

PROPOSED

WAIKATO REGIONAL PLAN CHANGE 1 – WAIKATO AND WAIPĀ RIVER CATCHMENTS

**SECTION 32
EVALUATION
REPORT**

TE PANONITANGA 1 I TE MAHERE
Ā-ROHE A WAIKATO E MAROHITIA
NEI - NGĀ RIU O NGĀ AWA O
WAIKATO ME WAIPĀ



Contents

| | |
|--|----------|
| PART A INTRODUCTION AND PLANNING CONTEXT | 6 |
| A.1 Introduction and topic background | 6 |
| A.1.1 Purpose of this report | 6 |
| A.1.2 How to navigate through the evaluation report | 6 |
| A.1.3 Decision making | 8 |
| A.1.4 Plan Change 1 to the Waikato Regional Plan | 9 |
| A.2 Statutory Framework | 11 |
| A.2.1 Legislation | 11 |
| A.2.2 RMA National Policy | 12 |
| A.2.3 Regional planning context | 13 |
| A.3 Bibliography for Part A | 17 |
| A.4 Appendices | 19 |
| A.4.1 Appendix 1: RMA requirements for Section 32 Evaluation reports | 19 |

| | |
|--|-----------|
| PART B DEVELOPMENT OF PLAN CHANGE 1 | 22 |
| B.1 Background | 22 |
| B.1.1 New era of Co-governance and Co-management of the Waikato and Waipa Rivers | 22 |
| B.1.2 Stakeholder Engagement Strategy | 22 |
| B.2 The Collaborative Stakeholder Group | 23 |
| B.2.1 Design and formation of the group | 23 |
| B.2.2 Implementation and operation | 24 |
| B.2.3 Field trips undertaken by the Collaborative Stakeholder Group | 25 |
| B.2.4 Approaches to connect the wider community | 25 |
| B.2.5 Tāngata whenua engagement | 27 |
| B.2.6 Technical information | 28 |
| B.2.7 The Collaborative Stakeholder Group's development of Plan Change 1 | 28 |
| B.3 Identifying Values and Uses | 30 |
| B.3.1 Process for developing the values and uses for the Waikato and Waipa Rivers | 30 |
| B.4 Developing the Policy Selection Criteria | 31 |
| B.5 Legislation and policies influencing stakeholder engagement – regional level and context | 32 |
| B.5.1 Regional Policy Statement | 32 |
| B.6 Communications | 33 |
| B.7 RMA Schedule 1 consultation | 34 |
| B.8 Development of Plan Change 1 | 35 |
| B.9 Bibliography for Part B | 36 |
| B.10 Appendices | 39 |
| B.10.1 Appendix 1: Meetings and consultation undertaken | 39 |
| B.10.2 Appendix 2: The CSG's Policy Selection Criteria | 50 |

PART C TECHNICAL INFORMATION **52**

| | |
|--|----|
| C.1 Technical Leaders Group process | 52 |
| C.1.1 Populating a Waikato Objectives Framework | 53 |
| C.1.2 Economic model | 53 |
| C.1.3 Groundwater investigations | 56 |
| C.1.4 Mātauranga Maori | 57 |
| C.1.5 Social and cultural impact assessment | 57 |
| C.1.6 Technical workbriefs | 59 |
| C.2 Key findings | 60 |
| C.2.1 Information provided to the CSG | 60 |
| C.2.2 Key findings from work carried out to inform the model | 61 |
| C.3 Bibliography for Part C | 86 |

PART D OBJECTIVES **92**

| | |
|---|-----|
| D.1 Assessment of the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA | 92 |
| D.1.1 Objective 1 and Objective 3 | 92 |
| D.1.2 Objective 2 and Objective 4 | 94 |
| D.1.3 Objective 5 | 96 |
| D.1.4 Objective 6 | 98 |
| D.1.5 Summary of the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA | 100 |
| D.2 Summary of reasons for selection of objectives | 102 |
| D.3 Bibliography for Part D | 103 |
| D.4 Appendices | 105 |
| D.4.1 Appendix 1. Current state and long term desired water quality targets for the Waikato and Waipa River catchment | 105 |

| | |
|---|------------|
| PART E PROVISIONS | 128 |
| E.1 Overview of the sections in Part E | 128 |
| E.2 Staging the transition to the 80 year goal | 131 |
| E.2.1 Plan Change 1 Provisions | 131 |
| E.2.2 Reasonably practicable options | 132 |
| E.2.3 Explanation of options | 132 |
| E.2.4 Evaluation of options and reason for preferred option | 132 |
| E.2.5 Effectiveness of Option 2: staged approach, make a start at reductions and prepare for future reductions and future allocation | 135 |
| E.2.6 Efficiency of Option 2: staged approach, make a start at reductions and prepare for future reductions and future allocation | 137 |
| E.2.7 Assessment of risk: certainty and sufficiency of information | 139 |
| E.2.8 Overall assessment of appropriateness and reasons for deciding on provisions | 139 |
| E.2.9 Bibliography for Part E.2 | 140 |
| E.3 Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point | 141 |
| E.3.1 Plan Change 1 Provisions | 141 |
| E.3.2 Reasonably practicable options | 142 |
| E.3.3 Explanation of options | 143 |
| E.3.4 Evaluation of options and reason for preferred option | 145 |
| E.3.5 Effectiveness of Option 6: FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges | 158 |
| E.3.6 Efficiency of Option 6: FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges | 174 |
| E.3.7 Assessment of risk: certainty and sufficiency of information | 179 |
| E.3.8 Overall Assessment of appropriateness and reasons for deciding on provisions | 180 |
| E.3.9 Bibliography for Part E.3 | 180 |
| E.3.10 Appendix 1 | 183 |
| E.4 Restricting land use changes | 184 |
| E.4.1 Plan Change 1 Provisions | 184 |
| E.4.2 Reasonably practicable options | 184 |
| E.4.3 Explanation of options | 184 |
| E.4.4 Evaluation of options and reason for preferred option | 185 |
| E.4.5 Effectiveness of Option 2: Controls on changes in land use | 186 |
| E.4.6 Efficiency of Option 2: Controls on changes in land use | 189 |
| E.4.7 Assessment of risk: certainty and sufficiency of information | 191 |
| E.4.8 Overall assessment of appropriateness and reasons for deciding on provisions | 191 |
| E.4.9 Bibliography for Part E.4 | 191 |
| E.5 Managing point source discharges | 193 |
| E.5.1 Plan Change 1 Provisions | 193 |
| E.5.2 Reasonably practicable options | 193 |
| E.5.3 Explanation of options | 194 |
| E.5.4 Evaluation of options and reason for preferred option | 194 |
| E.5.5 Effectiveness of Option 2: Existing provisions, additional controls on point source discharges and consent application considerations | 195 |
| E.5.6 Efficiency of Option 2: Existing provisions, additional controls on point source discharges and consent application considerations | 198 |
| E.5.7 Assessment of risk: certainty and sufficiency of information | 199 |
| E.5.8 Overall Assessment of appropriateness and reasons for deciding on provisions | 199 |
| E.5.9 Bibliography for Part E.5 | 200 |
| E.6 Managing Whangamarino Wetland | 201 |
| E.6.1 Plan Change 1 Provisions | 201 |

| | |
|--|-----|
| E.6.2 Reasonably practicable options | 201 |
| E.6.3 Explanation of options | 201 |
| E.6.4 Evaluation of options and reason for preferred option | 202 |
| E.6.5 Effectiveness of Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland | 203 |
| E.6.6 Efficiency of Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland | 204 |
| E.6.7 Assessment of risk: certainty and sufficiency of information | 206 |
| E.6.8 Overall Assessment of appropriateness and reasons for deciding on provisions | 206 |
| E.6.9 Bibliography for Part E.6 | 207 |
| E.7 Flexibility of the use of Te Ture Whenua and settlement land | 208 |
| E.7.1 Plan Change 1 Provisions | 208 |
| E.7.2 Reasonably practicable options | 208 |
| E.7.3 Explanation of options | 209 |
| E.7.4 Evaluation of options and reason for preferred option | 210 |
| E.7.5 Effectiveness of Option 2 develop new policy | 212 |
| E.7.6 Efficiency of Option 2: develop new policy | 214 |
| E.7.7 Assessment of risk: certainty and sufficiency of information | 217 |
| E.7.8 Overall assessment of appropriateness and reasons for deciding on provisions | 218 |
| E.7.9 Bibliography for Part E.7 | 218 |
| E.8 Prioritisation and sub-catchment planning | 220 |
| E.8.1 Plan Change 1 Provisions | 220 |
| E.8.2 Reasonably practicable options | 220 |
| E.8.3 Explanation of options | 221 |
| E.8.4 Evaluation of options and reason for preferred option | 222 |
| E.8.5 Effectiveness of Option 3 prioritisation of implementation timing, sub-catchment planning and co-ordination of actions | 225 |
| E.8.6 Efficiency of Option 3 prioritisation of implementation timing, sub-catchment planning and co-ordination of actions | 229 |
| E.8.7 Assessment of risk: certainty and sufficiency of information | 231 |
| E.8.8 Overall assessment of appropriateness and reasons for deciding on provisions | 231 |
| E.8.9 Bibliography for Part E.8 | 232 |
| E.9 National Environmental Standards | 234 |
| E.10 Overall conclusion | 235 |
| E.11 Appendices | 237 |
| E.11.1 Appendix 1: List of Plan Change 1 Objectives, Policies, Methods and Rules | 237 |

Part A Introduction and Planning Context

A.1 Introduction and topic background

A.1.1 Purpose of this report

This Section 32 evaluation report accompanies the Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River catchments (hereafter called 'Plan Change 1').

Under Section 32 of the Resource Management Act 1991 (RMA) Waikato Regional Council is required to assess the extent to which each objective proposed through Plan Change 1 is the most appropriate to achieve the purpose of the RMA and by assessing efficiency and effectiveness, which policies, rules and methods are the most appropriate to achieve the objectives. (Refer to A.4.1 'Appendix 1: RMA requirements for Section 32 Evaluation reports' for the detailed wording of s32).

This report fulfills the requirements of a s32 evaluation.

Plan Change 1 is a geographically specific change to the operative Waikato Regional Plan, applying only in the Waikato and Waipa catchments. Plan Change 1 focuses on the management of discharges of the contaminants nitrogen, phosphorus, sediment and microbial pathogens, and particularly focuses on the management of diffuse discharges. The requirements in Plan Change 1 are in addition to what is currently in the Waikato Regional Plan (2012).

For the avoidance of doubt, Plan Change 1 does not change the management of water quality in other areas of the Waikato Region, nor does it change the management of other resources in the Waikato and Waipa catchments.

A.1.2 How to navigate through the evaluation report

The structure of this report is in five parts:

Part A 'Introduction and Planning Context': Provides an introduction and outline of the Planning Context for Plan Change 1.

Part B 'Development of Plan Change 1': Sets out how Plan Change 1 was developed.

- This part sets out the process of development and evaluation of the package that underpins Plan Change 1. It describes the development of Plan Change 1, particularly co-management, the input and involvement of stakeholders and the engagement with the community and partners. It includes detail on the process for developing the values and uses, and about the Policy Selection Criteria used in decision making in Plan Change 1 development.

Part C 'Technical Information': Provides an overview of the technical work that supports Plan Change 1.

- This part outlines technical information supporting the project that developed Plan Change 1, including the scenario modelling. It includes an overview of the establishment of the Technical Leaders Group and the outputs of the technical work done to support the project.

Part D 'Objectives': Evaluates the objectives.

- This part sets out the assessment of the appropriateness of the objectives.

Part E 'Provisions': Evaluates the proposed provisions.

- This part outlines the evaluation of the relevant management options to address land use and associated discharges and their effects on water quality. The effectiveness and efficiency of Plan Change 1 is evaluated.

A.1.2.1 Assessment of objectives and provisions

The objectives are assessed as to whether they are the most appropriate to achieve the purpose of the RMA.

The provisions are assessed as to whether they are the most appropriate to achieve the objectives.

The criteria used in this evaluation were based on the S32 requirements and MfE Guidance (MfE, 2014) in addition to the Collaborative Stakeholder Group's Policy Selection Criteria.

The Policy Selection Criteria that are relevant to this evaluation of the objectives are (refer to B.10.2 'Appendix 2: The CSG's Policy Selection Criteria' for the complete list):

- Gives effect to Te Ture Whaimana/the Vision and Strategy.
- RMA (including the National Policy Statement for Freshwater Management).
- Provides for aspirations of River iwi.
- Gives positive social and community benefits.
- Achieves the restoration and protection of native habitats and biodiversity.

Part E, as part of assessing the appropriateness of the provisions in achieving the objectives, identifies the reasonably practical options for provisions, and assesses the efficiency and effectiveness of the provisions.

Effectiveness

Reasonably practicable options have been assessed for their effectiveness in achieving the objectives. The criteria used to make this assessment are:

- **Relevance:** Effective in achieving the objective(s). Clear policy direction and decision making.
- **Feasibility:** Within council's powers, responsibilities and resources. Degree of risk and uncertainty of achieving objectives. Ability to implement, monitor and enforce.
- **Acceptability:** Level of equity and fair distribution of impacts. Level of community acceptance. Likely political acceptance.

In addition, the Policy Selection Criteria relevant to this evaluation of the provisions are (refer to B.10.2 'Appendix 2: The CSG's Policy Selection Criteria' for the complete list):

- Realistic to implement, monitor and enforce.
- Acceptable to the wider community.
- Allows for flexibility and intergenerational land use.

Efficiency

Assessing the efficiency of provisions includes identifying and assessing the environmental, social, cultural and economic costs and benefits.

In addition, the Policy Selection Criteria that are relevant to this evaluation of the provisions are (refer to B.10.2 'Appendix 2: The CSG's Policy Selection Criteria' for the complete list):

- Optimises environmental, social and economic outcomes.

Refer also to E.1 'Overview of the sections in Part E'.

A.1.2.2 Glossary of abbreviations used throughout this report

For a full glossary of terms, please refer to the Glossary section of the Proposed Waikato Regional Plan Change 1 - Waikato and Waipa River Catchments. In addition, the following list of abbreviations may assist the reader:

BPO Best Practicable Option

CSG Collaborative Stakeholder Group

EIJV Economic Impact Joint Venture

FEP Farm Environment Plan

FMU Freshwater Management Unit

GDP Gross Domestic Product

GRP Gross Regional Product

HRWO Healthy Rivers Wai Ora

MAV Maximum Acceptable Value

MCI Macroinvertebrate Community Index

MMOL Multiple Maori Owned Land

MRT Mean Residence Time

N Nitrogen

NES National Environment Standard

NOF National Objectives Framework

NPS-FM National Policy Statement for Freshwater Management

NRP

Nitrogen Reference Point

NZCPS New Zealand Coastal Policy Statement

Overseer OVERSEER^(R) Nutrient budgets

P Phosphorus

PSC Policy Selection Criteria

RMA Resource Management Act 1991

RPS Waikato Regional Policy Statement

TLG Technical Leaders Group

TN Total Nitrogen

TP Total Phosphorus

TSG Technical Support Group

WOF Waikato Objectives Framework

WRA Waikato River Authority

WRC Waikato Regional Council

ZMP Zone Management Plans

A.1.3 Decision making

A.1.3.1 Requirements of the Local Government Act

The Local Government Act 2002 sets out, in sections 76 - 82, requirements regarding decision making. Through the development of Plan Change 1 the decision making procedures set out in this Act have been appropriately observed.

The scale and significance of decisions related to Plan Change 1 were considered (as required by sections 79 and 82, in particular), and deemed to be of considerable importance for the environmental, social, economic and cultural wellbeing of the Waikato and Waipa River catchments and their communities. Plan Change 1 will impact on landowners within the Waikato and Waipa catchments, but is critical for improving water quality for River iwi and for future generations, as required by settlement legislation (refer to A.2.1.1 'Waikato and Waipa River Legislation').

The evaluation and analysis provided in this report and in the background supporting documentation is therefore of a commensurate scale to address the scale and significance of Plan Change 1. This report meets the decision-making requirements of the council (under both the LGA ss76-82 and the RMA s32) with specific reference to the identification and assessment of reasonably practical options and the consideration of the known views of persons with an interest in this matter.

For more information refer to section A.2 'Statutory Framework'.

A.1.3.2 Co-Governance

Waikato Regional Council has prepared Plan Change 1 for the Waikato and Waipa River catchments in partnership with Maniapoto Maori Trust Board, Raukawa Charitable Trust, Te Arawa River Iwi Trust, Tūwharetoa Maori Trust Board, and the Waikato Raupatu River Iwi Trust. Under settlement legislation (refer to A.2.1.1 'Waikato and Waipa River Legislation'), joint recommendations (WRC 2013, Document# 2904117) are made by the Council and iwi partners in relation to:

- commencing the process to prepare, review, amend and/or vary a Resource Management Act planning document; and
- recommending that a draft Resource Management Act planning document is notified.

The Waikato Regional Council retained the ultimate decision to formally notify Plan Change 1.

A.1.4 Plan Change 1 to the Waikato Regional Plan

The decision to commence the project along with setting the boundaries and approach to the project was agreed to by Waikato Regional Council and Waikato and Waipa River iwi partners, and recorded as a resolution of Council in August 2012 (WRC 2012, Document# 2242297).

Plan Change 1 is a catchment-specific change to the Waikato Regional Plan. The principle features are to:

- Add a new sub-regional chapter 3.11 specifically for the Waikato and Waipa River catchments.
- Make consequential amendments to other chapters of the Waikato Regional Plan.

A map of the area covered by the Waikato and Waipa River catchments is shown in Plan Change 1, Map 3.11.1.

The Waikato Regional Plan is operative, and contains objectives, policies, methods and rules that were developed for and apply to the entire Waikato Region (with the exception being Chapter 3.10 Lake Taupo catchment). The current Waikato Regional Plan will remain in force, and as the proposed objectives and provisions contained in Plan Change 1 apply to the specific geographical area of the Waikato and Waipa catchments, they will apply in addition to the current provisions.

There are four main drivers for undertaking Plan Change 1: legal requirements; policy effectiveness of the Waikato Regional Plan; stakeholder and community expectations; and water quality monitoring results. These are discussed below.

A.1.4.1 Legal requirements

Under settlement legislation (refer to A.2.1.1 'Waikato and Waipa River Legislation'), Te Ture Whaimana o Te Awa o Waikato/ the Vision and Strategy for the Waikato River (Vision and Strategy) is the primary direction setting document for the Waikato and Waipa rivers, and must be 'given effect to' by regional and district plans within the rivers' catchments. The Waikato Regional Plan was evaluated against the Vision and Strategy and it was identified that changes were required to give effect to the Vision and Strategy (Opus 2013, Document# 2900240).

The National Policy Statement for Freshwater Management 2014 (NPS-FM) requires Waikato Regional Council to manage water quality by setting objectives, limits and targets for all fresh water bodies. It sets out a process to do so, and requires Waikato Regional Council to make or change the Waikato Regional Plan so that the objectives are in accordance with the process outlined.

More detail on the legislative requirements are contained in A.2 'Statutory Framework'.

A.1.4.2 Policy effectiveness of the operative Waikato Regional Plan

The objectives in the Regional Plan were developed in the early 2000s. This predates the River Iwi Co-management Legislation, the A.2.3.2 'Vision and Strategy', the A.2.2.1 'National Policy Statement for Freshwater Management 2014' and the A.2.3.3 'Waikato Regional Policy Statement'.

The Vision and Strategy focuses on restoring and protecting the health and wellbeing of the Rivers, including the protection of the economic, social, cultural and spiritual relationships that Waikato and Waipa River iwi and the Waikato Region's communities have with the Rivers. While the existing Regional Plan objectives address some aspects of the Vision and Strategy, they are not as focused on the values specified in the Vision and Strategy, or the issues affecting water quality in the Waikato and Waipa River catchments. One of the fundamental reasons for Plan Change 1 was to give effect to the Vision and Strategy.

The current Regional Plan objectives do not refer to Freshwater Management Units (FMUs), which under the NPS-FM are to be driven by community values and measurable attributes, in order to guide the development of water quality objectives. While there is clearly alignment between the existing objectives and the proposed objectives, the existing Regional Plan does not give full effect to the NPS-FM.

