons and Hawke’s Bay however, relevant data on the potential impacts is not currently available. For *E.coli*, 17 out of 737 monitored sites breach the bottom line. Five of the sites are in Southland and two sites are in Canterbury, outside of the Hinds and Selwyn-Waihora zones studied. A further six sites are in the Waikato region, and an analysis of the costs of meeting the bottom lines is currently underway. The remaining three regions where *E.coli* bottom lines are not met are Auckland (2), Wellington (1) and Nelson (1). Proposed bottom lines for Chlorophyll *a* in lakes are breached at 24 out of 108 sites in New Zealand, including a number of Northland and Whanganui dune lakes, the Waikato peat lakes, and Lakes Rotorua, Okaro and Hayes. Table 5 below provides a summary.

Table 5: No. of sites breaching bottom lines in New Zealand, Southland, and Canterbury

Water Body	Objective	Attribute	New Zealand	Southland	Canterbury (Hinds, Selwyn-Waihora)
Rivers	Ecosystem health	Nitrate Toxicity (median)	4/681	✓	✗ (4/142)
	Ecosystem health	Periphyton	Partial data; some sites fail in Horizons & Hawke’s Bay	✓	✓ (Some sites outside of Hinds and Selwyn breach)
	Human health	<i>E. coli</i>	17/737	✗ (5/73)	✓ (2 sites breached in other zones)
Lakes	Ecosystem health	Chlorophyll <i>a</i>	24/108	✓	No lakes (Lake Ellesmere excluded)*

✗ No. of sites breaching bottom line/No. of monitored sites – bottom lines not met at some sites

✓ Bottom lines met at all sites

* Lake Ellesmere falls outside of the classification of a ‘lake’, as it is intermittently open to the sea.

Detailed case studies encompassing science, economics and policy have been carried out in Southland and Canterbury to assess the potential impacts of proposed bottom lines for ecosystem health and human health. In these studies, ecosystem health in rivers is measured by nitrate toxicity and periphyton; human health for secondary contact with fresh water is

²⁰ The aggregate farm model used for the Southland study did have parameters that incorporated technical change.

measured by *E.coli*. Ecosystem health in lakes is measured by Chlorophyll *a*. Case study results from Waikato are pending.

Meeting proposed bottom lines in Southland

- The proposed bottom lines for ecosystem health are currently met in Southland and will continue to be maintained under all scenarios tested in Southland, including some that allow for dairy growth and profitability.
- The proposed national bottom line for human health in rivers is breached at five monitoring sites for *E.coli*. Fencing of waterways on surrounding sheep and beef farms as well as on dairy farms is a cost effective mitigation to address *E.coli*. The majority of costs for this mitigation would be met by sheep and beef farms, as most dairy farms have fencing in place.

Improving water quality in Southland

- Improved water quality results in marginal benefits to non-market values for recreation and existence values ranging between \$0.1 and \$2.3 million per annum in 2037. However, this is an underestimate of the total marginal benefit, as some significant non-market values have not been quantified.
- Municipal and Industrial: bottom lines would not result in costs to Invercargill municipal water supply. However, reducing key contaminant concentrations in storm water and waste water to improve water quality could cost councils, residents and businesses.

Meeting proposed bottom lines in Canterbury

- In Canterbury, the Hinds and Selwyn-Waihora zones were studied. The national bottom line for human health is currently met in both zones, however, it is breached at two sites in Canterbury outside of those zones.
- Periphyton is not an issue in Hinds and Selwyn-Waihora. However, some sites in Canterbury outside of these zones are below the proposed bottom line.
- In Selwyn-Waihora current plan proposals are consistent with meeting nitrate toxicity national bottom lines. The Hinds zone contains the most significant breaches of the nitrate toxicity bottom line in the country and has two out of four of the monitored sites in New Zealand that currently breach the proposed threshold (median measure). Therefore, there are substantial costs of meeting the nitrate toxicity bottom line for ecosystem health in Hinds, at up to \$22 million per annum.

The work carried out in Southland and Canterbury provides an estimate of the potential impacts of meeting bottom lines in those regions. The modelling showed that economic growth, particularly conversion of land to dairying, could continue under certain regional policy scenarios in both Southland and Canterbury without breaching proposed national bottom lines. For the limited number of water bodies that currently do not meet national bottom lines, there will be costs associated with adjusting to bottom lines over time.

The extent to which the results from these studies can be generalised at a national scale is limited. The results cannot be extrapolated to other regions or to a national level, due to differences in geographies, climates, types of freshwater bodies, farming practices and the assumptions made in the modelling which are unique to the regions studied. There is a substantial amount of uncertainty and potential errors associated with using assessments from one part of the country and attributing it to another (value transfer). In addition, there is limited or only partial information on other freshwater values, such as non-use values.

While the results from these regions cannot be extrapolated to other regions in New Zealand, the approaches of studies are useful as they employ robust methods to evaluate a range of scenarios for how regions might meet bottom lines. The results provide an indication of the types of issues regions may face in meeting bottom lines and the order of magnitude of potential costs and benefits. The work to date has highlighted that for assessments to be relevant, they need to be carried out at a local/regional level.

As a result, an aggregate, national cost benefit assessment has not been provided for all values of freshwater. However, administrative and compliance costs have been estimated at a national level at \$5.25 million per year as detailed above.

Table 6 summarises the results available for the analysis of costs and benefits at a regional and national level. Note that while substantial work has been done in two regions, and more work is underway, a *national* cost benefit ratio is not able to be estimated at the current time. Making definitive conclusions about the efficiency of the provisions contained in proposed section CA of the NPS is therefore difficult. The implications of this are considered further in section 5.2.4 *Risk of acting or not acting*.

Table 6: Summary of results

<u>National</u>
<ul style="list-style-type: none"> • Information on administrative and plan development costs (\$5.25 million per year) • No current nationwide economic impact studies on the costs and benefits of meeting bottom lines.
<p><u>Southland</u></p> <p><i>Meeting proposed bottom lines</i></p> <ul style="list-style-type: none"> • Proposed bottom lines for ecosystem health are currently met and do not impose costs. • Human health can be met in Southland by fencing waterways, a cost effective mitigation to address <i>E. coli</i>. • Efficiency gains could provide headroom for growth. <p><i>Improving water quality</i></p> <ul style="list-style-type: none"> • Municipal: proposed bottom lines would not result in costs for the Invercargill water supply. Reducing key contaminant concentrations in stormwater and wastewater to improve water quality could cost councils, residents and businesses. • Non-market values: partial study done taking into account existence and recreational values. Results indicate that improved water quality would result in a marginal benefit of between \$0.1 and \$2.3 million per year.
<p><u>Canterbury</u></p> <ul style="list-style-type: none"> • Farming: in Selwyn-Waihora an 11% reduction in nitrate toxicity required. Cost negligible. • Farming: in Hinds a significant reduction in nitrate toxicity required. Costs

approximately \$22 million per annum (note: some opportunity cost to meet this will also exist under the status quo as these levels are likely to be addressed under the current NPS requirement in any case).

- Farming: in other areas of Canterbury reduction in nitrate toxicity and *E.coli* is required. Costs unknown but expected to be similar to Hinds.
- Municipal and industry: costs unknown.
- Non-market valuations: benefits unknown.

Other regions

- Costs and benefits currently unknown.
 - Partial data indicates that some sites are below the threshold for periphyton in Horizons and Hawke's Bay. However, relevant data on the potential impacts is not currently available.
 - Five sites breach the *E.coli* bottom lines in Waikato, and an analysis of the costs of meeting the bottom lines is currently underway. The remaining four sites are in Auckland (2), Wellington (1) and Nelson (1). However, relevant data on the potential impacts in these regions is not currently available.

5.2.3.5 Summary of costs and benefits of the national objectives framework

The following is a summary of the section 32(2) requirement to identify and assess the benefits and costs of the environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions.

The introduction of the national objective framework through the amended NPS assists councils to have freshwater objectives in place by 2030 (or earlier), and plan to achieve bottom lines where they are not already met. It does not impose a timeframe or prescribe a means of getting to that point, and communities may choose a timepath that defers the cost of meeting targets into the future when the present value of costs is relatively low.

The proposed national objectives framework will result in low magnitude costs for regional councils on planning, for Government on preparation, and for stakeholders/regional councils on consultation, while producing medium to high benefits in reducing costs for regional councils (science) and resource users (advocacy), improving investment certainty and delivering positive planning outcomes for Māori/iwi, communities, the general public, exporters and the tourism sector.

Requiring councils to give effect to the national objectives framework in their regional plans would probably entail low cost to regional councils and stakeholders on planning and consultation, given that what is required is an incremental change to a process of implementing the NPS that is happening in any case. Isolating the incremental adjustment in council implementation costs to accommodate the proposed NPS changes is difficult to do, given variations in the planned implementation across each of the 16 regional and unitary councils. However, given on average councils plan to spend \$0.7 million a year until 2021 in

implementing the NPS, the incremental adjustment required by the amendments is unlikely to be a major imposition on council activities. Regional councils and unitary authorities have wide variation in their ratepayer base, the size of their regions, and variations in the existing states of the water bodies in their regions, but incorporating the national objectives framework into an amended NPS by itself should not present major costs.

In contrast there are benefits in costs that can be averted or reduced by implementation of the amended NPS, because of the reduction in legal challenges to regional provisions and the science which underpins them once national bottom lines are adopted. Currently a significant number of submissions on regional plans are heard at hearings and all have had at least one provision in the plan appealed to the Environment Court, so a reduction in causes for legal challenge could produce substantial savings across the 16 regional authorities. Horizons Regional Council spent \$9.8 million on its proposed One Plan. Environment Waikato spent \$1.5 million in implementing a single plan change. A survey of 49 territorial authorities suggests their costs incurred in resolving appeals were just under \$0.6 million on average. Even a small proportionate decrease in challenges in such cases could result in appreciable savings for councils. Reduction in such challenges would also result in savings for private sector submitters and appellants.

A bigger cost reduction is likely to come from reducing the delay on appeals being resolved. Environment Court hearings, mediation and negotiation on the interim decision and appeals to the High Court have added 3 – 5 years to the time taken to bring some plans to operative stage. This creates costs for participants in such actions, but more important are the hidden costs of delay to the wider economy, in the uncertainty around future options and the deferment of investment that could support economic growth and employment.

Where bottom lines are not currently met there may be substantial opportunity costs to achieve them although these can be spread over time, using a range of regulatory and non-regulatory means to avoid the impact on a particular sector. Modelling work in Southland suggests the achievement of national bottom lines (where they are not met) could be achieved over a 25 year period to 2037 without significant cost²¹. In Hinds the modelled costs of first meeting the NPS requirement to maintain or improve, then the national bottom line for nitrate toxicity under one scenario where the bottom line is met by 2038 is estimated to be \$22 million per annum from 2038 onward, or 7 per cent of the region's net income.

Further estimates of the costs of meeting national bottom lines in specific catchments are not necessarily indicative of what the amended NPS will cost to implement (even in those catchments). This is due to the uncertainty that the modelled scenarios and timeframes will match the implementation path chosen by the community and councils through a consultative process. If implementation costs are deferred, so too will be the benefits of improved water quality, for amenity, cultural appreciation and other current uses such as recreation. The framework will retain flexibility for local councils and their communities to respond in ways that suit their circumstances, while relieving them of some of the costs of scientific research and debate on what local limits should be.

The study in Southland also looked at the marginal impact of improving water quality on the non-market values of water, estimating values for three recreational activities in the range \$0.1-\$2.3 million in 2012 dollar terms between now and 2037. Other recreation and non-use values were not estimated, but would add to the non-market benefits of improved water quality.