Since the Regional Plan was made operative, a new Waikato Regional Policy Statement (RPS) has been developed and made operative. This includes Objective 3.4, which relates to the Vision and Strategy, and Objective 3.14 relating to the mauri and values of fresh water bodies, including reference to establishing objectives, limits and targets for managing fresh water bodies, as well as recognising the need for catchment-specific management approaches. Objective 3.16 provides guidance on managing riparian areas and wetlands and Objective 3.25 and 3.26 focus on soil management issues. While there is clearly alignment between the objectives of the RPS and Plan Change 1, the existing Regional Plan does not give full effect to the RPS.

Therefore, the existing Regional Plan objectives are relevant in part, but do not give effect to the policy directives of the NPS-FM, RPS and the Vision and Strategy. The existing objectives can be regarded as being complementary to the objectives being sought by Plan Change 1, but do not go far enough for managing diffuse discharges in the Waikato and Waipa River catchments.

In addition, the Regional Plan does not sufficiently address how to manage activities on land to protect water quality, particularly from diffuse discharges, nor how to manage the effects of problematic amounts of nitrogen, phosphorus, sediment and microbial pathogens entering water bodies. The Office of the Auditor-General's report (Office of the Auditor-General, 2011) on freshwater quality highlighted that more is needed to manage the risks to water quality in the Waikato region than the current mix of regulatory and non-regulatory methods, particularly for diffuse discharges. Apart from the Lake Taupō catchment, the current Regional Plan does not address how to manage activities on land to protect water quality and appropriately manage the effects of diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens entering water bodies.

Therefore, the objectives in the Regional Plan are complementary to the proposed objectives in Plan Change 1, but are currently insufficient on their own to meet the current statutory requirements.

A.1.4.3 Stakeholder and community expectations

Water pollution is consistently the most important environmental issue identified by the Waikato community. People want the rivers to support a range of uses (Versus Research Ltd, 2013). Industry expects to be able to continue to use water from the rivers, and for the rivers to provide for future economic opportunities. Overseas markets are increasingly expecting our environmental scorecard to support our 'clean green' reputation.

The rivers are a taonga to iwi, who have long been concerned about their management. This project plays a part in fulfilling iwi aspirations for the Waikato River. As set out in the Vision and Strategy, iwi seek the restoration and protection of the health and wellbeing of the Waikato River and recognition that the river's strategic importance to New Zealand's social, cultural, environmental and economic wellbeing requires the restoration and protection of its health and wellbeing (Henry, 2014). Iwi anticipate restoration of the river's water quality so that it is safe for people to swim in and take food from over its entire length. River iwi all have aspirations to strengthen their respective tribal economies and are committed to working alongside the community and stakeholders to achieve Te Ture Whaimana - the Vision and Strategy (River iwi 2015 Document# 3629218).

A.1.4.4 Water quality monitoring

Nitrogen has slowly but steadily rising trends in the Waikato and Waipa rivers over the last 20 plus years. Nitrogen levels downstream of Taupō are especially low, but increase down the length of the Waikato River.

In the Waipa River there are moderate levels of phosphorus, with mixed trends. In the Waikato River there are some moderate levels, and some improvement. The phosphorus levels downstream of Taupō are especially low, but increase down the length of the Waikato River.

Levels of *E. coli* in the Waipa River are high, with no discernible trends. In the Waikato River levels are moderate downstream from Karapiro with some deterioration. *E. coli* levels are very low in the Upper Waikato River.

Sediment levels in the Upper Waikato River are low to moderate, with some deterioration. The Lower Waipa River and Waikato River have high levels, with some deterioration.

A.2 Statutory Framework

This section sets out the key legislative and planning contexts for Plan Change 1.

A.2.1 Legislation

Resource Management Act

Regional councils have responsibilities under the RMA and give effect to the Act through regional policy statements and plans. The RMA is the primary legislation that guides regional plans in managing water quality. Specifically:

- S5 states that local authorities have a responsibility to sustainably manage natural and physical resources while “safeguarding the life-supporting capacity of air, water, soil and ecosystems”.
- S30 outlines the functions that regional councils must undertake to give effect to the RMA. This includes:
 - The control of the use of land for the purposes of the maintenance and enhancement of the quality of water in water bodies and coastal water (s30(1)(c)(ii)); and
 - The control of discharges of contaminants into or onto land, air, or water and discharges of water into water (s30(1)(f)); and
 - If appropriate the establishment of rules in a regional plan to allocate the capacity of air or water to assimilate a discharge of a contaminant s30(1)(fa)(iv).
- S70 sets a baseline with respect to discharges to waterways, including a requirement that any permitted activity rule shall not allow for the adverse effects specified in s70 (for example, conspicuous change in colour or visual clarity).
- S2 defines relevant terms including discharge, contaminant, water, fresh water and water bodies.
- Schedule 1 outlines the process that must be followed when any part of a policy statement or plan is reviewed.
- S32 outlines the requirements for preparing and publishing the evaluation report that supports this Plan Change.

A.2.1.1 Waikato and Waipa River Legislation

There are three Acts that relate specifically to the Waikato and Waipa Rivers:

- Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010;
- Ngāti Tūwharetoa, Raukawa and Te Arawa River Iwi Waikato River Act 2010; and
- Ngā Wai o Maniapoto (Waipa River) Act 2012.

The purpose of the two Waikato River Acts is to restore and protect the health and wellbeing of the Waikato River for (present and) future generations. The overarching purpose of the Waipa River Act is to restore and maintain the quality and integrity of the waters that flow into and form part of the Waipa River for present and future generations and the care and protection of te mana tuku iho o Waiwaia.

Under these Acts, the Waikato Regional Council shares co-management responsibilities with Waikato and Waipa River iwi (Maniapoto, Ngāti Tūwharetoa, Raukawa, Te Arawa River Iwi, and Waikato-Tainui). The Co-management arrangements for the Rivers provides for Joint Management Agreements between River iwi and Local Authorities. These agreements cover preparation, review, change or variation of RMA planning documents, including the Regional Plan. It was through these mechanisms that the scope of Plan Change 1 was agreed.

A.2.1.1.1 Other relevant legislation

Other relevant legislation that has informed the development of Plan Change 1 includes:

- Local Government Act 2002: The council has duties and responsibilities under this Act that relate to the purpose of local government, which is to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses. There is also guidance on consultation and decision making processes.
- Soil Conservation and Rivers Control Act 1941: The functions provided for under this Act were transferred to regional councils in 1989. The primary aims of this Act are to manage river and catchment systems, to minimise and prevent damage from floods or erosion and to do works that:

- Control the flow of water towards, within and from watercourses.
 - Prevent the overflow of banks and reduce damage cause by such events.
 - Reduce erosion by undertaking soil conservation activities.
- Conservation Act 1987: This Act promotes the conservation of New Zealand's natural and historic resources, and for that purpose establishes the Department of Conservation (which administers the Act) and Fish and Game.
 - Land Drainage Act 1908: This Act provides the council with powers relating to the construction and maintenance of land drainage. This Act has particular significance in the Lower Waikato and Hauraki plains where major land drainage works have been carried out.

A.2.2 RMA National Policy

This section sets out the national planning context relevant to developing Plan Change 1.

A.2.2.1 National Policy Statement for Freshwater Management 2014

The National Policy Statement for Freshwater Management (NPS-FM) is the first step in improving freshwater management at a national level. It sets out objectives and policies that direct local government to manage water in an integrated and sustainable way that contributes to economic uses, environmental integrity and provides for the values that are important to New Zealanders.

Underpinned by community discussions about the desired future state of water quality, councils are required to set fresh water quality and quantity limits, utilising the best available scientific and socio-economic knowledge.

The NPS-FM sets national bottom lines for two compulsory values - ecosystem health and human health for recreation - and minimum acceptable states for other national values.

Part A of the NPS-FM sets out objectives and policies relating to water quality, emphasising the need to sustainably manage the use of land and discharge of contaminants and to maintain and improve⁽¹⁾ overall water quality. This includes identifying freshwater management units along with setting water quality limits⁽¹⁾ and specifying targets⁽²⁾ for meeting improvements in water quality.

Part B of the NPS-FM addresses water quantity, emphasising the need to manage allocation of water resources efficiently and to protect wetlands and outstanding fresh water bodies.

Part C of the NPS-FM addresses integrated management and emphasises the need to manage land use and development and the effects of that on fresh water and coastal water.

Part CA sets out a National Objectives Framework, which has a standard list of values for which a particular freshwater body could be managed, such as swimming, fishing or irrigation. While the actual values chosen for each freshwater body will be a local decision, the minimum states that apply to those values are set at a national level through this framework. The framework incorporates the consideration of tangata whenua values, consistent with the Mana Atua - Mana Tangata Framework.

Part CB sets out a requirement for a plan to monitor progress towards and achievement of freshwater objectives. Part CC reinforces the need to collect information on freshwater takes and sources of contaminants and to establish and operate a freshwater accounting system (that is, a system for measuring quality and quantity management information).

Part D sets out tangata whenua roles and interests, and the requirements for involving iwi and hapū, along with identifying their values and interests in management and decision-making.

Part E requires the NPS-FM to be implemented as promptly as reasonable, but recognising that a staged approach may be required.

A.2.2.2 New Zealand Coastal Policy Statement (2010)

The New Zealand Coastal Policy Statement (NZCPS) (DoC, 2010) contains policies in relation to the coastal environment⁽³⁾

1 defined in the NPS-FM as the maximum amount of resource use available, which allows a freshwater objective to be met

2 defined in the NPS-FM as a limit that must be met at a defined time in the future. This meaning only applies in the context of over-allocation.

3 This includes the area from Mean High Water Spring seaward to 12 nautical miles as well as an area inland determined by each local authority, and a distance upstream of major rivers/ estuaries as agreed between local authorities and the Department of Conservation.

The NZCPS contains policies on water quality management along with policy directives on sediment sources and land use development that may impact on coastal water quality. As noted above, Part C of the NPS-FM requires integrated management of freshwater and coastal waters, including interactions between freshwater, land, associated ecosystems and the coastal environment.

A.2.2.3 Other national policy

Other national policy of relevance to Plan Change 1 includes:

- National Policy Statement for Renewable Electricity Generation: The National Policy Statement for Renewable Electricity Generation (NPS-REG) came into force on 12 May 2011. The NPS-REG ensures a consistent approach is taken to planning for renewable electricity generation in New Zealand by giving national direction on the benefits of renewable electricity generation and requiring all councils to make provision for it in their plans. The NPS-REG defines the need to develop, operate, maintain and upgrade renewable electricity generation activities throughout New Zealand and the benefits of renewable electricity generation as matters of national significance.
- National Environmental Standard for Sources of Human Drinking Water: The purpose of this NES is to reduce the risk of contamination of drinking water sources by requiring regional councils to consider the effects of certain activities on drinking water sources when granting water permits or discharge permits upstream of takes for drinking water, and including or amending rules in a regional plan in relation to permitted activities. Different criteria apply depending on whether or not the drinking water concerned currently meets the health quality standards. The NES is to be implemented when plans are changed or reviewed. Knowledge of the locations of takes for drinking water supply will be relevant when considering limits, land-use and the potential for water contaminants to affect drinking water supplies.

A.2.3 Regional planning context

This section sets out the regional planning context relevant to developing Plan Change 1.

A.2.3.1 Waikato River Authority

The Waikato River Authority (WRA) is a statutory body formed under the Waikato River legislation.⁽⁴⁾ The WRA has ten members who are appointed by River iwi (five) and Ministers of the Crown (five). The purpose of the WRA is to:

- set the primary direction through the Vision and Strategy (refer to A.2.3.2 'Vision and Strategy' below for further information);
- promote an integrated and co-ordinated approach to implement the Vision and Strategy;
- fund rehabilitation through the Waikato River Clean-up Trust.

A.2.3.2 Vision and Strategy

The Vision and Strategy for the Waikato River is the primary direction-setting document for the Waikato and Waipa Rivers and their catchments. It was initially given statutory recognition via the two Waikato River legislation in 2010, and subsequently extended to incorporate the upper Waipa River through the Waipa River legislation in 2012. The Vision and Strategy was included in its entirety in Schedule 2 of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010. Refer to B.1.1 'New era of Co-governance and Co-management of the Waikato and Waipa Rivers' for more detail.

The Vision and Strategy is also included in its entirety in the Waikato Regional Policy Statement (RPS), and regional and district plans must give effect to it. Importantly, if there is any inconsistent provision in any RMA planning document, including any national policy statement, the Vision and Strategy prevails.⁽⁵⁾

The Vision and Strategy contains the vision, objectives and strategies that reflect community aspirations and expectations. The vision is:

*Tooku awa koiora me oona pikonga he kura tangihia o te maataamuri
The river of life, each curve more beautiful than the last*

4 Section 22 Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 and Section 23 Ngāti Tūwharetoa, Ngāti Raukawa and Te Arawa River Iwi Waikato River Act 2010.

5 Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, Section 12; and RMA s67(3) and s75(3)

Our Vision is for a future where a healthy Waikato River sustains abundant life and prosperous communities who, in turn, are all responsible for restoring and protecting the health and wellbeing of the Waikato River, and all it embraces, for generations to come.

The Vision and Strategy applies to the Waikato and Waipa rivers and to activities in the the catchments of these rivers. It takes a holistic approach and aims for the restoration and protection of the economic, social, cultural and spiritual relationships that Waikato and Waipa River iwi and the Waikato region's communities have with the Waikato and Waipa Rivers.

The Vision and Strategy prevails over the NPS-FM when there are any inconsistencies, and requires more stringent water quality conditions to be met. It requires the Waikato river to be safe for people to swim in and safe to take food from over its entire length.

A.2.3.3 Waikato Regional Policy Statement

The Waikato Regional Policy Statement (2016) (RPS) contains issues, objectives, policies and methods that are relevant to managing water quality and associated land use activities that may impact on water quality.

Under s62(3) of the RMA, the regional council must "give effect to" a national policy statement or New Zealand coastal policy statement in its RPS. Likewise, under the Waikato and Waipa River legislation (as discussed above) the Vision and Strategy is deemed in its entirety to be part of the RPS and the RPS cannot be inconsistent with the Vision and Strategy.⁽⁶⁾

RPS objectives that are of particular relevance to Plan Change 1 include:

- 3.1 Integrated Management: which emphasises the need to recognise (among other matters), the inter-relationships between water body catchments, riparian areas, wetlands and coastal environments, as well as the relationships between environmental, social, economic and cultural wellbeing.
- 3.3 Decision making: which sets out underlying principles for decision making including the adoption of appropriate planning timeframes, adaptive management, mātauranga Māori, and flexible solutions for local variations.
- 3.4 Health and wellbeing of the Waikato River: which recognises the Vision and Strategy.
- 3.5 Energy: which recognises (among other matters) the national significance and regional benefits of electricity generation.
- 3.8 Ecosystem services: which recognises the need to maintain and enhance these services, and their importance to regional wellbeing.
- 3.9 Relationship of tangata whenua with the environment: which recognises the need to provide for this relationship.
- 3.10 Sustainable and efficient use of resources: which requires that use and development of resources is sustainable and efficient.
- 3.14 Mauri and values of freshwater bodies: which requires that the mauri and identified values of freshwater bodies are maintained or enhanced.
- 3.16 Riparian areas and wetlands: which requires (among other matters) that water quality and wetland quality and extent is maintained or enhanced.
- 3.25 Values of soil: which recognises the importance of safeguarding the life supporting capacity of soils.

Policies specific to freshwater management are set out in Part B, chapter 8 and include:

- Policy 8.1: Approach to identifying fresh water body values and managing freshwater bodies: which addresses the development of freshwater objectives, limits and targets.
- Policy 8.2: Outstanding fresh water bodies and significant values of wetlands: which requires protection or where appropriate enhancement of outstanding water bodies.
- Policy 8.3: All fresh water bodies: which requires the maintenance or enhancement of freshwater bodies by (among other matters) reducing sediment and contaminants entering water bodies and protecting and enhancing riparian and wetland habitat.
- Policy 8.4: Catchment-based intervention: which establishes criteria for catchments, including the Waikato River, for managing the adverse effects of activities and land use change.
- Policy 8.5: Waikato River catchment: which recognises the Vision and Strategy as the primary direction-setting document for the Waikato River.

6 Refer to section 2 of the RPS.

A.2.3.4 Waikato Regional Plan

The Waikato Regional Plan became operative in part on 28 September 2007 with Variations 2, 5, 6, and 7 made operative in 2008, 2011, 2012 and 2010, respectively. The Regional Plan provides direction regarding the use, development and protection of natural and physical resources in the region. It provides a policy framework and implementation methods in relation to water, river and lake beds, land and soil, air and geothermal resources.

Plan Change 1 is a change to the Regional Plan. It is focused on giving effect (in part) to the Vision and Strategy, the NPS-FM and the RPS. The full Regional Plan and Regional Coastal Plan will be reviewed over the next few years. That part of the Waikato River that is deemed to be in the coastal marine area (approximately 8 kms upstream from the mouth) will be addressed in future plan reviews.

Plan Change 1, which focuses on the Waikato and Waipa Rivers, will be incorporated into the Regional Plan as a new chapter, and with consequential changes to embed this new chapter into the overall plan. The new chapter is catchment-specific and is complementary to existing provisions in the Regional Plan.

The existing objectives that are relevant to the subject matter of Plan Change 1 include:

Objective 3.1.2: Management of water bodies: This objective sets out that water is to be managed in a way that ensures a significant list of criteria. Of particular note this includes reference to: social, economic and cultural wellbeing; net improvements of water quality; an increase in extent and quality of wetlands; significant adverse and cumulative effects on tangata whenua values are remedied or mitigated; non-point source discharges of nutrients, faecal coliforms and sediment to levels consistent with the identified purpose and values for which the water is being managed; concentrations of contaminants leaching from land use and non-point source discharges do not create risks for human health or aquatic ecosystems; positive effects of water use and associated infrastructure is recognised.

Objective 3.5.2: Discharges: This objective provides guidance that discharges should be undertaken in a manner that is consistent with Objective 3.1.2; objectives in land section 5.2.2; and that the discharge does not reduce the contaminant assimilative capacity of the water body to the extent that the water cannot be used for “out of stream” purposes.

Objective 4.3.2: River and Lake Bed Disturbances: This objective sets out a list of criteria as guidance for managing alterations to beds and banks of waterways; including vegetation introduction/removal and livestock access. This includes that elevated suspended solids is not inconsistent with Objective 3.1.2; accelerated infilling of wetlands is avoided; no increase in the adverse effects of flooding; faecal contamination does not have effects inconsistent with Objective 3.1.2.

Objective 5.1.2 Accelerated erosion: This objective seeks a net reduction in accelerated erosion; including no adverse effects on water quality, aquatic ecosystems and wetlands that are inconsistent with Objective 3.1.2; no increase in adverse effects of flooding; accelerated infilling of lakes, rivers wetlands and cave systems is avoided.

Objective 5.2.2: Discharges onto or into land: This objective sets out a list of criteria as guidance for managing discharges of waste and hazardous substances onto land; including not having adverse effects on aquatic habitats or water quality that is inconsistent with Objective 3.1.2.

A.2.3.5 Iwi Management Plans

Under the RMA s66(2A) iwi management plans recognised by an iwi authority must be taken into account in the preparation of a regional plan. Iwi management plans in the Waikato and Waipa River catchments were considered during the development of Plan Change 1, and include:

- Ngāti Tūwharetoa Environmental Iwi Management Plan 2003
- Ko Tā Maniapoto Mahere Taiao; Maniapoto Environmental Management Plan 2016
- He Mahere Ika: Maniapoto Upper Waipa River Fisheries Plan 2015
- Te Rautaki Taiao a Raukawa; Raukawa Environmental Management Plan 2015
- Raukawa Fisheries Plan 2012
- Waikato-Tainui Environmental Management Plan; Tai Timu Tai Pari Tai Ao 2013
- Te Aranga Ake i te Taimahatanga - Rising Above the Mist - Ngāti Tahu - Ngāti Whaoa Iwi Environmental Management Plan 2013
- Te Arawa River Iwi Trust Environmental Management Plan 2015
- Te Arawa River Iwi Trust Fisheries Plan 2015

A.2.3.6 Waikato Conservation Management Strategy 2014 – 2024

Under RMA s66(2)(c), when preparing a regional plan, council is required to have regard to management plans and strategies prepared under other Acts to an extent that their content has bearing on resource management issues of the region.