²¹ Only the *E.coli* indicator of risks to human health had isolated occurrences, while nitrate toxicity and periphyton could be managed to meet the bottom line requirements.

Recreation values are location-specific, varying with the size, climate, affluence and tastes of the local population and with the availability or otherwise of substitute locations for recreation. The Southland study cannot be taken as representative of values obtainable elsewhere, but they may be indicative of the scale of value change that could be realised if the achievement of national bottom lines leads to improved water quality. The regional studies provide New Zealand with its first understanding of the costs and benefits of setting bottom lines for water quality. In particular, the Southland group of studies highlight:

- the amount of work required to undertake an assessment of the costs and benefits (under a range of different scenarios)
- potential issues faced by regions in meeting bottom lines
- that councils and communities would have a wide range of economic and environmental, social and cultural choices in managing freshwater quality of rivers
- the importance of differences in local conditions on costs and benefits, and the limitations this poses on being able to extrapolate local findings to a national level.

One of the main difficulties in estimating a national cost benefit ratio for the proposed changes has been isolating the impact of the bottom lines from what the NPS already requires. For example, the opportunity cost for meeting the bottom line for nitrate toxicity in Hinds will likely also be incurred to some extent by meeting the current requirements of the NPS to “maintain or improve” overall water quality in a region. Also, any costs identified will vary between regions depending on current water quality state, as well as the methods chosen by the council, in conjunction with the community, of how to meet bottom lines over time.

There are a wide range of options available for councils and communities to manage toward bottom lines, including technology transfer, land use rules, allocation-based methods, catchment mitigation and good management practice. Despite the many management options available, and the discretion councils have on timeframes to meet the objectives, there are circumstances where national bottom lines may not be achievable and the need for an exception to a bottom line may be valid. Policy CA2 provides for this.

The provision of exceptions to bottom lines in specific circumstances provides limited flexibility around the requirement to meet bottom lines. It is not intended that the costs of meeting bottom lines be a justification for an exception, as long timeframes and a host of management techniques can be used to move toward bottom lines over time. However, in specific circumstances these policies will allow for those situations where achieving bottom lines are unfeasible.

5.2.4 Risk of acting or not acting

Section 32(2)(c) requires an assessment of the risk of acting or not acting if there is uncertain or insufficient information about the subject matter or provision. The extent of our knowledge is as follows:

- There is sufficient information available from consultation with councils on the existing implementation difficulties with the narrative standards contained in the NPS and the Act.
- Limited information is available nationally on the impacts of the national objectives framework from an administrative view, but given that the changes represent an incremental change to what is already required, impacts are likely to be low.

- Information is available for three out of six regions that fail bottom lines (at some sites). Canterbury and Southland were chosen as two regions where meeting national bottom lines (for attributes, nitrate toxicity and *E.coli* respectively) would be difficult at some sites (Waikato has also been the focus of a case study and results are pending).
- Firm information is available from the Southland studies suggesting that the risks of not acting outweigh the risks of acting in that region. The proposed national bottom lines for ecosystem health in rivers that were tested in Southland do not impose costs. Water quality will be maintained above bottom lines for periphyton (slime) and nitrate toxicity under all scenarios tested (including scenarios that expand dairying).
- Information is available from Canterbury studies that the costs of meeting bottom lines for nitrate toxicity could be substantial but the costs of this (to some extent) are likely to be incurred by the current NPS requirement of addressing water quality in a region.
- There remains some knowledge gaps on the impact of national bottom lines.

Despite the lack of quantified national level data of the proposed changes, the risk of not acting is a continuation of the current risk under the NPS of a lack of national consistency and of setting ineffective freshwater objectives (and by extension, limits). The additional administrative costs of the NPS are considered to be low and will temper the costs incurred by councils and submitters in developing their own freshwater objectives.

There remain some acknowledged gaps in the assessment of the impact of bottom lines. For example, assessment of the impacts for the remaining bottom lines for rivers: periphyton (limited analysis undertaken in Southland), dissolved oxygen and ammonia toxicity (few if any sites fail for the median measure); also the bottom line attributes for lakes: total phosphorus, total nitrogen, and *Chlorophyll a*. Nationally, lake monitoring data is limited. Some lakes are known to be at risk of failing bottom lines but regional impact studies are yet to be conducted. Auckland, Wellington and Nelson have some sites which fail *E.coli* but are predominantly urban and have not yet been the subject of a case study. As a result it is not possible to produce a full national picture of the impact of national bottom lines. However, the work conducted gives an indication of the potential magnitude of impacts as well as providing a methodology for further study.

There is a risk that in acting (progressing national bottom lines) there will be costs to councils and resource users that were not anticipated. In spite of the ability to plan and manage to bottom lines over long timeframes, there may still be potentially significant impacts of bottom lines to one or more sectors, particularly in terms of opportunity costs. However, a proportion of any cost of meeting bottom lines may also be generated by the existing requirement of the NPS to 'maintain or improve water quality across a region' and councils and communities' response to that, and therefore not solely attributable to bottom lines. Despite our partial understanding of the costs and benefits, if the costs of meeting bottom lines are deferred, so too will the benefits of improved water quality. It is considered the risk of not acting outweighs the risk of acting to impose compulsory values with national bottom lines and the benefits these will bring.

While the full potential of costs and benefits has not been quantified, the proposed amendments have been determined to be effective in addressing the issues identified in the problem statement. Because some of the amendments represent a clarification of existing requirements of the NPS, the risks of not acting are considered to be greater than the risks of acting, and the policies should therefore be implemented.

5.2.5 Reasons for deciding on the provisions (section 32(1)(b)(iii))

Ensuring the freshwater objective and limit setting process results in quality decisions requires a mix of science, technical and economic information, as well as values-based judgements. All these matters could become the subject of time-consuming and costly research, followed by debate through regional council planning and court processes, with uncertain and potentially inconsistent outcomes. The costs of this fall to submitters and appellants on regional planning documents, as well as regional councils (and therefore ratepayers) and the courts. Councils individually conducting the scientific and technical work required to underpin freshwater objective setting also results in unnecessary repetition.

The causes of these problems are the lack of clarity in the NPS, and the considerable variation between councils in terms of their capability and capacity to deal with difficult freshwater objective and limit setting, including generating the technical information to inform values based policy. The national objectives framework, and its implementation through the NPS, would assist councils with all of the issues listed above.

5.2.6 Are the provisions the most appropriate way to achieve the objectives?

Based on the assessment outlined above, it is considered that Policies CA1, CA2 and CA3 are the most appropriate way to achieve Objectives CA1, A1 and B1.

6. Freshwater accounting

Freshwater accounting is a collective term for increasing our understanding of existing water use and assimilative capacity within a water body or catchment. It involves accounting for all water takes ('allocated' and the 'used' amount) including all water takes that are permitted.

It also involves identifying the quantities and sources of contaminants, including those from diffuse sources.

The information gathered through freshwater accounting is vital, it is the foundation for setting effective freshwater objectives and limits. It provides information for resource users on the availability of water or assimilative capacity, and for communities on the success of managing within limits and progress towards meeting freshwater objectives.

Freshwater accounting is currently implied through the duties imposed on local authorities by sections 35(1) and 35(2) of the Act. Section 35(1) requires local authorities to gather such information as is necessary to effectively carry out their functions under the Act. For regional councils those functions include the control of the taking, use, damming and diversion of water, and of the quantity, level and flow of water in any water body (section 30(1)(e)) and the control of discharges of contaminants into or onto land or water (section 30(1)(f)). Section 35(2)(d) requires local authorities to monitor the exercise of resource consents. For regional councils this will include the exercise of water permits to take water, and discharge permits to discharge contaminants to land or water. Information on water takes is currently being generated under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010. These regulations require consent holders of water takes greater than 5 L/sec to provide annual records of water use to their regional council. The information generated under these regulations will be a substantial component of freshwater accounting.

The third report of the Land and Water Forum recommended (Recommendation 8) that regional councils should ensure freshwater objectives and limits are achieved through a four step process of:

- accounting
- assessing and evaluating
- implementing
- monitoring and review.

Accounting was seen as key to the management of water quality by allowing the total contaminant load and all sources of contaminants of concern in any catchment to be identified. In terms of managing water quantity the Land and Water Forum noted that it was not possible to operate an effective allocation system without knowing how much water was being taken and whether conditions were being complied with.

Consultation with a number of regional councils has indicated that most accounting systems developed for water quantity are generally good, though vary in their levels of sophistication. In contrast, most councils are in the early stages of accounting for all sources of contaminants.

6.1 Appropriateness of Objective CC1

This section addresses the requirements of section 32(1)(a) of the Act, by providing an evaluation of the extent to which the proposed objective is the most appropriate way of achieving the purpose of the Act. Objective CC1 seeks to improve the information base on water takes and sources of contaminants. An improved information base will address the problems identified in section 2 of this report, particularly in relation to information gathering on sources of contaminants, and in relation to permitted water takes.

6.1.1 Options

Objective CC1 is a simple and directive statement. The only alternative to the objective therefore is to not seek to improve the information base (and therefore maintain the status quo).

6.1.2 Appropriateness assessment

Section 32(1)(a) requires an assessment of whether the objective is the most appropriate way to achieve the purpose of the Act. Table 7 below outlines the assessment of Objective CC1 and the status quo against the purpose of the Act. On the basis of this assessment, an evaluation can then be made of which option is most appropriate to achieve the purpose of the Act.

Table 7: Assessment of Objective CC1 against the purpose of the Act

	Achievement of the purpose of the Act	
	Objective CC1	Status quo
Purpose of the Act (s5)		
Enable people and communities to provide for their social, economic and cultural well-being (s5(2))	<p>Improving the information base on water takes and sources of contaminants will provide more accurate information on resource availability. In conjunction with the limit setting process under the NPS, this will allow people to plan use and development of resources and provide greater certainty.</p> <p>The availability of better information may result in constraints on resource use, but will better enable communities to set freshwater objectives and limits that balance environmental, economic, social and cultural wellbeing, and to manage within those limits into the future, therefore avoiding the costs of having to 'clawback' over-allocated water resources.</p>	<p>The existing information base does not provide certainty about the availability of water for abstraction, or assimilative capacity available for discharges of contaminants. In some instances this has led historically to the over allocation of resources, and has the potential to result in a future scenario of 'clawback' becoming necessary if over allocation occurs in the absence of sufficient information. This represents a significant risk to social and economic wellbeing if activities need to be restricted or reduced in the future.</p> <p>In the short-term a lack of information may result in continuing resource allocation, with its associated benefits to social, economic and cultural well-being.</p>
Enable people and communities to provide for their health and safety (s5(2))	Existing measures to safeguard human health would continue, with an improved information base.	Existing measures to safeguard human health would continue, although management may not be as effective.