The Waikato Conservation Management Strategy (Department of Conservation, 2014) provides a framework for the integrated management of natural and historic resources, including any species, in Waikato over the next 10 years. The Conservation Management Strategy identifies outcomes for areas managed by the Department of Conservation as well as showing how the Department will contribute to conservation objectives by working with tangata whenua, communities, local and regional authorities, statutory agencies and business in Waikato.

A.2.3.7 Waikato Regional Council Zone / Catchment Management Plans

Under the council's functions for managing rivers and their catchments, including the effects of rivers, flooding and erosion, the council has prepared a series of non-statutory zone management plans (ZMPs). The ZMPs are the primary tool for implementation of all integrated river and catchment management activities within each zone. Each ZMP includes the following details:

- Vision for the zone.
- Strategy to achieve the vision.
- Activities to implement the strategy.
- Set of service levels and performance standards for the activities.
- Financial strategies and funding arrangements.

The following ZMPs are relevant to Plan Change 1:

- The Lower Waikato zone management plan covers the Waikato River catchment between Ngāruawāhia and the Tasman Sea. It covers an area of 283,757 hectares, which is 20 per cent of the total Waikato River catchment area.
- The Central Waikato zone management plan consists of the Waikato River catchment between Karāpiro Dam and Ngāruawāhia and has an area of 64,000 hectares. The zone represents 4.5 per cent of the total Waikato River catchment area.
- The Waipa zone management plan has around 12 per cent of the total land area within the Waikato region, 17 per cent of the region's population and contains around 20 per cent of the region's native vegetation. The zone is dominated by the Waipa River channel and tributaries, and is the single largest tributary to the Waikato River catchment.
- The Upper Waikato zone plan guides the integrated catchment management activities of Waikato Regional Council from Taupō to Karāpiro. It covers 436,000 hectares and includes the hydro lakes of Aratiatia, Ohākuri, Ātiamuri, Whakamaru, Maraetai, Waipapa, Arapuni and Karāpiro. It also includes the steep land of the Paeroa Range, Horohoro Bluffs and northern Hauhungaroa Range.

A zone management plan for the Lake Taupō Zone is currently being prepared.

A catchment management plan for the Waipa Catchment was developed in 2014. The Waipa Catchment Plan (WCP) is intended to guide Waikato Regional Council, Waipa River iwi, communities and other stakeholders in the implementation of all integrated catchment management activities within the Waipa River catchment and builds on the approaches developed in the 2012 Waipa zone management plan.

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A.4 Appendices

A.4.1 Appendix 1: RMA requirements for Section 32 Evaluation reports

The Waikato Regional Council is required to examine the objectives, policies, rules, and other methods of Plan Change 1 in accordance with the requirements of section 32 of the RMA.

An evaluation report required under this Act must—

1. a. examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and
b. examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—
 - i. identifying other reasonably practicable options for achieving the objectives; and
 - ii. assessing the efficiency and effectiveness of the provisions in achieving the objectives; and
 - iii. summarising the reasons for deciding on the provisions; and
- c. contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.
2. An assessment under subsection (1)(b)(ii) must—
 - a. identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—
 - i. economic growth that are anticipated to be provided or reduced; and
 - ii. employment that are anticipated to be provided or reduced; and
 - b. if practicable, quantify the benefits and costs referred to in paragraph (a); and
 - c. assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.
3. If the proposal (an amending proposal) will amend a standard, statement, regulation, plan, or change that is already proposed or that already exists (an existing proposal), the examination under subsection (1)(b) must relate to—
 - a. the provisions and objectives of the amending proposal; and
 - b. the objectives of the existing proposal to the extent that those objectives—
 - i. are relevant to the objectives of the amending proposal; and
 - ii. would remain if the amending proposal were to take effect.
4. If the proposal will impose a greater prohibition or restriction on an activity to which a national environmental standard applies than the existing prohibitions or restrictions in that standard, the evaluation report must examine whether the prohibition or restriction is justified in the circumstances of each region or district in which the prohibition or restriction would have effect.
5. The person who must have particular regard to the evaluation report must make the report available for public inspection—
 - a. as soon as practicable after the proposal is made (in the case of a standard or regulation); or
 - b. at the same time as the proposal is publicly notified.
6. In this section,—

objectives means,—

- a. for a proposal that contains or states objectives, those objectives:
- b. for all other proposals, the purpose of the proposal

proposal means a proposed standard, statement, regulation, plan, or change for which an evaluation report must be prepared under this Act

provisions means,—

- a. for a proposed plan or change, the policies, rules, or other methods that implement, or give effect to, the objectives of the proposed plan or change:
- b. for all other proposals, the policies or provisions of the proposal that implement, or give effect to, the objectives of the proposal.

Part B Development of Plan Change 1

B.1 Background

B.1.1 New era of Co-governance and Co-management of the Waikato and Waipa Rivers

In August 2012 Waikato Regional Council resolved to commence a change to the Regional Plan, having received a joint recommendation from all five River iwi partners (WRC 2012, Document# 2242297). The Partnership Charter (WRC 2014, Document# 2151115) introduced the commitment to co-governance and co-management between Waikato Regional Council and Waikato and Waipa River iwi for Plan Change 1 for the Waikato and Waipa River catchments. The charter outlined the formation of a Joint Working Party, Te Rōpū Hautū (TRH),⁽⁷⁾ to support the running of the Healthy Rivers Wai Ora project. TRH was comprised of executives from Waikato and Waipa River iwi and Waikato Regional Council, with the Waikato River Authority attending as a non-voting member. Recommendations from TRH (and from the collaborative process, refer to B.2 'The Collaborative Stakeholder Group') were then made to the Healthy Rivers Wai Ora Committee (HRWO Committee). This committee comprised trustees from the five iwi authorities and five regional councillors from Waikato Regional Council. The overall purpose of the HRWO Committee was to jointly decide on the final recommendation to the Waikato Regional Council on the content of the Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai (WRC 2014, Document# 3196477).

B.1.2 Stakeholder Engagement Strategy

The Stakeholder Engagement Strategy (WRC 2013, Document# 2154945) approved by Council in March 2013, outlined how Waikato Regional Council and River iwi would work alongside stakeholders and the community during the process to review parts of the Regional Plan. The purpose of the strategy was to contribute to high quality stakeholder involvement in the plan review process and to enduring solutions in the plan itself.

The Stakeholder Engagement Strategy included key sector and community interests. The project started with a wide definition of stakeholders as 'those who are likely to be impacted by the project, and/or are able to influence the goals of the project' (Boyce 2015). In the Healthy Rivers Wai Ora project the Stakeholder Engagement Strategy contained six categories for engagement.

1. Leaders and governance⁽⁸⁾ (territorial authorities, boards, shareholders, Trustees).
2. Key stakeholders (represented through the Collaborative Stakeholder Group).
3. Tangata whenua and iwi Māori.
4. Farming and local communities.
5. Community and general public.
6. Technical specialists.

Information was gathered in relation to each of these categories with a focus on the outcomes sought, the benefits of involvement, the preferred engagement methods, most valuable timing for input into the project and most relevant outputs of the project.

7 Sections 14(5) and (6) of the Ngāti Tūwharetoa, Raukawa, and Te Arawa River Iwi Trust Waikato River Act 2010, and Section 13(5) and (6) of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, and Section 8(2) of the Ngā Wai o Maniapoto (Waipa River) Act 2012

8 Governance is used broadly here to refer to all types of leadership roles but excludes the statutory decision-making authorities.

B.2 The Collaborative Stakeholder Group

B.2.1 Design and formation of the group

The Stakeholder Engagement Strategy set the foundation for the “Collaborative Stakeholder Group” (CSG) - a group of stakeholders and community representatives tasked with intensively considering and deliberating on technical and policy information, informed by the views of their sectors, communities and Māori interests in the catchment (WRC 2013, Document# 2154945). The CSG played a central role in the engagement process, developing an in-depth understanding of the issues and recommending solutions to the HRWO committee. It was important that those affected would be part of developing the solution. The intended result was that better and more lasting solutions would provide for improved outcomes for the rivers.

The composition of the CSG was an iterative process, with input from various stakeholders who attended a stakeholder forum (WRC 2013, Document# 2838592), sector and community nominations, and TRH and the HRWO committee assessment. From the input received and as delegated by Council, the HRWO committee confirmed that 25 members (that became 24 members due to a resignation) would make up the CSG based on defined criteria (WRC 2015, Document# 2914978). The criteria sought candidates with the right skills (communicative, consider multiple views, solutions-orientated, ability to synthesise technical information), and candidates with networks, influence and mandate. These were skills identified by stakeholders at the August 2013 large stakeholder forum (WRC 2015, Document# 3668567). CSG membership included representatives from dairy, horticulture, rural advocacy, energy, industry, sheep and beef, environment/NGOs, local government, tourism and recreation, forestry, Māori interests, water supply takes, rural professionals and community representatives. Sector representatives also had delegates to represent them if they could not attend a CSG workshop (Boyce, 2015).

| Sector | Representative | Delegate |
|------------------------|--|--------------------------------|
| Dairy | George Moss Dr Rick Pridmore | Charlotte Rutherford |
| Horticulture | Chris Keenan | Garth Wilcox |
| Rural advocacy | James Houghton | Sally Millar |
| Energy | Stephen Colson | Tim Mckenzie |
| Industry | Dr Ruth Bartlett | Elizabeth Aveyard |
| Sheep and beef | James Bailey | Graeme Gleeson |
| Environment/NGOs | Al Fleming Michelle Archer | Jim Crawford/Dr David Campbell |
| Local government | Sally Davis | Tim Harty |
| Tourism and recreation | Alastair Calder | Don Scarlet |
| Forestry | Patricia Fordyce | Sally Strang/ Kelvin Meredith |
| Maori interests | Alamoti Te Pou Weo Maag Gina Rangi | - Clinton Hemana - |

| | | |
|---|--------------------|--------------|
| Water supply takes | Garry Maskill | Mark Bourne |
| Rural professionals | Phil Journeaux | - |
| Community representatives <i>People living in the Waikato and Waipa river catchments</i> | Jason Sebastian | No delegates |
| | Brian Hanna | |
| | Gayle Leaf | |
| | Evelyn Forrest | |
| | Dr Gwyneth Verkerk | |
| | Liz Stolwyk | |
| | Matt Makgill | |

List of Collaborative Stakeholder Group members and delegates

B.2.2 Implementation and operation

The CSG had its first workshop in March 2014, followed by regular workshops every 2-6 weeks until their final workshop in July 2016 (refer to B.10.1 'Appendix 1: Meetings and consultation undertaken' for a full list of workshops held). At their first workshop the CSG were presented a draft Terms of Reference (WRC 2014, Document# 3016986), which was approved at a subsequent workshop in June 2014 (WRC 2014, Document# 3079941). Some of the key items outlined in the Terms of Reference (WRC 2014, Document# 2194147) included the:

- Purpose and role of the CSG
- Membership, skills and competencies
- Roles of the independent chairperson and independent facilitator
- Duration, frequency and attendance
- Principles to guide input and participation
- Project scope.

Through a series of workshops the CSG progressed through a staged process for the creation of Plan Change 1:

- Understanding the issues from all sides
- Developing limits and targets
- Developing options and policy mix
- Finalising the policy toolkit.

As the project gradually gained momentum in 2015/2016 in respect of information gathering and discussing certain unresolved issues, the CSG formed sub-groups to handle these matters (refer WRC 2016, Document# 8405744 for more details). The sub-groups were topic specific and in many instances met more than once depending on the topic. The number of CSG members for each sub-group varied. CSG member and delegates could attend, Council staff were involved, and River iwi were also invited to participate, with Technical Leaders Group (TLG) members contributing as required. In most cases, the CSG independent facilitator and/ or chair led the process. Sub-groups made no formal decisions - whatever was discussed at the sub-groups was brought back to the full CSG for discussion and approval (WRC 2016, Document# 8405744). The topics for the sub-groups included:

- Integrated assessment
- Engagement
- Plan change template
- Property limits / *Overseer*
- Property plans/ Farm Environment Plan
- Maori land
- Plan drafting.

B.2.3 Field trips undertaken by the Collaborative Stakeholder Group

A key part of developing the list of values and uses for the Waikato catchment was the hosting of CSG workshops by River iwi and sectors. The field trips were used so CSG members could learn about others' values, perspectives and their on-the-ground realities. As the workshops were hosted around the Waikato and Waipa catchments, there was also an opportunity for CSG members to experience the different water quality states at different points along the rivers and the location specific values. (See B.10.1 'Appendix 1: Meetings and consultation undertaken' for a list of these field trips).

B.2.4 Approaches to connect the wider community

The CSG was the central point of engagement with the wider community and had an important role to play in implementing the stakeholder engagement strategy. To this end, the CSG developed a Community Engagement Plan, which over the course of the project was amended according to the stages of the project and information available at that time (WRC 2015, Document# 3208832).

The purpose of community engagement was to actively involve those likely to be most affected in the plan review process so that the CSG and decision makers understood the issues from all sides, and workable solutions were generated. CSG-led engagement activities were undertaken to understand broader community values. The CSG used a mix of existing and new opportunities to involve people in the project at identified critical phases.

Engagement activities included events that were open to all, and events that were designed by sectors specifically for those sectors. When CSG members held various meetings with their sectors they reported back to the wider CSG at their workshops (WRC 2016, Document# 8391929). Public events and activities were held throughout the Waikato and the Waipa catchments, and two online surveys were held to gather feedback. Information about the project and invitations to participate at events or online were provided via regular communications through HRWO project newsletters (after each CSG workshop), Waikato Regional Council publications and website, local and regional newspapers, via CSG members and their respective sectors, and Facebook.

B.2.4.1 Summary of initial large stakeholder forum

The first CSG engagement activity was a large stakeholder forum held on 23 October 2014 (See B.10.1 'Appendix 1: Meetings and consultation undertaken'). As the first public engagement activity for the CSG since they had been established, the forum was an opportunity to report on progress and update stakeholders on the project. This workshop was attended by 123 stakeholders and the feedback received from these stakeholders was used by the CSG to further refine their draft policy selection criteria and working list of values and uses.

B.2.4.2 Summary of first CSG-led community engagement period

From 25 March to 5 May 2015 an intensive community engagement period was conducted (See B.10.1 'Appendix 1: Meetings and consultation undertaken') (WRC 2015, Document# 3410308). The CSG wanted to ensure as many stakeholders as possible could have their say over the six weeks in a variety of ways.

Engagement opportunities were publicised utilising different methods, including via:

- The Healthy Rivers Wai Ora online newsletter (500+ subscribers)
- Email from CSG members to their respective sector networks
- The Healthy Rivers Wai Ora Committee
- Local newspaper advertisements around the catchment
- A stand at the Waikato Environment Expo (Waikato Winter Show)
- The Waikato Regional Council Facebook page
- The Waikato Regional Council website.

The focus over this six-week engagement period was on connecting with stakeholders via the facilitated stakeholder workshop at Hamilton Gardens, the five community drop in sessions around the Waikato and Waipa river catchments, and the online survey. Numbers attending these events are shown below.

| Engagement event | Attendance / Responses |
|----------------------|------------------------|
| Stakeholder Workshop | 132 |

| | |
|--------------------------------|------|
| Upper Waikato drop in session | 18 |
| Middle Waikato drop in session | 35 |
| Lower Waikato – Huntly drop in | 20 |
| Lower Waikato – Tuakau drop in | 26 |
| Waipa drop in | 34 |
| Online survey | 241 |
| Total | 506* |

Number attending each engagement event

*the total includes some people attending more than one engagement event

The topics covered focused on water quality issues and their causes. The intent was to update people on the project and involve them in discussion with the CSG on six key areas:

- how the CSG proposes to divide the catchment into areas to better manage water quality;
- current water quality and trends in different parts of the Waipa and Waikato River catchments;
- insights into factors driving water quality;
- how the CSG will determine how healthy (or unhealthy) a water body is;
- how the project's modelling and research programme will help develop options; and
- the project milestones and timelines.

Each of the above six areas provided information and posed questions for response.

Reports of the feedback from this engagement period, including both analysed and verbatim feedback, were put on the public website so that stakeholders could see the compiled feedback. Overall, there was keen interest from sectors and the wider community to provide input on the CSG's key areas for engagement.

B.2.4.3 Summary of second CSG-led community engagement period

The next community engagement period ran from 27 October to 13 November 2015 (refer to B.10.1 'Appendix 1: Meetings and consultation undertaken'). The focus over the three week period was on consulting with stakeholders via three main methods: an open stakeholder workshop at Mystery Creek Events Centre; five community workshops around the catchment; and an online survey (see table below for numbers participating).

| Engagement event | Attendance / Responses |
|--|------------------------|
| Stakeholder Workshop | 235 |
| Upper Waikato community workshop - Tokoroa | 55 |
| Upper Waikato community workshop - Reporoa | 44 |
| Middle Waikato community workshop - Hamilton | 59 |
| Lower Waikato community workshop – Tuakau | 36 |
| Waipa community workshop - Otorohanga | 47 |
| Online survey | 561 |
| Total | 1037* |

Number attending each engagement event

*the total includes some people attending more than one engagement event

This engagement period focused on water quality policies and solutions, and was used to update stakeholders on the project and involve them in discussion with the CSG on five key areas:

- the long term vision for the Waikato and Waipa river catchments (restoring and protecting the water quality in the rivers, to achieve the community's values and the *Vision and Strategy for the Waikato River*);
- CSG thinking on limiting nitrogen, phosphorus, sediment and microbial pathogens entering water, to achieve community values;
- what timeframes (or 'targets') could look like for achieving the limits under different water quality scenarios;
- potential economic, social, environmental and cultural impacts under a range of water quality scenarios; and
- policy options (regulatory and non-regulatory) being explored for achieving limits and targets.

A sub-set of questions was used at the community workshops due to the shorter time available, with community workshop participants having the option of completing the full set via the online survey.

The CSG wanted to ensure as many stakeholders as possible could have their say over the engagement period. Engagement opportunities were publicised in a variety of ways, including via:

- the Healthy Rivers Wai Ora online newsletter (800+ subscribers)
- email from CSG members to their respective sector networks
- the Healthy Rivers Wai Ora committee
- newspaper advertisements around the catchments in both regional and local community papers
- targeted online advertising
- Waikato Regional Council's Facebook page
- Waikato Regional Council's website
- various sector newsletters and updates.

Reports of the feedback from this engagement period, including both analysed and verbatim feedback, were put on the public website so that stakeholders could see the compiled feedback. Some of the key results included:

- most people being comfortable with the staged approach to achieving water quality aspects of the Vision and Strategy;
- most feeling comfortable with using tailored property plans along with catchment wide rules to reduce contaminant losses over time; and
- most feeling comfortable with the set of catchment wide rules that CSG were considering.

B.2.5 Tāngata whenua engagement

Within the Stakeholder Engagement Strategy (WRC 2013, Document# 2154945), is reference to the Tāngata Whenua Engagement Strategy, which was lead by River iwi utilising existing hui and other engagement opportunities to involve tāngata whenua. The purpose of tāngata whenua engagement outlined in the Stakeholder Engagement Strategy was:

To adequately involve tāngata whenua and to identify the values, issues and aspirations of tāngata whenua in relation to freshwater bodies. Also, to align and reinforce the Partnership Charter and protocols between the project partners, as well as individual joint management agreements between the regional council and iwi.

The Partnership Charter (WRC 2014, Document# 2151115) was a key document for tāngata whenua engagement as it established the protocols between the council and River iwi in relation to the development of Plan Change 1. River iwi had primary responsibility for leading the engagement with tāngata whenua, with the council having responsibility to provide assistance for this engagement. The specifics are outlined below as provided within the Charter.