	Achievement of the purpose of the Act	
	Objective CC1	Status quo
Sustain the potential of natural and physical resources to meet needs of future generations (s5(2)(a))	Limit setting and water management under the NPS are fundamental to sustaining the potential of natural and physical resources to meet the needs of future generations. Improved information will ensure that sustainable and accurate limits can be set.	Management to water quality limits will be almost impossible without an understanding of the total loads and sources of contaminants. Maintenance of water takes within allocation limits in catchments that are close to or fully allocated will also be extremely difficult if permitted activity takes are not accounted for.
Safeguard the life-supporting capacity of air, water, soil and ecosystems (s5(2)(b))	Limit setting and water management under the NPS are fundamental to safeguarding the life-supporting capacity of water and ecosystems. Improved information will ensure that sustainable limits can be set.	Ensuring that limits are met (and that therefore life-supporting capacity is maintained) will be difficult on the current information base.
Avoid, remedy or mitigate adverse effects of activities on the environment (s5(2)(c))	Improved information has been identified as important for limit setting, water management and understanding resource availability. Information availability will facilitate decision making on further resource use that ensures that adverse effects of activities are avoided, remedied or mitigated.	In general, decision making currently occurs in an environment of incomplete information. Issues identified with declining water quality and over allocation of fresh water suggest that avoiding, remedying or mitigating effects of activities has proven to be difficult.
Principles of the Act (ss6 – 8)		
Matters of National Importance (s6)	<p>Section 6(c) of the Act requires the Minister to recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna. Improved information will inform decision making in relation to these matters, and facilitate the setting of limits to protect them.</p> <p>Section 6(e) of the Act requires the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga to be recognised and provided for. As noted above, improved information will assist with the limit setting and water management process, which will better provide for the matters listed under section 6(e) of the Act.</p>	Existing measures to provide for matters listed in section 6(c) and section 6(e) would continue, although management may not be as effective.

	Achievement of the purpose of the Act	
	Objective CC1	Status quo
Other matters (s7)	<p>Sections 7(b) and 7(g) are relevant to a consideration of Objective CC1.</p> <p>Improved information will provide a more comprehensive understanding of the finite characteristics of natural and physical resources, and enable more efficient use to be made of the resource.</p>	Limits set may overestimate the availability of resources in the absence of information on permitted takes and discharges, and diffuse sources of contaminants.
Treaty of Waitangi (s8)	Freshwater accounting systems will allow councils to track progress in managing activities within limits for specified values. Where values such as mahinga kai or kei te ora te mauri are being managed for in a water body, freshwater accounting systems will allow councils to give effect to Treaty principles such as active protection and partnership.	If limits are set to protect tāngata whenua values there is a risk that Treaty principles will not be able to be given effect to, if management to limits is occurring without comprehensive information on water takes and sources of contaminants.

6.1.3 Appropriateness of objectives conclusion

Table 7 identifies a number of risks that arise from a lack of comprehensive information on water takes and sources of contaminants, in terms of managing water bodies to freshwater objectives and limits set under Policies A1 and B1. While the purpose of the Act can still be achieved under the status quo, Table 7 outlines that freshwater accounting will allow the purpose of the Act to be achieved more effectively. On this basis it is considered that, of the available alternatives, Objective CC1 is the most appropriate way of achieving the purpose of the Act.

6.2 Appropriateness of Policies CC1 – CC2

Section 32(1)(b) of the Act requires an assessment of whether the provisions (in this case the policies) are the most appropriate way of achieving the proposed objectives. The Act requires that the evaluation should identify other reasonably practicable options (6.2.1) and assess the effectiveness (6.2.2) and efficiency of the policies (6.2.3), the risk of acting or not acting (6.2.4), as well as a summary of the reasons for deciding on the policies (6.2.5). These evaluations have been undertaken at a level of detail which corresponds to the scale and impact of the proposal as required by section 32(1)(c).

As required by section 32(3)(b) the appropriateness of the policies has been assessed against the objective proposed to be included by the amendments (Objective CC1). No existing objectives of the NPS are considered to be relevant to the proposed amendments for freshwater accounting.

6.2.1 Options (section 32(1)(b)(i))

Three levels of options exist in relation to the NPS objective of improving the information base on water takes and sources of contaminants:

- alternatives to requiring freshwater accounting (section 6.2.1.1)
- alternatives within any freshwater accounting system in relation to the way it is carried out (section 6.2.1.2)
- implementation alternatives (section 6.2.1.3).

6.2.1.1 Alternatives to freshwater accounting

The proposed amendments to the NPS would result in councils being required to operate water quality and water quantity accounting systems. Two alternatives to this have been considered.

a) Status quo

The first option is the continuation of the status quo, relying on section 35 of the Act, and the current information gathering activities of councils including through the Water Measuring and Reporting Regulations (which provide information on the amount used, compared to what was allocated for water takes over 5 L/sec). However, a study by NIWA illustrates the wide variability in the existing accounting systems used by councils and the issues identified with their implementation. Continuing with the status quo is unlikely to ensure information on resource availability is readily available throughout the country (particularly in relation to water quality), and because of the variety of approaches currently being used, will not enable the aggregation of data for regional and national water management and monitoring purposes.

b) One-off investigation projects

A second alternative would be to undertake one-off specific investigation projects for each catchment or freshwater management unit as a precursor to the limit setting process. However, while this option would ensure that the necessary information was available for limit setting, specific investigations would only provide a snapshot of water quality and quantity and would not provide an ongoing indication of resource availability or enable ongoing regional or national monitoring and management.

6.2.1.2 Alternatives within a freshwater accounting system

Within any freshwater accounting system there are alternatives relating to the level of information that needs to be collected. The proposed amendments to the NPS only specify that water quality and water quantity accounting systems are to be established in accordance with the relevant limit setting policies, and that they are to be at a level of detail that corresponds with the issues in each freshwater management unit. There are two alternatives to this approach.

a) Catchment freshwater accounting systems

The proposed amendments to the NPS define a freshwater management unit as ‘the water body, multiple water bodies or any part of a water body determined by the regional council as the appropriate spatial scale for setting freshwater objectives and limits and for freshwater accounting and management. For the purposes of freshwater accounting and management a freshwater management unit includes the surrounding catchment’. An alternative to requiring freshwater accounting at a freshwater management unit level would be to require systems to be set up for each catchment in a region. However, this would be administratively inefficient, time consuming and result in significant expense. It is also not precluded by the current definition of

freshwater management unit and particular councils may decide to implement the amended NPS requirements on a catchment by catchment basis.

b) Restricted freshwater accounting

A second alternative would be to require freshwater accounting only for catchments where issues of allocation have been identified. However, this would be a reactive rather than proactive approach, and may lead to less effective limit setting and water management for those catchments where an accounting system is not established. It would also increase the risk of over allocation by not providing a comprehensive picture of resource availability throughout a region.

6.2.1.3 Implementation alternatives

a) Guidance only

The alternative would be to implement freshwater accounting through providing guidance to regional councils on the benefits of accounting, and methods for doing so. The major disadvantage of this approach would be the potential risk of only partial uptake of the guidance (and therefore partial implementation of freshwater accounting).

6.2.2 Effectiveness (section 32(1)(b)(ii))

Section 32(1)(b) of the Act requires an assessment of whether a policy is effective in achieving the NPS objectives. Policies CC1 and CC2 would require that water quality and water quantity accounting systems were in operation prior to limits being established. The effectiveness of the policies should therefore be assessed against Objective CC1 (and its requirement to improve the information base on water takes and sources of contaminants).

An analysis of the effectiveness of Policies CC1 and CC2 in achieving Objective CC1 is outlined in Table 8 below.

Table 8: Effectiveness of Policies CC1 and CC2

Criteria for assessing effectiveness	Assessment of freshwater accounting provisions
<p>Effectiveness Do the provisions achieve the objective?</p>	<p>The provisions require freshwater accounting systems to be put in place prior to limits being established or reviewed (Objective CC1(a)).</p> <p>Accounting systems will improve the information base (Objective CC1) on water takes by providing regularly updated information on:</p> <ul style="list-style-type: none"> • all water takes from a water body and/or freshwater management unit • major categories of use • availability of fresh water. <p>Accounting systems will improve the information base (Objective CC1) on sources of contaminants by providing regularly updated information on:</p> <ul style="list-style-type: none"> • loads and/or concentrations of relevant contaminants in freshwater management units • sources of relevant contaminants • availability of assimilative capacity in freshwater management units. <p>Accounting systems are defined (in part) as systems that keep</p>

Criteria for assessing effectiveness	Assessment of freshwater accounting provisions
	<p>regularly updated information on the share of any established freshwater limit that is available (Objective CC1(b)).</p> <p>Accounting systems will enable the aggregation of water quality and quantity data for regional and national purposes (Objective CC1(c)), provided that consistent data is kept. This would be an important matter for guidance, as the amendments to the NPS do not (and should not) contain this level of information.</p> <p>Policies CC1 and CC2 therefore achieve each of the three parts of Objective CC1.</p>
<p>Transparency Transparent information is available to inform the freshwater objective and limit setting process</p>	<p>Policy CC2 would require councils to ensure the information gathered through freshwater accounting systems was publicly available, ensuring transparency of information.</p>
<p>Practicality Least disruption to current freshwater objective and limit setting, and realistically achievable</p>	<p>Most councils have implemented some form of freshwater accounting system for water takes, and while some modifications may be needed to ensure consistency across the country, these are not expected to cause disruption to the staged implementation of freshwater objectives and limits that most councils have selected.</p> <p>Implementation of freshwater accounting for sources of contaminants is less well developed, but requiring it in step with the development of freshwater objectives and limits should lead to relatively little disruption to Council work programmes.</p>
<p>Treaty of Waitangi Takes into account the principles of the Treaty of Waitangi.</p>	<p>Freshwater accounting systems will allow councils to track progress in managing activities within limits for specified values. Where values such as mahinga kai or kei te ora te mauri are being managed for in a water body, freshwater accounting systems will allow councils to give effect to Treaty principles such as active protection and partnership.</p>
<p>Strength of language and understandability</p>	<p>The provisions need to be read in conjunction with the definitions to understand the requirements for freshwater accounting systems, but they are clear and directive about the need to establish and operate accounting systems.</p> <p>Guidance material will be needed to ensure that consistent accounting systems are implemented around the country to enable aggregation of data. The provisions and the definitions as drafted currently do not provide enough detail, although it is important to note that this is not the role of an NPS.</p>

Policies CC1 and CC2 will be effective in achieving Objective CC1. The policies require the establishment and operation of accounting systems, which will achieve Objective CC1 by ensuring that more information is available than is currently the case under the status quo. Accounting systems will build on existing systems where possible, and sufficient time is allowed for councils to develop water quality accounting systems where they do not currently exist. The requirement for them to be publicly available ensures a transparent system.

6.2.3 Efficiency (the costs and benefits of freshwater accounting) (section 32(1)(b)(ii) and section 32(2))

Overall the amended NPS will have the following impacts:

- Costs:
 - Scientific, modelling and administrative costs for regulatory agencies of central government and regional councils.
 - Potentially some minor compliance costs for resource users, iwi and the public in provision of information to populate accounting frameworks.
- Benefits:
 - Provide better quality information to stakeholders and potential investors about resource availability (water for allocation and assimilative capacity). Increased certainty can provide opportunities for further investment and/or innovation.
 - Provide improved data to underpin all aspects of the amended NPS eg, it can provide a reference point for estimating market and non-market costs and benefits associated with potential limits, assist in reducing appeals (for councils and other parties) and assist in forestalling future clean-ups by clearly defining resource availability.
 - Better informed assignment of roles and responsibilities when resource use must be reduced to achieve a target; including consideration of both equity and cost-effectiveness.
 - Allocative efficiency – creating headroom by establishing the difference between the volume of water consented and what is actually used by a consent holder.
 - Better management within limits with reduced risk of over-allocation and overuse.
 - More consistent accounting information enabling aggregation of accounting to regional and national level.

The incremental costs of the amended NPS for regulation preparation, consultation and reporting are likely to be low, but rather higher costs could fall on regional councils for the technical and scientific modelling and development of accounting systems.

There are two components to the costs associated with accounting. Firstly, there are establishment and operating costs for accounting systems, mainly information management and database (IT) costs. The recently completed report of councils²² covered the total IT costs associated with databases for managing consents and meter information. These costs cannot be used to estimate the additional costs associated with establishing and operating the accounting system. Councils may choose to invest in upgraded IT systems that partly or completely automate the data aggregation and manipulation required to produce ongoing accounts, to reduce costs.