For the Waikato and Waipa River iwi, roles and responsibilities were to:

- take a lead role in the facilitation of any hui that is aimed to inform hapū, tāngata whenua and/or iwi management groups (who are identified to be represented by the iwi authority), on matters relating to the Healthy Rivers Wai Ora project;
- take a lead role in facilitating the responses, comments and involvement of hapū, tāngata whenua and/or iwi management groups (who are identified to be represented by the iwi authority) in the Healthy Rivers Wai Ora project process;

- assist, where appropriate, with the identification and early engagement (prior to the RMA Schedule One process) of hapū, tāngata whenua and/or any iwi authorities who have acknowledged interest via impending Treaty settlements in the Waikato River catchment (includes Waipa River); and
- ensure information is disseminated as necessary and appropriate within their own organisation and ensure appropriate representation of the iwi authority at different meetings whenever possible.

For the Waikato Regional Council, roles and responsibilities included:

- provide project management of the development of Plan Change 1;
- take a lead role (where within its function and agreed by the Parties) in implementing project plan actions necessary to achieving the development of Plan Change 1 (for example, stakeholder engagement plan);
- assist River iwi in the facilitation of any hui aimed to inform hapū, tāngata whenua and/or iwi management groups on matters relating to Plan Change 1 (for example, technical staff support, information hand-outs); and
- support, in a mutually agreed capacity, the development of objectives, policies and rules (if applicable) of Iwi Management Plans, where the development will complement Plan Change 1 and ensure a consistent approach that results in improvements to water quality.

Over the course of the project, River iwi have undertaken engagement with their respective iwi, hapū and whānau. Some of these engagement activities have been captured as part of a feedback record, which includes hui, pānui/ newsletters, forums, committee meetings and other specific events (WRC 2016, Document# 3343486).

It was noted that during the Healthy Rivers Wai Ora project, River iwi were or had recently already sought guidance and feedback as part of developing their iwi environmental management plans and fisheries plans – feedback that was also relevant to the HRWO project with regard to iwi aspirations and perspectives (WRC 2015, Document# 3454017). River iwi have also provided feedback on their engagement activities and input directly to the CSG, such as on the Policy Selection Criteria, Outcome statement and principles for implementing Te Ture Waimana – the Vision and Strategy (refer to B.10.1 'Appendix 1: Meetings and consultation undertaken' for a full list).

Regular reporting of matters regarding tāngata whenua engagement was conducted at Te Rōpū Hautū meetings, at the Healthy Rivers Wai Ora committee and to Council (WRC 2016, Document# 2954689).

Earlier in the project, CSG were hosted by River iwi in their respective rohe, providing an opportunity for each of the River iwi to share their respective values and perspectives with CSG in regard to the Healthy Rivers Wai Ora project (refer to B.10.1 'Appendix 1: Meetings and consultation undertaken' for a full list). River iwi advisors also had a standing invitation to attend CSG workshops to provide input, to advise of any information gaps, emerging issues, and actions required to address such issues. This was on the same basis as council staff attendees (WRC 2015, Document# 3405141).

B.2.6 Technical information

The Technical Leaders Group (TLG) was formed as an impartial, advisory group of specialists who provided technical information to the CSG. The seven member TLG called upon other technical experts, known collectively as the Technical Alliance, as required. These technical experts collated, analysed, summarised and presented environmental, social, cultural and economic information about the rivers and the consequences of different land management scenarios (WRC 2013, Document# 2872118).

Information from the TLG was also used by decision makers on Plan Change 1.

For more information on the establishment of the Technical Leaders Group, refer to C.1 'Technical Leaders Group process'.

B.2.7 The Collaborative Stakeholder Group's development of Plan Change 1

The figure below illustrates the overall process of how the CSG discussed and deliberated on various types of information from diverse sources (policy, technical, community) to recommend solutions to inform the development of Plan Change 1.

POLICY INFORMATION

- *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*
- *National Policy Statement for Freshwater Management 2014*
- Sector initiatives and codes of practice
- Advice from policy, regulatory and extension staff

TECHNICAL INFORMATION

- Scenario modelling
- Integrated Assessment Framework
- Technical advice from Technical Leaders Group

COMMUNITY ENGAGEMENT INFORMATION

- Open stakeholder workshop feedback
- Community workshops feedback
- Sector meetings feedback
- Survey feedback
- Iwi/tangata whenua feedback

Collaborative Stakeholder Group deliberates and develops a policy mix

Collaborative Stakeholder Group develops plan change

Waikato Regional Council

Healthy Rivers Wai Ora committee

Waikato Regional Council will make the final decision on the proposed plan change at a council meeting. If they disagree with the recommendation, it will go back to the Healthy Rivers Wai Ora committee to reconsider.

Once Waikato Regional Council has adopted the proposed plan change, it will be publicly notified for the public to consider and make submissions.

The Healthy Rivers Wai Ora committee, comprising River iwi governors and regional councillors, is the means by which the six project partners can make decisions on the proposed plan change. They will recommend a proposed plan change to Waikato Regional Council.

The Collaborative Stakeholder Group's ultimate role is to recommend solutions that inform the development of a proposed plan change to the Healthy Rivers Wai Ora committee.

The Collaborative Stakeholder Group's development of a plan change.

B.3 Identifying Values and Uses

B.3.1 Process for developing the values and uses for the Waikato and Waipa Rivers

Identifying values and uses is a key step in developing policy, as set out in the National Policy Statement for Freshwater Management 2014.

In setting objectives, limits and targets for catchments, a required step is to consider which of the national values apply to that catchment, and whether there are any additional values that also apply.

The CSG considered values and uses from a range of different people, groups and perspectives, including taking feedback from a large stakeholder forum, presentations, field trips, community engagement, feedback from their sectors, feedback from river iwi staff, technical reports on iwi cultural values, River iwi environmental management plans and other relevant documents. The CSG received the following key inputs into their deliberations:

- CSG members gave presentations on their values and a snapshot of their sectors, at CSG2, 7 May 2014 (CSG workshop notes CSG2, 2014, Document# 3049929).
- Staff presented a summarised list of values from research on community values, at CSG2, 7 May 2014 (Barns, Henry and Reed 2013)
- Staff presented a comparison of values expressed in Te Ture Whaimana/ the Vision and Strategy, Resource Management Act 1991, key objectives in the Proposed Waikato Regional Policy Statement and the National Policy Statement for Freshwater Management 2014, at CSG5, 14 August 2014 (WRC 2014, Document# 3102316).
- CSG members participated in field trips, presentations and feedback from networks at each CSG workshop.

These inputs enabled the CSG to develop a working list of values and uses and share this at the October 2014 large stakeholder forum. Feedback was gathered from this forum and provided to the CSG (WRC 2015, Document# 3410308). The CSG then continued to work on the values and uses list, with further input via presentations, field trips and feedback from their networks at each CSG workshop. River iwi staff provided feedback at CSG Workshop 10, 5-6 March 2015 (River iwi 2015, Document# 3314058). This feedback was developed following a values hui in December 2014 organised by River iwi staff.

The working list of values and uses was included in a CSG update report to the HRWO committee in April 2015, with the opportunity for the committee to provide any comments back to the CSG (WRC 2015, Document# 3325934).

Incorporating feedback and making edits

Feedback on the values was then summarised and recommended wording suggested. A detailed gaps analysis assessment was also undertaken, which assessed feedback from presentations, field trips, technical reports on iwi cultural values, River iwi environmental management plans and other relevant documents (GMD Consultants 2015, Document# 3431297).

Considering those key themes from the feedback, the following amendments were made to the list of values and uses (WRC 2015, Document# 3421947):

- The addition of the Vision from the Vision and Strategy, and a statement about the importance of the Vision and Strategy.
- The addition of a diagram showing how the values and uses fit into the Mana Atua - Mana Tangata framework.
- The re-organisation of the values into Mana Atua – intrinsic values, and Mana Tangata – use values. The Mana Tangata – use values were grouped into cultural and social use values, and economic use values.
- The rewording of values to focus on why the rivers are important to that value.
- A shortening of some values to ensure balance in length.

At CSG14, 9-10 August 2015, the CSG finalised the values and uses document. The final edits included adding a value on the historical relationship between the rivers and River iwi, adding a value on mitigating flood hazards, and minor wording amendments to ensure consistency between the values and flow of the document as a whole. CSG agreed on the values and uses for the Waikato and Waipa rivers and recommended that the list go to the Healthy Rivers Wai Ora Committee for endorsement (WRC 2015, Document# 3487796).

The final list of values and uses for the Waikato and Waipa rivers can be found in WRC 2015, Document# 3781494.

B.4 Developing the Policy Selection Criteria

To support the decision making of the Collaborative Stakeholder Group (CSG) a number of criteria were developed. These Policy Selection Criteria are filters the CSG used to help select the policy options to incorporate into Plan Change 1.

The CSG developed the Policy Selection Criteria over a number of months, with input from the public, River iwi and the Healthy Rivers Wai Ora committee.

The selection criteria are in addition to requirements under the Resource Management Act (s32) for new objectives to be examined for their appropriateness in achieving the purpose of the RMA (refer to Part D 'Objectives'), and the policies and methods of those proposals to be examined for their efficiency, effectiveness and risk of acting or not acting (refer to Part E 'Provisions'). There are some areas of overlap with the RMA criteria used in the s32 evaluation and the CSG's Policy Selection Criteria (an assessment of the CSG Policy Selection Criteria and the alignment with the relevant Resource Management Act sections is in WRC 2015, Document# 3394456).

The testing of potential policy options against the pre-agreed selection criteria assisted the CSG in their collective decision making and to identify areas not adequately addressed in their policy package.

Refer to B.10.2 'Appendix 2: The CSG's Policy Selection Criteria' for a detailed list of the Policy Selection Criteria.

B.5 Legislation and policies influencing stakeholder engagement – regional level and context

B.5.1 Regional Policy Statement

The purpose of a regional policy statement (RPS) is to achieve the purpose of the RMA by providing an overview of the resource management issues of the region, and policies and methods to achieve integrated management of the natural and physical resources (WRC 2016, Document# 3647993).

The RPS recommends tāngata whenua and stakeholder involvement as a central feature of water body management. As outlined in the RPS, Waikato Regional Council (WRC 2016, Document# 3647993) will work with tāngata whenua to develop systems and processes to:

- a. adequately involve tāngata whenua in the management and decision making regarding fresh water bodies and associated ecosystems;
- b. identify values and interests in fresh water bodies and associated ecosystems; and
- c. develop monitoring programmes, including mātauranga Māori, to monitor the achievement of identified values of fresh water bodies.

In terms of stakeholder involvement in the RPS, Waikato Regional Council (WRC 2016, Document# 3647993) will take a collaborative approach to investigating and implementing future fresh water body management approaches. This will include:

- a. providing for the early and meaningful involvement of stakeholders;
- b. involving stakeholders in the process of identifying catchment based values and establishing fresh water objectives, limits and targets;
- c. involving stakeholders in the process of identifying costs and benefits of any proposed regulatory management options which may include assessment of the impacts of the scale and rate of change required to achieve potential limits and subsequent targets; and
- d. working with stakeholders for the development and delivery of non-regulatory policy options including primary industry initiatives, third party audited self management and education programmes.

For this project, Waikato Regional Council and River iwi co-ordinated their respective efforts when engaging with tāngata whenua in the catchment area. It is recognised that the River iwi are mandated as authorities to discuss the appropriate processes to engage with tāngata whenua on resource management issues.

B.6 Communications

There were multiple avenues for general communications on the project. These included a website page, an up-to-date brochure, monthly e-newsletters, press releases, social media, stories in council's quarterly newsletter, newspapers and rural publications (WRC 2015, Document# 3077536).

B.7 RMA Schedule 1 consultation

Schedule 1 of the RMA includes requirements to consult certain parties during the preparation of the plan, as well as specific obligations relating to consultation with iwi authorities.

Extensive consultation has been undertaken with parties listed in clause 3(1) of Schedule 1. Details of meetings and other engagements with these parties are provided in B.10.1 'Appendix 1: Meetings and consultation undertaken'.

Once Plan Change 1 had been drafted and content agreed through the collaborative process, a copy of the draft Plan Change 1 was sent to the following parties for comment:

- The Minister for the Environment and other Ministers of the Crown who may be affected by the Change;
- District and city councils
- Iwi authorities
- Community and Public Health.

For completeness, Schedule 1 also includes a requirement to consult with any customary marine title group in the area, however this was not applicable in the Healthy Rivers Wai Ora case as there was no such group.

B.8 Development of Plan Change 1

Council decision making process

The completion of draft Proposed Plan Change 1 went through a series of steps, moving from the CSG who had been developing the detail of the policy, over to Council and River Iwi partners for consideration and the formal decision making process.

At the 7 June 2016 CSG workshop, CSG went through each provision in Plan Change 1 and voted on it, using the agreed CSG decision making process, recording any objections and the reason for those objections. CSG made their final decision that recommended the draft Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River Catchments, to the Healthy Rivers Wai Ora Committee for consideration (Waikato Regional Council 2016, Document #6552908).

The 5 September 2016 Healthy Rivers Wai Ora Committee meeting was the official hand over of Plan Change 1 from CSG to Council and River Iwi partners, for their consideration and recommendation to full Council to notify (Waikato Regional Council 2016, Document #9038723). In addition to Plan Change 1, CSG presented a set of agreed messages that accompany the formal RMA document (Waikato Regional Council 2016, Document #8966327).

Recommendations from River Iwi partners

The five River Iwi provided decisions of their respective governance entities to the Healthy Rivers Wai Ora Committee on 5 September 2016. As set out in their individual Joint Management Agreements, the decisions mean the five River Iwi have individually “jointly decided” on the content of Plan Change 1 – Waikato and Waipa River Catchments and, collectively, the River Iwi recommended the Council publicly notify Plan Change 1.

The decisions of individual River iwi governance entities stand alone and require recognition in their entirety. However, as a high level summary, the five River Iwi:

- are broadly supportive of the general direction of travel to achieve Te Ture Whaimana o Te Awa o Waikato in 80 years
- recommend the Council publicly notify the current version of Plan Change 1
- have reserved their rights to individually and collectively submit on Plan Change 1
- believe the effective implementation of Plan Change 1 is critical to its success
- recommend independent commissioners hear submissions and provide recommendations to Council
- are committed to continue their role of co-managing the Waikato and Waipa Rivers —alongside the Council— to achieve Te Ture Whaimana.

(Waikato Regional Council 2016, Document #9047879)

Decision to notify

The recommendation from Healthy Rivers Wai Ora Committee was received by Waikato Regional Council on 15 September 2016. The council made the decision to proceed with Plan Change 1, and publicly notify Plan Change 1 in accordance with Clause 5 of Schedule 1 to the Resource Management Act 1991, having had particular regard to this report, the s32 evaluation report.

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Waikato Regional Council 2015. Collaborative Stakeholder Group progress report. Report to Healthy Rivers Wai Ora Committee 17 April 2015 - Decision Required. Dated 30 March 2015. Document# 3325934.

Waikato Regional Council 2015. Collaborative Stakeholder Group's values and uses for the Waikato and Waipa rivers. Report to Healthy Rivers Wai Ora Committee 18 September 2015 - Decision Required. Document# 3487796.

Waikato Regional Council 2015. Intensive engagement period 1 Feedback report - March-May 2015. Document# 3410308.

Waikato Regional Council 2015. Values and uses for the Waikato and Waipa Rivers - re-crafted list. Report for Collaborative Stakeholder Group - Agreement and Approval, dated 19 June 2015. Document# 3421947.

Waikato River iwi 2015. Summary of River values hui. Powerpoint presentation. Presented to CSG workshop 10, 5-6 March 2015. Document# 3314058.

B.10 Appendices

B.10.1 Appendix 1: Meetings and consultation undertaken

A. Collaborative Stakeholder Group workshops

| CSG workshop Number | Date | Location | Hosted by | Focus of session |
|---------------------|----------------------|--|---|--|
| 1 | 27/28 March 2014 | The Link, Hamilton | N/A | Getting to know each other, understanding the project (scope context, structure, timeline), design code of conduct and confirm Terms of Reference |
| 2 | 6/7 May 2014 | The Link, Hamilton | N/A | Getting to grips with the issue and how to work with the community |
| 3 | 5/6 June 2014 | Tokoroa Events Centre, Tokoroa | Dairy sector and Raukawa Charitable Trust | Synthesising the problem, understanding dairy and Raukawa values, drafting a focus statement |
| 4 | 1/2 July 2014 | Oparure marae, Te Kuiti | Maniapoto Māori Trust Board | What will change involve for people and the river, understanding Maniapoto values, learning about social, economic and cultural aspects, focus on Waipa water quality |
| 5 | 14/15 August 2014 | The Link, Hamilton | Local Government sector | Exploring the technical and policy mix 1, understanding local government values, draft Freshwater Management Units, focus on Central Waikato water quality |
| 6 | 15/16 September 2014 | Turangawaewae marae, Ngaruawahia | Waikato-Tainui | Exploring the technical and policy mix 2, understanding Waikato-Tainui values, draft Policy Selection Criteria, focus on Lower Waikato water quality, approach to Mātauranga Māori |
| 7 | 30/31 October 2014 | Ohaki marae and Broadlands Hall, Reporoa | Te Arawa River Iwi Trust (TARIT) | Exploring the technical and policy mix 3, understanding TARIT values, consider stakeholder input on policy selection criteria and values, focus on Upper Waikato water quality, approach to attributes and attribute levels |
| 8 | 2/3 December 2014 | Pukekawa Hall and Tuakau Hall | Horticulture sector | Exploring the technical and policy mix 4, understanding Horticulture values, explore possible policy tools, further explore the current state of waterways in relation to attribute levels, introduction to farm planning and economic modelling |
| 9 | 9/10 February 2015 | Don Rowlands Centre, Karapiro | Tourism and Recreation sector | Progressing the core tasks of the CSG in relation to water quality, further discussions about attributes (particularly clarity) and sediment, understanding Tourism and Recreation values, confirming refined community engagement plan |
| 10 | 5/6 March 2015 | Cambridge Town Hall, Cambridge | Sheep and Beef sector | Progressing the core tasks of the CSG in relation to water quality, further discussions about attributes (particularly nutrients), understanding Sheep and Beef sector values, deciding on an FMU option and attribute set to test with the community in the 1 st engagement period |

| | | | | |
|-----|-------------------|-------------------------------------|--------------------------|---|
| 11 | 23/24 April 2015 | Te Kauwhata Rugby Club, Te Kauwhata | Environment / NGO sector | Progressing the core tasks of the CSG in relation to water quality, introduce templates for s32 analysis and the CSG's recommendations report, understanding Environment/NGOs sector values, understand current situation for lakes, River iwi feedback on values and policy selection criteria, integrated assessment framework expert panel feedback, preliminary feedback from the 1 st engagement period |
| 12 | 4/5 June 2015 | Taupo Yacht Club, Taupo | Tuwharetoa | Progressing the core tasks of the CSG in relation to water quality, policy options for sediment, understanding Tuwharetoa values, consider full feedback from 1 st engagement period, decide what to do about attributes and FMUs, decide on scenarios to be modelled |
| 13 | 2/3 July 2015 | Don Rowlands Centre, Karapiro | NA | Progressing the core tasks of the CSG in relation to water quality, groundwater and hydrology, policy options for nutrients and microbes, confirming attributes, integrated assessment framework development |
| 14 | 10/11 August 2015 | Don Rowlands Centre, Karapiro | NA | Progressing the core tasks of the CSG in relation to water quality, results of faecal source tracking study, update on modelling work, update on Mātauranga Māori work, initial exploration of allocation options |
| 15 | 26/27 August 2015 | Don Rowlands Centre, Karapiro | NA | Progressing the core tasks of the CSG in relation to water quality <ul style="list-style-type: none"> • Results of the catchment and economic modelling Round 1 • Re-runs to model in Round 2 • Policy options work – land use change, further work on property level limits |
| 16a | 8 September 2015 | Don Rowlands Centre, Karapiro | NA | Progressing the core tasks of the CSG in relation to water quality <ul style="list-style-type: none"> • Scene-setting talking points– communicating the nature of Round 1 results • Integrated Assessment – framework and progress on Round 1 • Re-runs to model in Round 2 – TLG report back on scenario selection, determine which Round 2 scenarios require Integrated Assessment • Policy options work – further exploring the concept of a property plan with regulatory backstop – feedback from WRC implementation staff • Planning community engagement – purpose, timing of sector and community meetings, principles for information sharing |
| 16b | 21 September 2015 | Don Rowlands Centre, Karapiro | NA | Progressing the core tasks of the CSG in relation to water quality <ul style="list-style-type: none"> • Full results of the Integrated Assessment Round 1 • Understanding the mitigations in the model and sector approaches to mitigations • Policy options work – Report back from sub-group looking at <i>Overseer</i> |

| | | | | |
|----|---------------------|-------------------------------|----|--|
| | | | | <ul style="list-style-type: none"> • TLG report back on Round 2 scenarios chosen for regional economic modelling and Integrated Assessment • Planning community engagement – purpose, timing of sector and community meetings, principles for information sharing |
| 17 | 1/2 October 2015 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Full results of Round 2 scenario modelling and integrated assessment • Re-runs to model in Round 3 • Policy options work – options for limits and targets in the rivers, including revisiting N and P in tributaries • Planning community engagement |
| 18 | 13/14 October 2015 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Policy work – options for policy methods to meet desired limits and targets • Planning community engagement |
| 19 | 23/24 November 2015 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Policy work – reviewing current thinking and further deliberation on limits, targets and policy methods in light of feedback from engagement period • Further discussion on allocating responsibility for contaminant reduction • Round 3 modelling – do the CSG want to model any policy simulations? |
| 20 | 9/10 December 2015 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Discussion on allocating responsibility for change – across sectors, within sectors, undeveloped land etc. • Further feedback on policy options (including qualitative feedback from community engagement). • Property plan options – implementation considerations and getting to scale |
| 21 | 17/18 December 2015 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Further discussion on allocating responsibility for change and setting limits, targets and accounting options for attributes. • Further work on policy options – catchment wide rules. • Further discussion on shallow lakes – options and water quality outcomes |
| 22 | 28/29 January 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> • Preferred approach to allocating responsibility, and policy detail for CSG to consult on with sectors in February. Confirming: |

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|-----|---------------------|-------------------------------|----|--|
| | | | | <ul style="list-style-type: none"> ○ Preferred approach to allocation of responsibility ○ Detail of catchment wide rules (including intensification rule) and property plans (including activity status – permitted/ controlled etc) and implementation approach to policy options including benchmarking |
| 23 | 18/19 February 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> ● Processing feedback and input on the policy package from sector feedback and WRC implementation staff ● Update on the technical approach to prioritising approach for policy purposes ● Hearing from sectors and using their knowledge to refine the policy mix |
| 23b | 26 February 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> ● Approach to Maori land and Whangamarino Wetland clarified ● Discussion on contributions across sectors and community, non-regulatory and cost-sharing methods ● Technical input on relationship between water quality targets and what has to happen on land |
| 24 | 2/3 March 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> ● Confirming the draft Policy Mix package to go to the Healthy Rivers Wai Ora committee on 22 March using the CSG decision making framework |
| 25 | 4/5 April 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> ● Checkpoint on the drafting of Plan Change 1 <ul style="list-style-type: none"> ● Discussing feedback from Healthy Rivers Wai Ora Committee ● Hearing back from sub-groups that met in March ● Further input from TLG on prioritisation and interim targets ● Further input from WRC implementers ● Provide clear direction to all sub-groups ● Provide clear direction to TLG on what to simulate in terms of effects of the Policy Mix |
| 26 | 28/29 April 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> |

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|----|---------------|-------------------------------|----|--|
| | | | | <ul style="list-style-type: none"> To receive the key documents and confirm or amend the direction in them: <ul style="list-style-type: none"> Plan Change 1 document – checking on this with CSG, prior to 9th May S32 document update on progress To receive overview of implementation as it is developing, and to give and receive feedback to WRC implementation staff Receive advice from TLG on the policy mix and hitting 10% targets; impact of Maori land option Receive TLG opinion on an adequate monitoring and accounting framework to assess the on-going effectiveness of Plan Change 1 |
| 27 | 9 May 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> Receive any feedback from Healthy Rivers Wai Ora committee Receive Plan Change 1 (in its current state) and confirm or amend the direction in it: Confirm matters related to Rules 1,3,4 Confirm sub-group process to finalise remaining rules |
| 28 | 30/31 May | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> Receive Plan Change 1 document with suggestions from latest round of sub-groups Consider the updated Plan Change 1 document in light of the policy simulation results, and confirm or decide on final changes to it Receive results of simulation of the effects of the policy mix and the implications of including Maori land scenarios Receive any further feedback from WRC implementers on proposed rules Receive feedback From Healthy Rivers Wai Ora committee and sectors |
| 29 | 7 June 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> Receive final draft of Plan Change 1 and confirm or amend using CSG decision making framework |
| 30 | 6/7 July 2016 | Don Rowlands Centre, Karapiro | NA | <p>Progressing the core tasks of the CSG in relation to water quality</p> <ul style="list-style-type: none"> Discuss any legal and/or planning issues arising from review of Plan Change 1 Finalise Plan Change 1, section 32 and other required documents |

Collaborative Stakeholder workshops

B. Collaborative Stakeholder Group field trips

- CSG3: dairy farm near Tokoroa - jointly hosted by Raukawa Charitable Trust and Dairy sector
- CSG4: Mangapu river restoration project (west of Te Kuiti) – hosted by Maniapoto Maori Trust Board
- CSG5: Hamilton water intake and Hamilton wastewater treatment plants – hosted by local government sector
- CSG6: Turangawaewae and Waikato river in Ngaruawahia – hosted by Waikato Tainui
- CSG7: Jet boat trip along the Upper Waikato river stopping at important cultural sites and other points of interest – hosted by Te Arawa River Iwi Trust (TARIT)
- CSG8: Visit to a grower farm, working packhouse and glasshouse produce facility – hosted by the horticulture sector
- CSG9: Visit to New Zealand Rowing High Performance Centre at Lake Karapiro – hosted by the Tourism and Recreation sector
- CSG10: Visit to Rahiri Farm near Maungatautari – hosted by the sheep and beef sector
- CSG11: Visit to Lake Waikare and the koi carp digester facility – hosted by the Environment/NGO sector
- CSG12: Visit to Ngairi George Sustainable Centre, Miraka milk plant, Tauhara Moana farms and geothermal fields and power plants – hosted by Tūwharetoa Maori Trust Board
- Additional field trip (outside of a CSG workshop) hosted jointly by the Forestry, Industry and Energy sectors to Ohakuri power station, Wairakei power station and Kinleith Mill.

C. Large Stakeholder Forums

Large Stakeholder Forum (LSF) refers to an all inclusive event that involves inviting a wide pool of stakeholders to engage in a facilitated session (Community Engagement Plan, 2015). LSF's have had many names over the course of the project including Open Stakeholder Workshop (OSW) and Stakeholder Workshop.

| LSF Name | Date | Location | Focus of session |
|--|-----------------|--|--|
| Healthy Rivers Stakeholder Workshop: Design of a Collaborative Stakeholder Group | 28 August 2013 | Te Rapa Conference and Function Centre, Ken Browne Drive, Te Rapa, Hamilton | Design of a Collaborative Stakeholder Group including stakeholder feedback on: <ul style="list-style-type: none"> the sectors that should be involved the size of the group the composition of sector and community representation on the group skills desirable in a collaborative group whether sectors should nominate their own representatives or be selected through an open application process |
| 2014 Healthy Rivers Wai Ora Large Stakeholder Forum | 23 October 2014 | Te Rapa Conference and Function Centre, Ken Browne Drive, Te Rapa, Hamilton | To update stakeholders on the project and to involve them in discussions on the Collaborative Stakeholder Group's: <ul style="list-style-type: none"> draft Policy Selection Criteria working list of values and uses |
| Healthy Rivers Wai Ora 2015 stakeholder workshop: <i>Water quality issues and their causes</i> | 25 March 2015 | Hamilton Gardens Pavilion, Hamilton Gardens, Hungerford Crescent, Hamilton | To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group (CSG) on: <ul style="list-style-type: none"> how the CSG proposes to divide the catchment into areas so we can better manage water quality current water quality trends in different parts of the Waipa and Waikato River catchments insights into factors driving water quality how we will determine how healthy (or unhealthy) a water body is how the project's modelling and research programme will develop options the project milestones and timelines |
| Healthy Rivers Wai Ora 2 nd 2015 open stakeholder workshop: <i>Water quality policies and solutions</i> | 27 October 2015 | Mystery Creek Events Centre (Bledisloe Room), 125 Mystery Creek Rd, Hamilton | To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group on: <ul style="list-style-type: none"> their long term vision for the Waikato and Waipa river catchments the CSG's current thinking about limits for nitrogen, phosphorus, sediment and microbial pathogens, to achieve community values what timeframes (or 'targets') could look like for achieving the limits under different water quality scenarios potential economic, social, environmental and cultural impacts of limits under a range of water quality scenarios policy options (regulatory and non-regulatory) being explored for achieving limits and targets |

Large Stakeholder Forums

D. Engagement events

| Engagement event type | Date | Location | Focus of session |
|-----------------------|------------------|--|---|
| Drop in session | 1 April 2015 | South Waikato Sport and Events Centre, 25 Mossop Rd, Tokoroa | <p>To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group (CSG) on:</p> <ul style="list-style-type: none"> • how the CSG proposes to divide the catchment into areas so we can better manage water quality • current water quality trends in different parts of the Waipa and Waikato River catchments • insights into factors driving water quality • how we will determine how healthy (or unhealthy) a water body is • how the project's modelling and research programme with develop options • the project milestones and timelines |
| Drop in session | 9 April 2015 | Civic Centre, 142 Main St, Huntly | |
| Drop in session | 13 April 2015 | Hamilton Gardens Pavilion, Hamilton Gardens, Hamilton | |
| Drop in session | 15 April 2015 | Otorohanga Club, 107 Maniapoto St, Otorohanga | |
| Drop in session | 5 May 2015 | Tuakau Memorial Hall, George St, Tuakau | |
| Community Workshop | 28 October 2015 | South Waikato Sport and Events Centre, 25 Mossop Rd, Tokoroa | <p>To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group on:</p> <ul style="list-style-type: none"> • their long term vision for the Waikato and Waipa river catchments • the CSG's current thinking about limits for |
| Community Workshop | 29 October 2015 | Tuakau Memorial Hall, George St, Tuakau | |
| Community Workshop | 5 November 2015 | Hamilton Gardens Pavilion, Hamilton Gardens, Hamilton | |
| Community Workshop | 10 November 2015 | Otorohanga Club, 107 Maniapoto St, Otorohanga | |

| | | | |
|--------------------|------------------|--|--|
| Community Workshop | 11 November 2015 | Broadlands Hall, 2986 Broadlands Rd, Reporoa | <p>nitrogen, phosphorus, sediment, and microbial pathogens, to achieve community values</p> <ul style="list-style-type: none"> • what timeframes (or 'targets') could look like for achieving the limits under different water quality scenarios • potential economic, social, environmental and cultural impacts of limits under a range of water quality scenarios • policy options (regulatory and non-regulatory) being explored for achieving limits and targets |
|--------------------|------------------|--|--|

Engagement events

E. Online surveys

| Survey number | Date | Focus of survey |
|-----------------|------------------------------------|--|
| Online survey 1 | 30 March 2015 – 30 April 2015 | <p>To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group (CSG) on:</p> <ul style="list-style-type: none"> • how the CSG proposes to divide the catchment into areas so we can better manage water quality • current water quality trends in different parts of the Waipa and Waikato River catchments • insights into factors driving water quality • how we will determine how healthy (or unhealthy) a water body is • how the project’s modelling and research programme will develop options • the project milestones and timelines |
| Online survey 2 | 28 October 2015 – 13 November 2015 | <p>To update stakeholders on the project and to involve them in discussions with the Collaborative Stakeholder Group on:</p> <ul style="list-style-type: none"> • their long term vision for the Waikato and Waipa river catchments • the CSG’s current thinking about limits for nitrogen, phosphorus, sediment, and microbial pathogens, to achieve community values • what timeframes (or ‘targets’) could look like for achieving the limits under different water quality scenarios • potential economic, social, environmental and cultural impacts of limits under a range of water quality scenarios • policy options (regulatory and non-regulatory) being explored for achieving limits and targets |

[Online surveys](#)

F. River iwi feedback to CSG

- Provision for the Development of Māori Land within the Framework of Te Ture Whaimana o Te Awa Waikato and Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai. Doc #3709793 and Collaborative Stakeholder Group (“CSG”) Focus Session Notes 26 February 2016, p. 11-13. Doc #3727426.
- Key messages from River iwi engagement – River iwi Presentation 23 November 2015. Doc #3629218 and Collaborative Stakeholder Group (“CSG”) Workshop 19 Notes (Day one) 23 November 2015, p. 4-8. Doc #3629626.
- River iwi feedback to CSG - Outcome statement and principles for implementing Te Ture Whaimana – the Vision and Strategy for the Waikato and Waipa Rivers. Doc #3483800 and Doc #3477259 and Collaborative Stakeholder Group (“CSG”) Workshop 14 Notes (Day one) 10 August 2015, p. 10-13. Doc #3471459.
- River iwi feedback to CSG Workshop 11 in April – Policy Selection Criteria and interpreting the Vision and Strategy. Doc #3394073 and Doc #3394072 and Collaborative Stakeholder Group (“CSG”) Workshop 11 Notes (Day two) 24 April 2015, p. 15-16. Doc #3359918.
- Summary of River Values Hui feedback to CSG Workshop 10 on 5 March 2015. Doc #3300920 and Doc #3303616 and Collaborative Stakeholder Group (“CSG”) Workshop 10 Notes (Day one) 5 March 2015, p. 7-9. Doc #3300658.

G. Individual River iwi values and perspectives presented to CSG as hosted by River iwi

- Wai Limits Are Needed? Stephanie O’Sullivan, Raukawa Charitable Trust. Doc #3081138 and Collaborative Stakeholder Group (“CSG”) Workshop 3 Notes (Day one) 5 June 2014, p.3. Doc #3079941.
- Maniapoto. Ben Ormsby, Maniapoto Maori Trustboard. Doc #3102443 and Collaborative Stakeholder Group (“CSG”) Workshop 4 Notes (Day one) 1 July 2014, p.6. Doc #3102953.
- Waikato Tainui Perspectives, Tim Manukau, Waikato Tainui. Doc #3168019 and Collaborative Stakeholder Group (“CSG”) Workshop 6 Notes (Day one) 15 September 2014, p. 2-3. Doc #3177101.
- Ngati Tahu-Ngati Whaoa, Evelyn Forest and Roger Pikia, TARIT Holdings Ltd. Doc #3208543 and Collaborative Stakeholder Group (“CSG”) Workshop 7 Notes (Day one) 30 October 2014, p. 1-3. Doc #3208894.
- Tuwharetoa perspectives, Topia Rameka. Doc #3427593 and Collaborative Stakeholder Group (“CSG”) Workshop 12 Notes (Day one) 4 June 2015, p. 1- 4. Doc #3419983.

B.10.2 Appendix 2: The CSG's Policy Selection Criteria

Gives effect to Te Ture Whaimana/the Vision and Strategy

Does the policy give effect to the Vision and Strategy for the restoration and protection of the health and wellbeing of the Waikato and Waipa rivers?

RMA (including the NPS Freshwater Management)

Does the policy:

- comply with the RMA (including the purpose and principles of the Act)?
- take account of existing policy frameworks?
- achieve the range of values identified?

Provides for aspirations of River iwi

Does the policy:

- provide for them to retain and use their taonga in accordance with their tikanga and kawa?
- give effect to their environmental, economic, cultural and social relationships with land and water?

Acceptable to the wider community

Does the policy:

- achieve sound principles for allocation?
- recognise efforts already made?
- exhibit proportionality (those contributing to the problem contribute to the solution)?

Optimises environmental, social and economic outcomes

Does the policy:

- aim for cost-effective solutions?
- provide confidence and clarity for current and future investment?
- provide realistic timeframes for change?

Achieves the restoration and protection of native habitats and biodiversity

Does the policy:

- support resilient freshwater ecosystems?
- support interconnectedness and connectivity between land and water?
- support healthy populations of indigenous plants and animals?

Gives positive social and community benefits

Does the policy:

- minimise social disruption and provide social benefit?
- enhance people's use of the river?
- take account of unique features and benefits?
- result in outcomes people can identify with, own and feel proud of?

Realistic to implement, monitor and enforce

Is the policy:

- able to be measured, monitored and reported?
- implementable and technically feasible?
- administratively efficient?

Allows for flexibility and intergenerational land use

Does the policy:

- foster innovation?
- encourage positive actions being taken?
- allow for change and review as new information and issues arise?
- provide flexibility of future land use (including Treaty settlements land and multiple Māori owned land)?
- take account of complexity and difference between farming systems and farm enterprises?

Supported by clear evidence

Does the policy:

- take an evidence-based and knowledge-based approach (including Mātauranga Māori)?
- transparently show the costs for meeting the outcomes?
- prioritise efforts to achieve catchment solutions?
- set transparent limits and definitions?

The CSG's Policy Selection Criteria (Source: Collaborative Stakeholder Group 2015. Document# 3183705)

Part C Technical Information

C.1 Technical Leaders Group process

Background - Technical Alliance

A Technical Alliance was established for Plan Change 1, comprising the Technical Leaders Group (TLG) and a Technical Support Group (TSG). The TLG was established using a Request for Proposal (RFP) seeking proposals to be the chair or a member of the TLG. The TSG was established using an Expression of Interest (EOI). The RFP and EOI were issued in December 2013.

Establishment of Technical Leaders Group

The RFP contained information on criteria on which respondents would be assessed. The criteria, guidelines for their application, and criteria weightings were developed by council staff based on the knowledge, expertise and skills required. An evaluation panel comprising a representative from each of council, iwi partners, Waikato River Authority, and an independent, independently scored each respondent for the chair and/or as a member of the TLG using a template, then convened to discuss, rank and shortlist respondents.

The TLG was established with the following members:

- Dr Bryce Cooper, General Manager - Strategy, NIWA (Chair)
- Dr Liz Wedderburn, Portfolio Leader Agriculture Policy and Maori Agribusiness Principal Scientist, AgResearch
- Mr Antoine Coffin, Director, Te Onewa Consultants
- Dr Graeme Doole, Professor of Environmental Economics, University of Waikato
- Dr Mike Scarsbrook, Environment Policy Manager, DairyNZ
- Dr John Quinn, Chief Scientist - Freshwater and Estuaries, NIWA
- Dr Tony Petch, Director, Tony Petch Consulting Ltd.

TLG members were experts who had recognised expertise relevant to the project, were able to work in a cross-disciplinary manner, integrate mātauranga Maori into the outcomes, and identify and prioritise research required, and who understood the role of the Technical Alliance in informing policy development.

Technical Support Group

The Expression of Interest process provided 80 technical specialists, and their names and areas of expertise were made available to the TLG. Throughout the process described below, the TLG were encouraged to source additional expertise required from the TSG. If suitable expertise was not available within the TSG, the TLG sought expertise elsewhere.

A Terms of Reference (WRC 2013, Document# 2872118) provided an overview of the role and tasks of the TLG and TSG. The TLG reported directly, through the TLG chair, to Te Rōpū Hautū and the HRWO committee (refer to B.1.1 'New era of Co-governance and Co-management of the Waikato and Waipa Rivers' for more information on the Plan Change 1 development process).

Technical Leaders Group Process

The TLG initiated a process to identify the information required to support CSG's deliberations on Plan Change 1 and the gaps in that information. They then described the work required to address the gaps and identified experts to carry out the work. Areas of work that fit within areas of expertise held by TLG members were picked up and progressed by those members. Additional expertise not found in the TLG was identified.

The TLG provided to the CSG their thoughts on the approach to be taken, using a simplified policy cycle that highlighted the following steps and roles:

1. Identifying the desired values – the CSG's Focus Statement includes safe to swim in and take food from, and provide for social, economic and cultural well being. These values raise questions or required further detail from the CSG, for example:
 - a. are desired values (and therefore attribute limits) to be met everywhere and all of the time, some places and some of the time, or some combination of these?
 - b. at what spatial scale do limits on contaminant losses from land apply?
 - c. can there be "overs and unders" in sub-catchments?