Secondly, costs are incurred in populating the accounting systems, including costs associated with scientific data collection and modelling of particular catchments, especially on sources of contaminants. How large these costs are depends on the scale and significance of the issues in the freshwater management unit. These range from staff time for simple methods, through to modelling costing over a million dollars for large complex freshwater management units.

²² Ibid

The marginal costs to councils from the proposed accounting amendments depend on the extent to which councils would be accounting under the status quo, and any changes in accounting practice that might be required by the proposed amendments. A recent NIWA report of selected regional councils shows the following as current practice:

Table 9: Examples of Council freshwater accounting practice

Council	Accounting for all takes	Accounting for all sources of contaminants
A	Yes	No. One-off source ²³ analyses for selected catchments
B	Yes	No. One-off source analyses for many river catchments
C	Partially	No. Few source analyses carried out
D	Partially	No. Few source analyses carried out
E	Yes	No. Source analyses being carried out for a number of major catchments and will be completed for all catchments within five years

The table above indicates that the councils reviewed are already accounting for takes, although some are not formally incorporating stock and domestic water, especially where these are a small percentage of total water taken (permitted takes). In addition, all the councils in the review had carried out some source analysis for some water bodies, but none were producing ongoing contaminant accounts.

The amendments would not require additional metering in order to account for all takes. However regional councils will need a reputable method for estimating water use by non-metered takes, including stock and domestic water, to build a more coherent picture of overall water use across the catchment. Existing estimation methods used by many councils are based on standard per household or stock unit daily intakes, adjusted by survey data. These methods are reported to have similar levels of accuracy to water meters.

Comprehensive information on likely extra costs associated with the proposed amendments on accounting for all sources of contaminant is difficult to estimate for the following reasons:

- It is difficult to separate the extra costs associated with accounting from those associated with freshwater objective and limit setting eg, catchment models are developed and used for both accounting *and* testing the impacts of various limit scenarios.
- Costs vary depending on the level of sophistication of accounting methods used.
- Many councils will carry out source analysis as part of their limit setting process without the proposed amendments.
- The region-wide costs vary depending on number of freshwater management units (FMU), since accounting is to be carried out at FMU scale.

The draft amendments require that accounting systems are at a level of detail corresponding to the significance of the issues in the catchment. Basic approaches to accounting for all sources of contaminant involve using data on average losses from various types of enterprise, combined with land use and enterprise data to develop an overall estimate for the catchment or freshwater management unit. One council has recently spent \$0.15 million to develop a basic source analysis for a large catchment. More sophisticated accounting using catchment models would be

²³ Note: one-off source analyses can be used as the basis for ongoing accounting for sources of contaminants.

required where pressures or risks are high. One council has indicated that preliminary data collection for accounting for sources of contamination in groundwater is costing of the order of \$100,000 in total, spread over three years, and another has spent \$1.2 million per major catchment on water quality science and related modelling costs to underpin limit setting, including an assessment of current sources of contaminants (covering both surface and ground water).

Typically, the upfront initial cost to develop accounting methods is higher than the costs of ongoing updating – with source (quality) accounting only being required every five years under the proposals.

In evaluating the efficiency of the water accounting framework, it is difficult to isolate the costs and benefits attributable to the framework. A number of water planning tasks regarding both quality and quantity management could be assisted by a more complete water accounting framework that a) accounts for unconsented water takes (eg, permitted takes and unauthorised takes) and b) the level of discharges from various sources.

On the information available, the likely costs and benefits (or associated savings from accounting) are relatively small compared with other aspects of the NPS (eg, the wider opportunity costs and benefits). The costs are entirely borne by the regional authorities (and ultimately, their ratepayers). Benefits are spread across the community through more effective water management.

6.2.4 Risk of acting or not acting (section 32(2)(c))

There is sufficient information available about the current freshwater accounting systems used by councils. Specific discussions have been undertaken with seven councils about their existing accounting systems.

National *quantifiable* information on the benefits of freshwater accounting has not been able to be obtained.

The risk of acting (requiring freshwater accounting systems to be implemented) is that the costs will be borne by councils for a relatively small gain in terms of benefits. However, this risk is considered to be relatively small. Improved information, particularly on permitted takes, and diffuse sources of contaminants, will make managing water bodies to freshwater objectives and limits more effective. The risk of not acting is that decisions will be made about freshwater objectives and limits in the absence of comprehensive information, and managing water bodies to ensure that over allocation does not occur will be more difficult. The risks of not acting, are considered to be greater than the risks of acting and the policies should therefore be implemented.

6.2.5 Reasons for deciding on the provisions (section 32(1)(b)(iii))

Consultation with a number of regional councils in March-June 2013 has indicated that most are accounting for water takes in some form, though with various levels of sophistication, reflecting their capability, capacity, resource pressures and data availability. Accounting for metered takes will become increasingly accurate as the requirements of the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 progressively take effect.

However in contrast, most councils are in the early stages of accounting for all sources of contaminants. Where one-off source analyses have been carried out, the approaches used vary,

for example, some have used coefficient-based methods of accounting for sources, based on average discharges per hectare by various land uses. Relatively sophisticated catchment modelling has been used to account for the sources of contaminant(s) in Lake Rotorua and Lake Taupō.

Councils are required under the NPS to set freshwater objectives and limits and manage to them, but in order for these to be effective, councils will first have to account for all takes and sources of contaminants. Freshwater accounting establishes essential information on which councils can develop an effective and efficient water management framework. It is fundamental to the processes of setting freshwater objectives and limits, and of selecting methods and tools to manage to them.

6.2.6 Are the provisions the most appropriate way to achieve the objective?

Based on the assessment undertaken above, it is considered that Policies CC1 and CC2 are the most appropriate way to achieve Objective CC1.