- d. where water quality is better than it needs to be, can it decline?
2. Setting attribute levels, with guidance from the TLG, that relate levels of nitrogen, phosphorus, sediment and microbial pathogens, consistent with the desired values, using guidelines from the National Policy Statement for Freshwater Management 2014 (NPS-FM), existing information and expert input.
 3. Scenario analysis by the TLG looking at future options for limits on point source discharges and non-point source losses from land. This will require an integrated assessment across desired values to provide the CSG with social, economic, cultural and ecological analysis. The TLG will use experts for these predictive modelling and non-market valuation studies.
 4. CSG deliberations to assess options against desired values and risk, whether consensus can be achieved, and whether further scenarios are required.

The TLG indicated that the approach would be sequential and iterative, and would require technical work on defining limits to meet CSG values, scenario modelling targeted to the needs of the CSG, and the 'bringing together' of diverse technical work across market and non-market values to provide a clear options analysis.

Details of the information requirements and work programme initiated by the TLG to address setting attribute levels and scenario analysis follow. The work programme and inter-dependencies are summarised in C.1.6 'Technical workbriefs'. The outputs and information from the work programme are summarised in C.2 'Key findings'.

C.1.1 Populating a Waikato Objectives Framework

The National Objectives Framework (NOF) in the NPS-FM provides a framework for defining values, their attributes and attribute states (A-D) that relate to the achievement of these values. Population of the NOF to date is limited, with ecosystem health and human health (nationally compulsory values) linked to a relatively narrow range of attributes.

To assist with the limit setting process for Plan Change 1, a process for populating a Waikato-Waipā catchment based NOF (Waikato Objectives Framework – WOF) with appropriate attributes and attribute states relating to defined values was established. The intent was that these attributes would be used to describe current state, assist with definition of change scenarios to aid CSG deliberations, and provide a framework for eventual recommendation to the Healthy Rivers Wai Ora committee on limits and targets relating to the four contaminants.

Population of the WOF was determined in the same way as the NOF process - an expert panel approach with specific, supporting analyses as required. A major difference was the integration of mātauranga Māori and western science in defining attributes relevant to key values (ecosystem health, human health and mahinga kai) and assigning appropriate attribute states. This holistic approach to value and attribute definition was consistent with the objectives of the Healthy Rivers Wai Ora project.

The attribute work was led by members of the TLG who convened a panel with Waikato-specific expertise in Mātauranga Māori, aquatic ecosystems and water quality. The panel's brief was to:

1. Provide a narrative and discussion of Māori values and principles as they apply to characteristics of water bodies affected by the four contaminants (nitrogen, phosphorus, sediment and microbial pathogens) and align these, where possible, with three core values (ecosystem health, human health and mahinga kai).
2. Populate a table of relevant attribute states for the contaminants that can be used to assess current attribute states and assist in the definition of freshwater objectives that are consistent with the NPS-FM and the Vision and Strategy/Te Ture Whaimana.
3. Supplement existing attributes in the NOF with additional attributes stemming from locally-relevant scientific knowledge and mātauranga Māori that reflect the particular values held for rivers and lakes in the Waikato and Waipā catchments.
4. Identify any information gaps that either prevent completion of the attribute table or are major areas of uncertainty, and identify the work required to gain that information (with estimates of costs and timeframes).

The attribute-setting process and panel outcome, including draft recommendations to the CSG, are summarised by the TLG (TLG 2014, Document# 3408329). The attributes were further refined following discussion with and consideration by the CSG (refer to C.2 'Key findings'). The full process of setting and refining the attributes is described in TLG 2016, Document# 6154421.

C.1.2 Economic model

The TLG recognised that a key input to the discussion of various limit and target scenarios identified by the CSG will be their relative economic cost, and considered how best to provide this analysis to the CSG and project partners.

The TLG decided to build a model (hereafter referred to as the HRWO model) based upon one that was built by the Economic Impact Joint Venture (EIJV) group (Doole, 2013) but extending its features and updating data inputs for use within Plan Change 1. The resultant HRWO model contains a consistent and integrated framework within which to ascertain what mitigations will be required to achieve water quality targets and limits and the costs of doing so. The rationale for using this modelling framework is provided in Doole *et al.* (2015c).

The TLG noted that the original EIJV work contains limitations in respect of the assessment of alternative targets required for Plan Change 1 as it does not include sediment and microbial pathogens as contaminants, and it focuses on pollutant loads rather than contaminant concentrations (which are how the NOF attributes are expressed). The EIJV also did not assess the regional impacts of meeting water quality limits, and this component needed to be added. A work brief was developed to review the EIJV model with a goal to informing the extension of the EIJV framework to address these limitations. The review was led by a member of the TLG, together with a panel of experts whose brief was to:

1. Review the EIJV model with regards to whether it is fit-for-purpose for informing the discussion regarding the economic impacts of alternative water quality targets within the Plan Change 1 development process.
2. Identify pragmatic and cost-effective means to extend the EIJV work to a point where it can be used to perform economic assessment of alternative water quality targets within the Plan Change 1 development process.

The panel concluded that the data needed to refine and improve the work of the EIJV model to improve its modelling capability and suitability for the project included:

- provision of a refined land use classification for the Waikato and Waipa catchments;
- estimation of *E. coli* and sediment loads and attenuation rates in the Waikato catchment;
- updated estimates of nitrogen and phosphorus loads and attenuation for the refined spatial zones in the model;
- estimation of the different revenue and cost items associated with each mitigation strategy in the model;
- application of an input-output model to ascertain the regional economic impacts relating to employment and costs of meeting water quality limits.

The TLG also recognised the need for extra information on groundwater lags, N attenuation, nutrient-chlorophyll relationships, and the predictors of clarity.

Once these enhancements were incorporated into the HRWO model, model outputs could be used to assess regional economic effects using a previously developed regional input-output model.

The work described above was that considered essential for the development of the HRWO model to be fit for purpose for this project. A number of other areas of work, based on expert opinion from the TLG and panel experts, were also included to ensure that the HRWO model contained the most appropriate or up-to-date data. These included establishment of expert panel workshops on:

- costs and efficacy of farm and riparian mitigation practices for all four contaminants;
- re-consideration of the sheep and beef costing data used in the EIJV model, to ensure the most up to date information;
- edge of field technologies, such as wetlands, to remove contaminants, to provide estimates of efficacy and cost for inclusion in the HRWO model.

A number of reports not commissioned by the TLG for this project but approved by the TLG as relevant to the HRWO model and its interpretation included:

- a faecal source tracking study, which provided key information on the source of faecal contamination (human, bovine, avian) to the rivers;
- a peer review of key findings from two bioassay studies already completed on nitrogen, phosphorus and algae in the Waikato River;
- a peer review of a report on visual clarity of the Waikato and Waipa Rivers (Vant 2014) to confirm relevance of this information for the project.

The reports describing the rationale for the modelling approach (Doole *et al.*, 2015c) and on the HRWO model structure (Doole, 2016a) were peer reviewed by New Zealand and international experts.

The HRWO model has seven main components that describe representative farm systems, the discharge of nitrogen, phosphorus, sediment and *E. coli* from these farm systems and from point sources, and the attenuation and transport of these contaminants through the catchment. These components are:

1. FARMAX, which estimates revenues and costs for representative dairy and drystock farms
2. OVERSEER, which estimates nitrogen leaching and phosphorus discharges from representative dairy, drystock and horticulture farms
3. SPARROW, which estimates *E. coli* discharges from agricultural land
4. NZEEM, which estimates sediment discharges from agricultural land
5. CLUES, which predicts the transport of nitrogen, phosphorus, sediment and *E. coli* through rivers and streams
6. LAM, which uses the outputs from the preceding five components to find the least-cost mix of mitigation options and changes in land use to achieve specified contaminant levels, subject to any constraints such as restrictions on the magnitude of changes in land use
7. Waikato Region Multi-Regional Input-Output Table, which estimates the effects on regional income and employment of changes in the profitability of the agricultural and forestry sectors provided in the solution obtained from LAM.

The representative dairy and drystock farms in the HRWO model were based on available information and consisted of data on:

- 26 representative dairy systems and 18 mitigation options (DairyNZ Economics Group, 2014)
- five representative drystock systems (including dairy support) with five mitigation options (Olubode, 2015)
- three representative horticulture systems with one mitigation option for each system (AgriBusiness Group, 2014).

Gross-margin analyses were used to estimate the cost of implementing the mitigations.

The modelling work also drew on a previous report from Opus containing data from point source dischargers (Roback, 2015). Point source operators were given the opportunity to provide feedback on the Opus report and this was summarised for the TLG by Keenan (2015) for consideration in the HRWO model.

Land use conversion costs were informed by Matheson (2015).

Additional economic data were provided by Oji Fibre Solutions and Scion and this formed part of the report of Monge *et al.* (2015).

The HRWO model is an equilibrium state model that provides outputs under steady-state and does not attempt to model the time-course of transitions from one state to another. These kinds of models are also policy-free, which means they do not contain a mechanism for ensuring farmers implement mitigation options and change land use; these are simply assumed to occur.

The main alternatives to using a static optimisation model are a small 'expert systems' simulation model, a dynamic optimisation model or an agent-based model. Small 'expert systems' models are ideal for describing the essential features of a system; they are not suited to providing detailed estimates of large-scale, integrated economic-environmental systems. Dynamic optimisation models require detailed information on the factors that govern how change happens over time such as information on the various factors that will influence how quickly landowners will change practices, how influential each factor is. Such information is not available and consequently these kinds of models, which are more complicated and expensive than static models, cannot be constructed. Agent-based models are not feasible for the same reason.

Another approach that was considered was the Waikato Integrated Scenario Explorer (WISE) framework. This framework was developed for long-run strategic planning and does not contain the detail necessary to provide estimates at the farm sector level of setting limits for water quality.

With respect to static optimisation models, the only alternative to LAM was NZFARM. The key difference between these two models is the way in which land use is constrained. In NZFARM the profitability of different land uses in an area are modified such that the simulated allocation of land to each use matches the historical pattern of use at a point in time. These modifications may bias estimates of changes in land use in response to changes in costs of production such as mitigation costs. The potential for this bias is reduced in LAM by creating representative farms for each sub-catchment and incorporating the costs of changing from one land use to another. In addition, historical land use patterns may be used in LAM to constrain the magnitude of changes in land use predicted by the model to the scale of historical change.

The approach used in LAM was deemed to be a more appropriate approach to predicting changes in land use than the approach used in NZFARM on the grounds of being easier to formulate, less prone to error, drawing on regionally-specific data and having a substantive theoretical justification.

The Waikato Region Multi-Regional Input-Output Table is an input-output model of the regional economy (McDonald, 2015). It is the only model available of the regional economy that could be disaggregated to provide estimates of changes in income and employment for Freshwater Management Units.

Input-output models are static, linear models, which means:

- the linkages between sectors are linear;
- the prices for goods and services do not change in response to changes in the demand and supply of them;
- the analysis is timeless.

In combination these features mean that input-output models are not well suited to predicting the impacts of large-scale, medium to long term changes in the structure of regional economies. In the absence of any alternatives, they are relied on to provide an indication of the magnitude of impacts.

The results of input-output models must be interpreted with particular caution because these models do not provide any guide as to how long it will take for the estimated impacts to be realised.

C.1.3 Groundwater investigations

Groundwater investigations: age of groundwater and denitrification potential

One of the most critical components to enable realistic policy to restore and protect the Waikato and Waipa rivers is an understanding of whether the water quality in the rivers reflects the current intensity of land use in the catchments. Because of the latency of soil and groundwater transport processes and hydro-chemical processes within aquifers it is unlikely that river water quality (particularly nitrate-nitrogen) is in equilibrium with catchment land use where a rapid change in land use intensity has occurred. Conversely, water quality is more likely to be in equilibrium with land use where land use intensity has remained stable over several decades.

Preliminary work was already completed in the Upper Waikato catchment to clarify the relationships between land use intensity and groundwater and surface water nitrogen loads to the river (Aqua, 2013). However, this work concluded that:

It is reasonable to expect that ground water's contribution to nitrogen to surface water quality at the monitoring sites will continue to increase...And that the rate of increase and the time over which it occurs is poorly understood.

Recent economic analysis of the likely costs of meeting national water quality objectives for the Upper Waikato show the main determinant of remediation cost is the extent to which river water quality (especially nitrate nitrogen) is in equilibrium with catchment land use (Doole, 2014). Both of these studies highlight the critical importance of understanding nitrate transport times from the land, via groundwater, to surface waters (the 'lag' effect), and the extent of attenuation processes within aquifers and riparian zones that remove nitrate during its transport. Little was known of the importance of these processes across the Waikato and Waipa river catchments.

A review of the state of knowledge on groundwater in the Waikato and Waipa catchments, led by a member of the TLG together with a panel of experts in Waikato's groundwater systems and their hydro-geochemistry, indicated that there was a need to:

1. Summarise the state of groundwater knowledge in the Waikato and Waipa catchments in relation to the information requirements of Plan Change 1.
2. Improve understanding of groundwater hydraulics, water chemistry, groundwater age and ground and surface water interactions where they are not sufficiently known.
3. Refine the conceptual models for groundwater-surface water in the Upper Waikato and Waipa catchments.
4. Improve the understanding of N attenuation between soil, groundwater and streams.
5. Determine the patterns of land use change and intensification over the last 50 years.

Work was commissioned to:

- Review hydrogeological data and development (or refinement) of conceptual hydrogeological models of the upper, middle and lower Waikato River and Waipa River catchments.
- Estimate time of travel through unsaturated zones in the upper Waikato, Waipa and middle/lower Waikato River catchments.
- Estimate changes in land use area and intensity and N leaching rates across the Waikato-Waipā catchments.
- Undertake a field programme during the 2014/15 summer to provide additional information on basic hydrology, hydrogeology, regional piezometric levels, water chemistry (especially N), and groundwater/surface water age.
- Develop a steady-state groundwater flow and transient transport model for the Waipa catchment.

- Develop a steady-state groundwater flow and transient transport model for the Upper Waikato, and Middle and Lower Waikato catchments.
- From the above work, further develop and refine parameter inputs to the N component of the CLUES catchment model.

C.1.4 Mātauranga Māori

Mātauranga Māori is a term that describes the body of knowledge originating from Māori ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices (Te Aka Maori-English). Mātauranga Māori embraces individual, local and collective knowledge, Māori values, cultural expressions, perspectives, observations, being traditional, historical and contemporary.

The NOF in the NPS-FM provides a framework for defining values, attributes and states. Māori values and attributes do not readily provide measures that could be immediately incorporated into the WOF, especially given that the focus of Plan Change 1 is on addressing the four contaminants rather than an holistic view of all drivers and effects on values. To assist with articulating and communicating the context of healthy rivers from a mātauranga Māori view and assisting in identifying new and potential measures, a knowledge network work programme was proposed whereby causative links could be drawn between mātauranga Māori and the contaminants. Initially it was thought that this work would align with that of Ngā Tohu o Te Wai, which is a national research project that aims to develop knowledge and tools for setting freshwater limits for mahinga kai, but there were differences in timing of the projects that precluded this happening.

The TLG noted that the values used in the WOF include a number of iwi-centric values, which they considered would benefit from further exploration to identify influencers and attributes, some of which may be applicable to use as measures. Some information on values, attributes, influencers and measures could be drawn from existing literature and programmes. Some new work was also proposed to provide a comprehensive picture of river health from a Waikato and Waipa iwi perspective. Conversations with River iwi supported this knowledge network approach.

Knowledge networks are graphical conceptual models that illustrate relationships or linkages between values, pressures (such as the four contaminants) and restorative actions. They draw on multidisciplinary information including mātauranga Māori and, in a parallel activity to the Healthy Rivers process, have been used in a Waikato River Authority study to develop report cards for the Waikato and Waipa Rivers. This provided a useful starting point for the work for Plan Change 1, which was managed by a member of the TLG, to:

- Draw from the knowledge and experiences of the WRA report card and Ngā Tohu o te Wai project teams as much as possible.
- Confirm the values for exploration – mahinga kai species/places, swimmability, sense of place, identity and relationships, and wai tapu, tauranga waka – including conversations with River iwi.
- Develop knowledge networks from a mātauranga Māori perspective drawing on literature available, values articulated in the CSG5 workshop, and workshops with iwi representatives, pūkenga and relevant practitioners. Knowledge networks include physical and non-physical values, and drivers, including whether these have positive or negative influences on the values.
- Produce knowledge networks and support narratives to describe the inter-dependencies of influences related to swimming, mahinga kai and special characteristics of rivers.

Hui were held with each River iwi to progress incorporation of mātauranga Māori through discussion of the project's objectives and outputs, the challenge of identifying indicators and the use of knowledge networks. The hui were followed by a wānanga to identify factors that affect swimming and fishing from an iwi perspective and that may be different or similar to scientific measures of these values. Coffin (2015) describes the outcomes of this work.

This work was incorporated during development of the WOF and in establishing the framework for and undertaking the cultural impact assessment.

C.1.5 Social and cultural impact assessment

Undertaking a social and cultural impact assessment for informing the recommendations of the CSG on establishing targets and limits in water bodies

To identify contaminant limits for the river, it is necessary to understand the impact of current and future land use on the concentration of these contaminants and their impact on the values and related objectives determined for the river. The Vision and Strategy/Te Ture Whaimana notes that a healthy Waikato River will sustain abundant life and prosperous communities. For the CSG to take this into account in their deliberations, consideration of the impact of the actions required to meet the water values on other community values was required.

Integrated Assessment is a framework to analyse the potential cultural, economic, environmental and social impacts of water quality scenarios. It is a relative assessment, which allows for comparisons between scenarios on factors other than water quality, and is described in the form of narratives and strength and direction of trends.

The starting points to establish the framework were the values for water identified by the CSG (refer to section: B.3 'Identifying Values and Uses') and the attributes in the WOF. Establishing the framework was led by a member of the TLG, together with a panel of experts in methodologies, analysis and interpretation of social and cultural impact assessment. Their brief was to:

- identify social and cultural values and associated indicators related to prosperous communities
- identify relevant methodologies and data sets available to undertake an impact assessment based on the land use scenarios
- undertake social and cultural impact assessment related to the future scenarios chosen by the CSG to meet the water values and objectives.

The expert panel undertook a qualitative expert evaluation together with input from River iwi and CSG members. Value judgements based on expert opinion were supplemented with available quantitative information. A set of 19 indicators was agreed and used for assessing the direction and magnitude of change arising from the steps towards achieving modelled scenarios identified by the CSG as the scenarios they would focus on. The expert panel was re-established to assist the CSG with interpreting economic model outcomes against the mātauranga Māori and prosperous communities indicators and values.

C.1.6 Technical workbriefs

The figure below maps the programme of work to inform the Plan Change 1 development process.

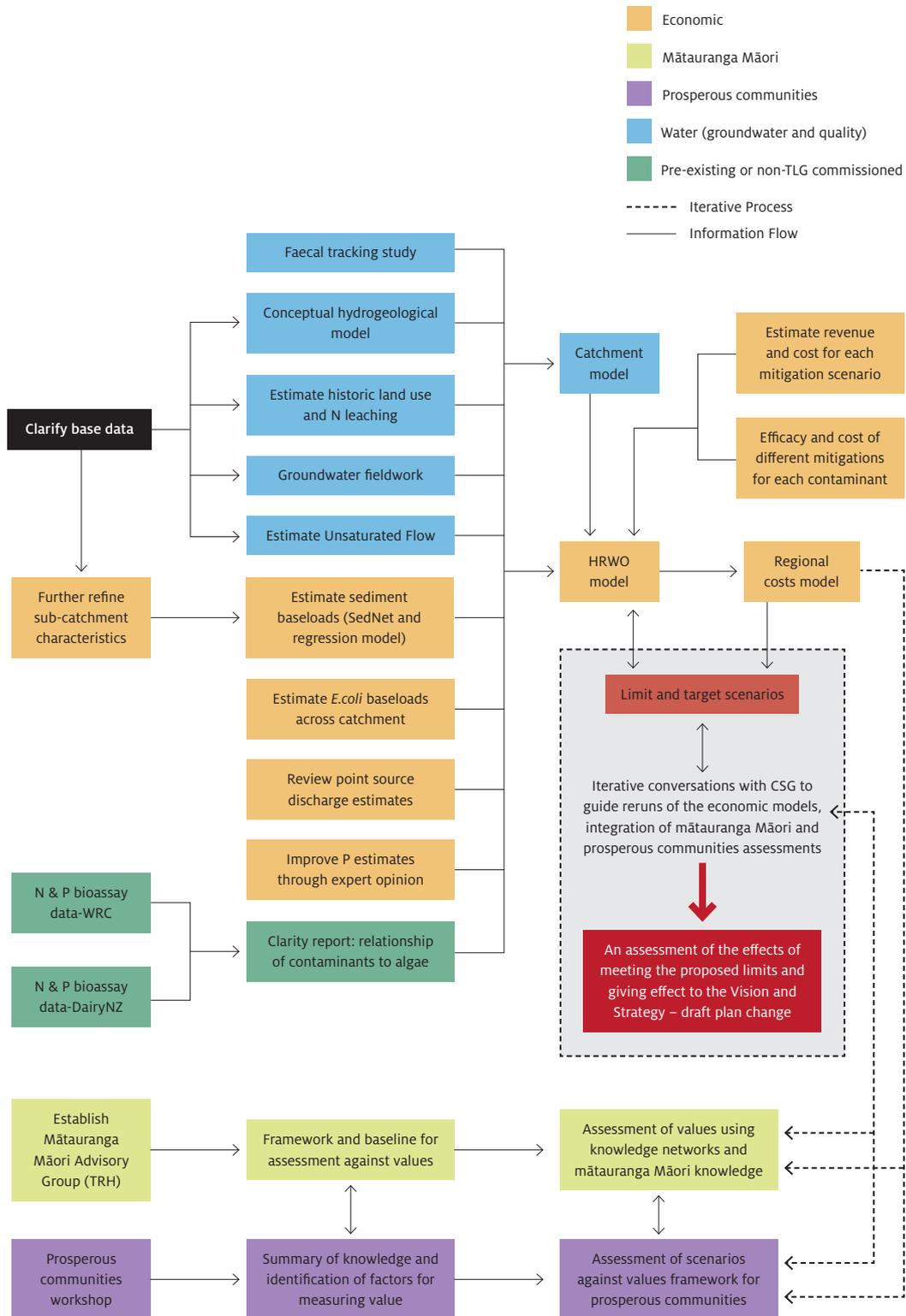


Figure 1 Programme of work to inform the Plan Change 1 development process.

C.2 Key findings

C.2.1 Information provided to the CSG

Information that would enhance understanding about the four contaminants and their role in water quality was either provided directly by TLG members within their areas of expertise, or sourced from other technical experts. Presentations at CSG meetings or reports provided to the CSG for information purposes are listed below by title, document number, a brief description of the content and the presenter or provider. Information in any given presentation may have been updated in subsequent reports.

- Freshwater attributes (Doc#3140287) – what attributes might be considered, including NOF attributes – Presentation by Mike Scarsbrook (TLG) at CSG5.
- Sources and pathways for nutrients to water and means of intervening (Doc#3140260) - how the four contaminants enter water (i.e. sources and pathways), farm practices that cause discharges, and ways of preventing and remediating discharges – Presentation by Liz Wedderburn and John Quinn (TLG) at CSG5.
- Sources of contaminants in the Waikato-Waipā catchment (Doc#3127539) - summary of point source and non-point source discharges to the Waikato and Waipā Rivers – Presentation by Bill Vant (WRC) at CSG5.
- Improving the economic and environmental performance of a New Zealand hill country pastoral catchment (Doc#2867144) – poster describing research at Whatawhata – Liz Wedderburn (TLG).
- Economic Impact Joint Venture model: summary of progress (Doc#3117632) – report of the Economic Impact Joint Venture Study (EIJV) results, describing the model development and capabilities and indicating gaps in the model if it is to be used for the Healthy Rivers Wai Ora project - Blair Keenan (WRC) CSG5.
- Mātauranga Māori presentation to Collaborative Stakeholder Group (Doc#3168018) - Presentation by Antoine Coffin (TLG) at CSG6.
- Economic Joint Venture Model - summary of progress (Doc#3360354) – description of model to be developed – Presentation by Graeme Doole (TLG) at CSG6.
- Dairy farm analysis for the Waikato Impact Joint Venture (Doc#3237693) - dairy representative farms approach in the economic modelling - Presentation by Matt Newman (DairyNZ) at CSG8.
- Ecology and water quality of lowland lakes in the Waikato region (Doc#3168017) – Presentation by David Hamilton (University of Waikato) at CSG6.
- Waikato Lowland lakes – Waikare (Doc#3168020) - role of Lake Waikare in the lower Waikato flood protection scheme – Presentation by Tony Petch (TLG) at CSG6.
- State of Waikato and Waipā waterways (Doc#3237698) - Report back from TLG on analysis of river/lake state against Attributes – Presentation by Mike Scarsbrook (TLG) at CSG7.
- Population of a Waikato Objective Framework - Report back from TLG on defining attributes for Human Health, Ecosystem Health and Mahinga Kai (Doc#3210866) - Presentation by Mike Scarsbrook and Antoine Coffin (TLG) at CSG7.
- Waikato River Restoration Report Card (Doc#3210870 and 3280378) – presentation on overview of the WRA project and draft report card as at 3/2/15 for CSG7 – Presentation by John Quinn (TLG) at CSG7.
- Sheep and Beef data (Doc#3428452) – sheep and beef representative farms approach in the economic modelling – Presentation by Femi Olubode (WRC) at CSG8.
- Integrated Assessment Framework (Doc#3286337) – Presentation by Liz Wedderburn (TLG) at CSG9.
- Clarity attribute (Doc#3286338) – consideration of what the clarity attribute might be – Presentation by Bill Vant (WRC) at CSG9.
- New Integrated Assessment Framework (Doc#3359779) – update on the approach that could be taken - Liz Wedderburn (TLG) at CSG11.
- Integrated assessment framework (Doc#3386100) – Presentation by Liz Wedderburn (TLG) at CSG11.
- The Clarity Attribute – addressing matters raised at CSG9 (in agenda Doc #3293036) – providing further information on clarity and proposed bands - Bryce Cooper (TLG).
- Application of economic models within the Healthy Rivers Project (Doc #3279414) - Graeme Doole (TLG).
- Managing for Ecosystem Health in the Waikato River: Interactions between phytoplankton, nutrient availability, flow and temperature. TLG Summary for CSG10 (Doc#3300075).
- Shallow Lake Management and Restoration - A WRC Management Perspective (Doc#3343054) – Presentation by Tracie Dean-Speirs (WRC) at CSG11.

- Sediment management (Doc#3412357) – sediment sources and types of erosion – Presentation by Alan Campbell (WRC) and Bryce Cooper (TLG) at CSG12.
- Maori attributes - tohu Maori (Doc#3666759) - overview of work being done on attributes - Presentation by Antoine Coffin (TLG) to CSG12.
- Ground water resources: Waikato and Waipa catchments (Doc#3445652)– summary of the groundwater work findings to inform the economic model – Presentation by Tony Petch (TLG) July 2015.
- Validating Integrated Assessment Framework (Doc#3445649) – the integrated assessment approach – Presentation by Liz Wedderburn (TLG) July 2015.
- Economic modelling in the HRWO project (Doc#3445650) – update on model and what CSG might expect – Presentation by Graeme Doole (TLG) to CSG13.
- Hydrology of the Waikato catchment (Doc#3426929) - Presentation by Ed Brown (WRC).
- Waikato River Hydrology presentation (Doc#3433579) - David Payne (Mighty River Power) CSG13.
- Matauranga maori and integrated assessment presentation - CSG14 (Doc #3466137)– approaches to integration of matauranga Maori – Presentation by Antoine Coffin (TLG).
- Health risks associated with faecally-contaminated freshwater (Doc#3465551) - Background, history, issues - Presentation by Graham McBride (NIWA) to CSG14.
- Sources of faecal pollution in selected Waikato Rivers (Doc#3469083) - Presentation by Mike Scarsbrook (TLG) at CSG14.
- Scenario modelling: the first set (Doc#3498179) – results of the first round of scenario modelling – Presentation by Graeme Doole and Bryce Cooper (TLG) at CSG15.
- Responses to questions raised by the Collaborative Stakeholder Group members following the economic modelling presentation on 26 August 2015. (Doc#3498648) - TLG.
- Round two scenario modelling (DM#3574464) – results of the second round of scenario modelling – Presentation by Graeme Doole (TLG) at CSG17.
- Comparison of Modelled Point Source Discharges and Consents on the Waikato and Waipa Rivers (Doc#3696906) - Report prepared by Tonkin & Taylor Ltd.
- The Benefits of a New Zealand Natural Capital Assessment (Doc#3021411) - information about a natural capital approach – Beat Huser (WRC).
- Policy Instruments for Ecosystem Services [electronic resource] / authors: Suzie Greenhalgh and Mindy Selman, contributing authors: Adam Daigneault, Cen Kaighin and Robyn Sinclair. – Lincoln, N.Z.: Manaaki Whenua Press, c2014.
- Economic Instruments for Managing Water Quality (Doc#3688999) - presentation giving overview of types of instruments available and their use - Presentation by Suzie Greenhalgh (Landcare Research) at CSG22.
- Draft barriers to the Development of Maori Freehold Land (Doc#3751561) - a report identifying key barriers to development of land – Antoine Coffin (TLG).
- Shallow lakes management plan (Doc#2256414 or Technical Report 2014/58 Vol 1, Vol 2).
- Waikato-Waipa River Restoration Strategy (Doc#3386108) - an update on the strategy - Presentation by Tracey May (WRC) Mike Scarsbrook (DairyNZ) and Bob Penner (WRA).

The information contained in the presentations and reports was based on existing information or was drawn from the studies in progress. These reports for information are generally not those that contained recommendations from the TLG. Reports and presentations providing recommendations are included with the discussion that follows below of key findings of the studies and their application to the project.

C.2.2 Key findings from work carried out to inform the model

The TLG focused on ensuring that the HRWO model was fit for purpose and that CSG members were provided with the information needed to assist their deliberations. All outputs from the work briefs described above were peer reviewed, either within the TLG or externally, to ensure that the information provided was technically robust, used appropriately for this project and its limitations were described.

C.2.2.1 Groundwater studies

Groundwater results

Of particular importance to developing a plan change that addresses the four contaminants was the need to develop a better understanding of the links between land use practices and observed responses in nitrogen levels in the receiving surface waters. Nitrogen (unlike the other three contaminants) is primarily transported to surface waters via a sub-surface pathway - leaching from the soil to groundwater followed by transport and re-emergence into streams. This transport pathway takes time (sometimes

decades - the lag effect) and can involve nitrogen removal by a microbial process known as denitrification (the N attenuation effect). The information gathered helps us understand the extent to which the water quality observed in rivers and streams is in equilibrium with current land use (the lag), and where there are major lags, the nitrogen load to come as a consequence of today's land use (taking into account the N attenuation effect). This same lag information also informs our understanding of the response times in surface water nitrogen concentration in response to mitigation practices that might be put in place as a result of Plan Change 1.

A report was written describing models of geology and water budgets that were developed and used, with groundwater chemistry data, to characterise the groundwater systems. The hydrogeological characteristics of each of the 74 Plan Change 1 catchments, including geology, water budgets and groundwater chemistry, are described by White *et al.* (2015).

Summary and findings - Waipa

The results of the field investigations provided greater spatial resolution to the general understanding of groundwater resources in the catchments. This information has been incorporated in the hydrogeological models, summarised by Petch (2015), and is consistent with previous work undertaken in the catchments.

Water chemistry

About 50 per cent of bores showed levels of nitrate-N that are elevated compared with background levels (that is, >1 mg N/L), most probably relating to land use activities. These results are consistent with other New Zealand studies (Morgenstern and Daughney 2012).

The remaining 50 per cent of sampled bores showed no elevation from background levels, with some (30 per cent) being associated with strong reducing conditions (lack of oxygen), which would promote removal of leached nitrate through denitrification (that is, attenuation).

Water level

Water levels for bores located in shallow aquifers (0-27 m deep) have groundwater levels of 4-10 m below ground surface. Deeper bores (40-90 m below surface) have water levels that are 15-50 m below ground. The water level gradients observed in adjacent bores (shallow and deep) at lower ground surface elevations indicated groundwater recharge was occurring. At higher elevations, the greater depth to water combined with the greater elevation of groundwater surface indicated flow away from upland areas to lower lying terrain and the streams incised within valleys. In general, this confirms that hydrological boundaries largely follow the topographical boundaries between sub-catchments.

Hydraulic properties

The results show the expected trends observed in previous studies: with low permeabilities found in fine grained sediments and greater permeabilities in sands and gravels near river channels and in fractured, indurated sandstones and limestone material. There is little evidence of strong spatial trends in hydraulic properties because of the complex geology within the catchments.

Summary and findings – upper, middle and lower Waikato

As in the Waipa catchment, the results of these field investigations have been incorporated in the hydrogeological models, summarised by Petch (2015).

The results are consistent with previous work undertaken in the catchments but provide greater spatial resolution to the general understanding of groundwater resources in the catchments.

Groundwater chemistry

About 38 per cent of all wells sampled show some contamination of nitrate-N, probably related to land-use activities (that is, >1 mg/L). The groundwater sampling in the Reporoa area showed the nitrate-nitrogen concentration was highly variable ranging from non-detectable to above MAV⁹ with a mean of 2.5 mg/L and median of 0.75 mg/L. Aerobic conditions were indicated at

⁹ MAV – Maximum acceptable value. The New Zealand MAV for nitrate-nitrogen concentration in drinking water is 11.3 mg/l. This level is based on the World Health Organisation Guideline Value (GV), established to protect infants from a condition known as “blue baby syndrome”. Affected infants have an abnormally high amount of methaemoglobin in their blood, hence the condition - methaemoglobinaemia. Unlike haemoglobin, methaemoglobin cannot transport oxygen in blood. In the 1950s, infant methaemoglobinaemia was reported regularly in the United States but today it is rare despite increasing exposure to high-nitrate drinking water. Explanations for this anomaly are higher standards of well construction and greater awareness of the importance of avoiding microbial contamination common in shallow ground water. This also explains why the incidence of infant methaemoglobinaemia in most developed countries (including New Zealand) is now very low, whereas in developing countries it is relatively common.

about 36 per cent of the sites and anaerobic conditions (indicating reducing conditions and potential for denitrification) were observed at about 32 per cent of the sites. The potential for denitrification could not be determined confidently at the remainder of the sites.

Water levels

Static water levels were measured at about 50 bores. This information was forwarded to GNS Science for constructing the piezometric surfaces. Depth to groundwater varies depending on the location of the bore within the catchments. Groundwater level is deeper in upland areas and nearer (within a few metres) the surface in low lying areas.

Radon

The sampling for radon along the Pokaiwhenua and Little Waipa streams showed the discrete input of groundwater at specific locations (springs) indicating the importance of groundwater flow through fractures in these upper Waikato catchments. Groundwater flow through fractures can be inferred in much of the upper Waikato where fractured volcanic rocks are present. Fractures allow the more rapid transmission of groundwater and nutrients in aquifers and reduce the opportunities for denitrification if the potential exists.

Oxidising and reducing conditions

The percentages of predicted reducing and oxidising redox status for the shallow and medium depth groundwater are listed (Close 2015), together with some comments about the likely degree of nitrate attenuation for each sub-catchment. There were approximately equal amounts by area of predicted reducing and oxidising conditions for the shallow groundwater but about three times as much oxidising groundwater compared with reducing conditions for the medium depth groundwater.

Cores from bore holes drilled at 22 sites in Hamilton Basin and adjacent to the Waikato hydrolakes during the summer were tested for the occurrence of anaerobic conditions. The opportunity was taken to test water chemistry, the presence or absence of anaerobic conditions and the occurrence of nitrogen at these locations. Although the depth to anaerobic conditions below the water table was highly variable, spatially and vertically (ranging from a few metres up to 50 m), it occurred at almost half the sites within five metres of the surface indicating the presence of conditions suitable for denitrification.

Summary and findings – field studies completed in both the Waipa and Waikato Catchments

Field studies were conducted in the Waipa and Waikato river catchments, in summer 2014-15, including a flow confirmation survey, low flow gauging, well information surveys, water chemistry sampling, groundwater level surveying, investigation of redox conditions in groundwater, radon surveys and water age dating (Rawlinson *et al.* 2015, Hadfield 2015).

Water age

Tritium analysis combined with some assumptions on how water moves through the subsurface environment allows the mean age of a water sample to be determined. As a groundwater or surface water sample never has one discrete age, the age of the water is usually expressed as mean residence time (MRT) in years. Importantly, the MRT does not provide any information on the age distribution in the sample, which would be required to irrefutably link currently observed water quality to the combination of past actions that have caused it. Nevertheless, determining the MRT is an important step towards establishing cause-effect relationships.

Surface water

The mean age of surface water in the Waipa and middle and lower Waikato catchments (expressed as MRT) during summer base flows is usually less than 15 years and averages about 10 years. In contrast, the mean age of surface waters during summer baseflows in the upper Waikato sub-catchment streams are older with an average MRT of about 52 years (median 35 years; flow weighted mean of about 47 years). The mean water age of the Waikato River above Karapiro is younger (about 12 years at Karapiro) due to the dominant influence of the water discharged from Lake Taupo, which provides two thirds of the flow. These distinct differences in summer baseflow water age demonstrate that the full effect of changed land use practices will be seen much earlier in the Waipa, middle and lower Waikato sub-catchments than in the upper Waikato sub-catchments - this applies to the effects of recent land use changes and to the effects of any mitigations that will be implemented.

Groundwater

The mean age of groundwater is highly variable throughout the study area. Mean residence times are often much older than surface waters (MRT from latest survey is about 150 years, n=14). The MRT is older than suggested by previous investigations (MRT 67 years; n=113). Initial analysis of the data obtained recently suggests there is no clear relationship between depth of groundwater and its mean residence time as there are confounding factors, such as aquifer confinement, and whether the well is located in a recharge or discharge zone. Nevertheless, some shallow wells (2-10 m deep) in the middle and lower Waikato

catchments and the Waipa catchment, which intersect very shallow groundwater, show consistently younger groundwater (1-2 years MRT). These ages may indicate shallow, more rapid flow in the active surface zone in the aquifers. Similarly there is no simple relationship between groundwater age and nitrate-N concentration in wells. Typically there is a wedge-shaped distribution showing groundwater older than the development of farming is low in nitrate-N, whereas younger groundwater ranges in concentration depending on land use intensity and potential for nitrate-N attenuation.

Low flows and stream head elevations

The information from the low flow gauging programme and investigation of stream head elevations was provided to GNS Science for inclusion in the water budgets and piezometric surfaces.

Steady-state groundwater flow and transient storage model for the Upper Waikato, Middle and Lower Waikato catchments

The travel time through the vadose zone (region of aeration above the water table) can be an important component of the overall lag time between land use changes and associated surface water quality impacts. Modelling of vadose zone lag times comprised three main stages; the calculation of land surface recharge with a soil moisture balance model, the calculation of vadose zone travel time, and the calculation of the time taken for the water and nitrate to penetrate into the uppermost aquifer layer (Wilson & Shokri 2015). The results of the vadose zone and saturated zone models are collectively referred to as the total travel time. The average vadose zone travel time was estimated to be shortest in the Waitomo catchment (6 years) and longest in the Torepatutahi catchment (77 years). Saturated zone calculations indicate that the time taken to penetrate the upper part of the aquifer ranges from 2.4 to 5.8 years (average 4.3), which is 10-40 per cent (average 17 per cent) of the total travel time. Total travel times are less than ten years for most of the lower Waikato, Hamilton, and Waipa basins, particularly for elevations less than 100m. Short travel times also occur at higher elevations along the river and stream valley floors. This is particularly noticeable near Tokoroa and in the Reporoa Basin in spite of elevations of around 300m. Longer travel times of 10-30 years are predicted for elevations above 100m, but are also predicted at some lower elevations along the catchment boundaries between streams. The longest time lags are predicted beneath and in the vicinity of volcanoes and ranges, which is a function of a greater depth to the water table in these areas. However, there is greater uncertainty in predictions made in these areas, mainly due to the lack of information about the depth to the water table.