7. Conclusions

Previous sections of this report have established that there is a risk of the implementation of the current NPS not achieving the improvements in water management sought to provide for New Zealand's economic growth and economic integrity. A variable approach to freshwater objective setting across regions risks ineffectiveness by creating uncertainty, inefficiency by incurring costs and delays, and a lack of transparency that reduces confidence in the institutional settings for water management and use. Similar risks are created by variable accounting practices.

In response to the defined problem of the current approach, the NPS amendments propose a national objectives framework (a process and a set of tables) be incorporated to assist regional councils to set freshwater objectives. There are provisions for freshwater accounting systems to be set up by councils to monitor all water takes and specific discharges into catchments. The proposed amendments also require that explicit consideration be given to the choices, costs and benefits of measures implemented under the NPS with respect to both water quality and water quantity management.

The proposed national objectives framework, the definition of ecosystem health and human health as mandatory national values, and the setting of scientifically agreed national bottom lines will contribute to safeguarding the life-supporting capacity of water and ensure human health associated with secondary contact with fresh water. Freshwater accounting systems will increase the information base for objective and limit setting and assist in ongoing water management activities and a nationally consistent process for setting freshwater objectives will be established.

The provisions provide transparency to stakeholders and are designed to be practically implemented as part of existing work programmes to set freshwater objectives and limits. They allow the principles of the Treaty of Waitangi to be taken into account in managing freshwater quality and quantity by incorporating the principle of Te Mana o te Wai into the national values.

A number of costs are likely to be incurred in addition to the status quo, such as the preparation (and ongoing population) of the national objectives framework by Government. A number of benefits, most of which are expected to be reductions in the administrative costs falling on regulators or the compliance costs falling on those subject to the water management regime are also likely. While these are important, they are not the only beneficial consequences from the amended NPS.

A principal source of potential benefit is the impact on water quality, availability and the economic consequences for use of water, which is a major driver for the proposed changes. These consequences optimise the value obtained from water by using it in ways that change its state (quality or quantity) by using it in a more water neutral way (eg, recreation and sightseeing) or by valuing its non-use attributes (existence values).

To the extent that the NPS does result in improvements in water quality and water quantity management, it will also improve the non-market values associated with water bodies, their suitability for recreational activities and for Māori cultural uses and heritage values. These values are difficult to quantify and apply economic valuation techniques to, and the Environment Court has ruled that economic valuation should not be applied to these issues.²⁴

²⁴ In *Minister of Conservation v Otago Regional Council C071/2002*, the Court stated that economic analysis is limited in cases where the Court is evaluating interests such as habitat, landscape and amenity use [162];

However, for non-market purposes there is a non-zero benefit from such improvements in water management, which needs to be recognised in consideration of efficiency but which is ultimately a value judgment that will vary depending on perspective.

In qualitative terms there is a long list of potential benefits expected to be conferred by the incremental changes in the NPS from the current version, including:

- non-market value gain for recreation and Māori customary use
- non-market value gain for non-use values
- reduced cost of delay in securing decision on uses of water
- reduced cost of scientific research and determination of limits by councils
- reduced expected cost of litigation for councils and the public
- reduced cost of compliance for those subject to the NPS.

Costs of the amended NPS are difficult to quantify on a national basis. The proposed changes to the NPS will result in low magnitude costs for regional councils in relation to their planning functions, for Government in preparing the amended NPS and for stakeholders and regional councils in terms of consultation.

Where bottom lines are not currently met there may be substantial opportunity costs to achieve them, although the timeframe flexibility provided by the NPS may allow these costs to be managed. Modelling work in Southland suggests that the achievement of national bottom lines (where they are not currently met) could be managed over a 25 year period to 2037 without significant cost. In contrast, in Canterbury in the Hinds water management zone, modelled costs of first meeting the NPS objective of maintaining and improving water quality, and then meeting the national bottom line for nitrate toxicity by 2038 is estimated to be \$22 million per annum from 2038 onward, or 7 per cent of the region's net income.

The case studies have provided the best available information on the costs of bottom lines. The information has quantified, where practicable, the costs specific to those regions and they have provided a methodology for other regions to use. This will lend support to communities when considering the impacts of the choices that are made in relation setting freshwater objectives. For a cost assessment to be relevant it must be carried out at the regional/local level due to the uncertainty inherent in attributing results from one region to another that has a different set of base conditions.

Unrestricted growth may cause problems in the future if not addressed by mechanisms such as the national bottom lines. The amendments set out a blueprint to show how water resources should be managed in the future as well as ensuring that New Zealand deals with any legacy issues. The costs of bottom lines, particularly in the Hinds District, stem from both legacy issues and projected future growth and these will need to be addressed under the current NPS requirements. The proposals seek to develop a durable water management regime that ensures legacy issues are not part of New Zealand's future.

and in *Meridian Energy Ltd v Central Otago DC* [2010] NZRMA (HC), the Court stated it would be difficult, if not impossible, to express some of the criteria in Part 2 of the Act in quantitative terms, and there is no provision for such assessment to be expressed in dollar terms [108].

While the proposed Objectives have been assessed as being the most appropriate to achieve the purpose of the Act; and the provisions *effective* in terms of achieving the proposed objectives of the NPS, there are uncertainties relating to *quantified* costs and benefits, and therefore the overall *efficiency* of the provisions in achieving the objectives. However, significant benefits are anticipated to be able to be achieved through the implementation of a nationally consistent process for the setting of freshwater objectives and through having a consistent information base on water takes and sources of contaminants. The flexibility in the implementation of the requirement to maintain bottom lines may allow costs to be balanced over time in regions where they would be experienced, and a significant proportion of these costs would be experienced in any case with the existing NPS requirements to establish freshwater objectives and maintain or improve water quality. While it is acknowledged that further work needs to be done to establish costs of national bottom lines on a regional or local basis, the benefits of a nationally consistent approach mean that the proposed amendments to the NPS are seen as an appropriate approach to address the problems identified with the existing implementation of the NPS.