C.2.2.2 Historical changes in land use and nitrogen leaching losses

Historical land use data derived from several sources were collated in a geospatial framework and analysed to provide information regarding land use change over the period 1972-2012 and estimate the resultant changes in nitrogen leaching losses. The key points from this analysis are as follows (Hudson *et al.* 2015):

- Of the 1.1M hectares in the catchment, in 2012 the data showed 28 per cent was in dairy, 22 per cent in intensive sheep and beef, 11 per cent in less-intensive hill country sheep and beef, 15 per cent in forestry, 16 per cent in native forest and scrub, and the remainder in urban, horticulture, maize, etcetera.
- Land uses have 'waxed and waned' during the 40 year period, with the total area in pastoral land use being similar at the start and finish but with more intensive uses increasing in area, particularly since 1996.
- Nitrogen leaching losses summed over the entire Waikato River catchment have increased gradually since 1972, with nitrogen leaching losses 66 per cent larger in 2012 than they were in 1972.
- Nitrogen leaching losses from dairy land use have increased 240 per cent since 1972, driven by an increase in nitrogen loss per hectare (a factor of 2.1), as well as an increase in the total area used for dairy.
- The relative contribution of dairy to total catchment nitrogen leaching losses increased from 43 per cent in 1972 to 63 per cent of the total in 2012.
- Estimated nitrogen leaching losses from non-dairy pastoral land use increased by 4 per cent over the period 1972 to 2012.

Although these predicted nitrogen leaching losses do not take subsequent attenuation into account, the relative increases are likely to be largely independent of attenuation. The trends in nitrogen leaching loss predicted for individual sub-catchments are generally consistent with what is evident in the water quality record.

Several individual sub-catchments indicate more pronounced trends. For example, in the Little Waipa sub-catchment there has been significant land use conversion from forestry to dairy, and nitrogen leaching losses are estimated to have increased by 322 per cent, particularly in the period 2008 till 2012.

Although inaccuracies in assignments of land use and the areas associated with specific land uses at discrete time steps exist (because the method used for determining land use varied between different time periods), overall trends in land use and nitrogen leaching losses are considered robust and adequate for the purpose of Plan Change 1.

C.2.2.3 Estimating *E. coli* loads and determining sources

Escherichia coli (*E. coli*) is used as an indicator of freshwater faecal contamination as part of risk assessments of pathogen infection and is one of the attributes of the human health compulsory water quality objectives in the NOF under the NPS-FM. Sources of faecal contamination in rural waterbodies include dairy shed effluent discharges, grazing livestock, water fowl and other wild or feral animals. *E. coli* from stock enters the stream network via direct deposition of faecal matter into the stream or via surface wash-off, overland flow from excess irrigation water, and drainage via artificial drains (Collins *et al.* 2007, Muirhead 2015).

Models were developed for predicting stream concentrations (median and 95th percentile) and annual loads of *E. coli* in the Waikato/Waipā River catchment (Semadeni-Davies *et al.* 2015a). The models estimate mean annual *E. coli* loads from diffuse sources on the basis of the River Environment Classification unit land use (Snelder *et al.* 2010), rainfall and soil drainage. Point sources are also added to the in-stream load. The loads are then subject to attenuation in hydro-lakes. The catchment was divided into 74 sub-catchments for this modelling, the boundaries of which were (largely) delineated on the basis of water quality monitoring sites. This allows comparison of model outputs with the estimates of *E. coli* load made from the observational data. Despite differences between modelled loads and loads estimated from measurements at various sub-catchments, overall, there was a high correlation between modelled and estimated *E. coli* loads (89 per cent) providing confidence the model was suitable for use in Plan Change 1 scenario modelling.

As part of better understanding the sources of faecal contamination, five streams in the Waikato catchment were assessed using a faecal source tracking technique during both dry weather and following rainfall events (Moriarty 2015). Ruminant and avian pollution was detected in almost all samples with ruminant pollution generally more dominant following rainfall. No human pollution was detected at any of the study sites. While very limited in extent, this study shows the expected importance of livestock in contributing to faecal pollution in rural areas of the catchment.

C.2.2.4 Nutrient loads

Sources of nitrogen and phosphorus to the Waikato and Waipā rivers and their tributaries have been estimated by Vant (2014). Point sources were estimated to contribute about 7 per cent of the nitrogen and 18 per cent of the phosphorus, while diffuse agricultural sources contributed 61 per cent of the nitrogen and 45 per cent of the phosphorus, with natural sources contributing the remaining proportions.

Models were developed for predicting nitrogen and phosphorus loads across 74 sub-catchments within the Waikato/Waipā catchment (see model description in Semadeni-Davies *et al.* 2015b). These models included contributions from point sources, geothermal inputs, and inputs from diffuse sources. There are 19 moderate to large point sources in the catchment and the load estimates made by Vant (2014) were used as inputs to the model. For estimation of diffuse nitrogen inputs, account was taken of lag times and attenuation (N attenuation estimates ranged between 5 per cent to 50 per cent across the 74 sub-catchments). Once within the drainage network, the model routes the loads downstream using a set of matrices that describe the connectivity of the drainage network. The loads are subject to reservoir attenuation where there are large lakes or hydro-power dams.

There was a high correlation between modelled loads and loads estimated from the data (98 per cent for TN, 93 per cent for TP), although several sub-catchment differences were large in either direction. This provided confidence that the model was suitable for use in Plan Change 1 scenario modelling, providing its limitations are understood.

C.2.2.5 Sediment loads

Elevated sediment concentrations in rivers can adversely affect both suitability for swimming (due to reductions in water clarity) and ecosystem health, either through deposition and smothering of biota or through the clarity reductions altering the success of visual feeders such as fish and birds (Hughes 2015, Yalden & Elliot 2015).

Erosion is the ultimate source of sediment transported by rivers, with the main processes being sheetwash and rill erosion (commonly referred to as hillslope erosion), mass movement (for example, landslides and mud flows), and stream bank erosion. Although large amounts of sediment eroded by these processes may be delivered to streams, it does not always get transported to the outlet of a catchment.

For the Plan Change 1 development process, estimates of suspended sediment loads were made using the NZ Empirical Erosion Rates Model (NZEEM, Betts 2015), with inclusion of bank erosion, hillslope erosion, and sediment attenuation processes. The estimated loads and the relative importance of these processes varies greatly across the catchment, in response to slope, soil type, underlying lithology, land use, and rainfall. Sediment attenuation or trapping occurs within the hydro lakes, with trapping efficiency estimates ranging from 24 per cent in Lake Aratiatia to 88 per cent in Lake Ohakuri and averaging 71 per cent.

C.2.2.6 Nutrient and algae relationships in the river

Phytoplankton (floating/planktonic algae) are a natural part of lake and lake-fed river food webs, providing energy to the food chain and cycling nutrients. However, phytoplankton also contribute to degradation of water clarity, taste and smell and alter water colour, and blooms of certain algal species can cause skin irritation and may be toxic. Phytoplankton only become problematic in the main stem of the Waikato River where there is sufficient time for them to grow and multiply. The Waipa is too turbid and lacks the residence time for phytoplankton to develop. Phytoplankton is a diverse community of species belonging to broader groups (for example, greens, dinoflagellates, diatoms, cyanobacteria) that range widely in size, mobility and physiology (for example, the nitrogen and phosphorus concentrations at which growth becomes limited). Consequently, phytoplankton management is complicated because these species respond differently to environmental influences.

Phytoplankton biomass in the Waikato main stem may be expected to be influenced by a number of factors including:

- residence time that is influenced strongly by the presence of the hydro-dams and secondarily by river flow rate/discharge
- solar input (influenced by day length, sun angle, greatest in summer) and its effect on temperature (increases algal growth rates)
- light penetration into the water column, influenced by fine suspended sediment and dissolved colour
- hydro lake stratification (influenced by residence time, insolation and possibly hydropower drawdown position); this increases the light exposure of phytoplankton in the surface (epilimnetic) layer
- nutrients, particularly nitrogen and phosphorus, either of which can limit growth if in short supply. If P is in short supply, this will limit growth regardless of the amount of N available. If N is in short supply, but P supply is sufficient, phytoplankton growth may be limited or, if the conditions are right, N-fixing cyanobacteria may grow within the limits of available P (for example, *Anabaena planktonica* that bloomed in parts of Lake Taupo and along the river in early 2003)
- zooplankton grazing of algal cells
- inputs of phytoplankton to the river from the lowland riverine lakes, particularly when they are experiencing blooms.

Of these influences, nutrient management is within the scope of Plan Change 1.

The TLG (2015, Document# 3433551) summarised the evidence relating to nutrient limitation of phytoplankton biomass (as measured by chlorophyll *a* concentration) within the Waikato River main stem, including spatial and temporal patterns and trends in chlorophyll *a* and nutrients and the results of three sets of bioassays (which experimentally test the effects of added nutrients on algal growth). The work builds on an earlier review by a caucusing of experts (TLG 2015, Document# 3306846) who reviewed the patterns and trends in water quality in Vant (2013) and two bioassay reports (Gibbs *et al.* 2014a and 2014b). It also incorporates key findings of further bioassay work (Gibbs & Croker 2015) and detailed analysis of patterns and trends in water quality at the Waikato main stem sites from the report of Verburg (2016).

Based on the above evidence the TLG concluded that phosphorus is more important than nitrogen in controlling annual median phytoplankton biomass in the Waikato River, but that nitrogen is likely to limit biomass at times and at places during summer and autumn. While efforts to control phytoplankton biomass should focus on phosphorus, the evidence suggests that nitrogen should also be controlled.

For use in Plan Change 1 scenario modelling, the above information was used to develop an empirical model for predicting chlorophyll *a* from levels of P (dominantly), N and the N:P ratio (Yalden & Elliott 2015). Under current conditions, the model predicts an average contribution to median chlorophyll concentrations of 16 per cent for all sites for TN and 69 per cent for all sites for TP. This model was also extended to combine the effects of chlorophyll and sediment to predict water clarity.

C.2.2.7 Mitigations

A key component of Plan Change 1 scenario modelling is the simulation of the effects of mitigation actions on contaminant losses from land to receiving waters. Existing literature on mitigations, their efficacy and cost was summarised and/or obtained by consulting with experts. More detail can be found in the report by Doole (2015). For model integrity, mitigations were only included where sufficient information existed on performance under real-world situations. Thus, mitigations currently being developed through research were excluded.

In Plan Change 1 scenario modelling there are four ways in which the discharge of the four contaminants to water can be reduced:

1. Change to a less intensive land use. This involves either changing from dairying to drystock, changing from dairying or drystock to forestry, and horticulture to drystock.

2. Changing farming practice or technology. For example by reducing stocking rates, reducing fertiliser applications, preventing stock from entering rivers and streams and installing sediment traps.
3. Intercept and treat discharges at the 'edge of field' before they enter rivers and streams by installing detention bunds, sediment ponds and constructed artificial wetlands.
4. Reduce discharges from point sources.

The sets of mitigation options used in the HRWO model are described in Doole (2015) and their use in scenario modelling (Doole *et al.* 2015a, 2015b) and policy simulation (Doole *et al.* 2016) have been reported. When run in optimisation mode (Round One and Two modelling), the mix of options (and their spatial location) that will achieve a particular set of limits for nitrogen, phosphorus, sediment and *E. coli* at least-cost will depend on the strictness of the limit for each contaminant relative to the other contaminants, the relative effectiveness and cost of each option, and the mix of uses land may be put to.

C.2.2.8 Waikato and Waipa river attributes

Development of Attributes

The WOF developed by the expert panel provided a suite of relevant attributes, based upon the three core values of human health for recreation, ecosystem health, and mahinga kai for rivers and lakes.

The process of identifying the attributes and the subsequent refining of the WOF attribute list for rivers, resulted in attributes that were appropriate, measurable and for which the relationship between actions on the land and the attribute in water could be described. Attributes considered include those described in the National Objectives Framework (NOF) as well as others that might be developed if they were within scope and related to the four contaminants.

Information on the attributes, and recommendations for attributes in the rivers based on the WOF, were provided to the CSG (TLG 2015 Document# 3414280), resulting in further consideration regarding which attributes are in scope and where they apply. Some of the WOF attributes addressing mātauranga Maori were considered out of scope or were not related to contaminants and were not developed further.

The agreed attributes are based on the NOF for nitrate, ammonia and *E. coli*; on the NOF for phytoplankton (chlorophyll *a*), total nitrogen and total phosphorus for lakes except that they are also to be applied to the Waikato River mainstem (in recognition of the hydro-lakes); and on a proposed clarity attribute developed by the TLG to address sediment with input from the CSG to define appropriate bands.

The discussion on attributes included information regarding the difference between an attribute and an indicator. In particular, the discussion regarding Macroinvertebrate Community Index (MCI) as a possible attribute highlighted the need to be able to link the attribute to the four contaminants. Information was provided to the CSG on why MCI was not considered appropriate as an attribute at this time because of the lack of robust cause-effect relationships that preclude modelling of the wider implications of limits on contaminants to achieve different MCI levels, but that MCI (and other metrics based on river invertebrate community characteristics, such as EPT richness and density) is a valuable overall indicator of Ecosystem Health (TLG 2015 Document# 3435173; Clapcott & Goodwin 2014).

Dissolved oxygen is a NOF attribute but the TLG advised it was indirectly related to the four contaminants (TLG 2015 Document# 3471897), and it was considered out of scope for Plan Change 1.

Past monitoring for lakes has been limited and insufficient data are available to describe or assess all potential attributes for lakes. Issues for setting attributes in lakes were considered by the TLG (2015 Document# 3465537) and it was noted that some lakes are currently below the bottom line for NOF attributes. The TLG considered whether attributes for lakes and rivers should be the same (TLG 2015 Document# 3539452) and recommended phytoplankton biomass (Chlorophyll *a*), Total Nitrogen, Total Phosphorus, planktonic cyanobacteria and clarity.

C.2.2.9 Freshwater Management Units

Identification of Freshwater Management Units

The TLG provided the CSG with an assessment of options available for identifying FMUs for the Waikato and Waipa Rivers and lakes (TLG 2014 Document# 3121490 and Document# 3140266 for presentation). The report set out factors that might be used by the CSG to determine which FMU option best meets the needs of the project, and proposed four options that the CSG may wish to further consider.

Subsequently (TLG 2014 Document# 3194192), the TLG provided advice on the timing of identification of FMUs within the CSG's process, noting that from a TLG work stream perspective, if the CSG were to delay a decision on FMU boundaries it would not limit or delay the work of the TLG in filling gaps in information or providing the CSG with scenarios on the implications of various proposed attribute limits.

It was noted that the scenario analysis work commissioned by the TLG was being conducted at the reasonably fine spatial scale of existing surface water monitoring sites and the CSG would be provided with that non-aggregated analysis. Such information could inform the choosing of FMUs, as the implications of those choices would be more apparent. The TLG also noted that the Ministry for the Environment had recognised that the purpose of FMUs, reasons for their inclusion in the NPS-FM, and the implications for councils and stakeholders of establishing FMUs, had not yet been made clear.

The CSG raised questions relating to the boundary of the Upper Waikato River FMU and location of the Karapiro monitoring site. The TLG advised that there was no particular technical issue with the non-coincidence of FMU boundaries and monitoring sites (TLG 2015 Document# 3408420).

Further to the CSG's decision on river FMUs, they were provided with advice on possible lake FMUs in a report that included pros and cons of lake FMU options (TLG 2015 Document# 3433691). The CSG decided that the lakes present in the Waikato-Waipā catchment would be managed within four FMUs relating to lake type (Dune, Peat, Volcanic and Riverine), but sought further information on the implications of this decision. Further information was provided together with a recommendation that the CSG focus on either placing all lakes in one FMU for simplicity, or four FMUs by lake type to recognise that lake types may vary in values, issues and management responses (TLG 2015 Document# 3465537).

Questions were raised in relation to current water quality state, representativeness of the current council monitoring network for each FMU, management options, current restoration activities, whether the same attributes and bands for the Waikato main stem be used for lakes and should this vary by lake type, and what end state could be achievable in the different lake types. These were addressed in a subsequent report provided to the CSG for their information (TLG 2015 Document# 3580294).

C.2.2.10 Limits and targets

Information was provided to the CSG on the current state of each attribute at each monitoring site in the catchment. Attribute current states based on Waikato Regional Council's monitoring data were expressed as the 2010-2014 monitoring data annual median or 95th percentile values (TLG 2015 Document# 8389150), and as bands using the NPS-FM NOF guidelines or the proposed bands for clarity (TLG 2015 Document# 3597165).

The CSG requested a range of scenarios be modelled (see section C.2.2.11 'Scenario modelling outputs'). These included scenarios defined by the bands to be achieved, and for the most aspirational scenario (known as Scenario 1), scenarios that described a staged or step-wise progression towards meeting Scenario 1.

The attributes to be achieved in Scenario 1 were expressed as bands using the NOF guidelines and clarity attribute bands (TLG 2015 Document# 3597165). These were subsequently set as the long term (80 year) targets.

The TLG provided advice on setting of interim targets for the rivers (TLG 2016 Document# 3752140). It was considered that targets could be both numerical and narrative. The TLG noted that short term or interim targets based on five-yearly monitoring data could be set to indicate that water quality would be expected to improve if mitigation actions were implemented, but that the targets may not be observable in the short term. This is due to a number of factors, including that:

- the changes expected over 10 years would be small and not likely to be statistically significant when a five-year median or 95th percentile was compared to the state of any preceding five year period;
- the natural temporal variability in water quality that arises from both minor or major climatic events and that will vary from year to year;
- the biological variability inherent in the river ecosystem including seasonal variation;
- lags in the response of biophysical systems to mitigations, particularly for nitrogen.

Because of these factors, the TLG considered that monitoring of the implementation of mitigation actions would be required to confirm that gains would be achieved even if the effects on water quality were not immediately evident in water monitoring results in the short term.

In respect of setting limits and targets for lakes, TLG noted (TLG 2015 Document# 3539452) that restoring a degraded lake to a more natural state is complex and difficult. Lakes are natural sinks for nutrients and sediments and current state often reflects historical legacies as well as current catchment land use - internal recycling of nutrients from past inputs can be a significant driver of current state. However, it is reasonable to expect that reductions in catchment loadings of nutrients and sediment will, over time, change lake trophic status and improve ecosystem health and recreation values.

Comparing the NOF National Bottom Lines for Total Phosphorus (50 ppb), Total Nitrogen (800 ppb) and phytoplankton chlorophyll *a* (12 ppb) with current state of the lakes indicated the size of the task for many peat lakes and all of the riverine lakes to achieve these bottom lines.

To set limits and targets for lakes, the TLG recommended the CSG consider no decline in the water quality of any lake, that all lakes are at least above the National Bottom Line for chlorophyll *a*, TN, TP, and cyanobacteria, and that all lakes are above the minimum acceptable state for swimming (*E. coli* in NOF band B, clarity above 1 m) (TLG 2015 Document# 3580294 and presentation #3590917).

A review of the river and lakes monitoring network was carried out to inform implementation of policy and future assessment of water quality (TLG 2016 Document# 8751223).

C.2.2.11 Scenario modelling outputs

Overview of scenario modelling

At the early stages of a policy development process, scenarios are a way of simplifying all the possible combinations that make up different futures (WRC 2015, Document# 3270026). In order to make sense of what is required and to acknowledge the range of aspirations, it's important to be able to describe the range of alternative futures in plain language. This is an essential step in guiding the biophysical and economic modelling for each scenario that results in possible numerical limits and targets in water bodies, as well as the associated overall cost (WRC 2015, Document# 3270026).

Through the development of Plan Change 1, a number of possible future scenarios were investigated (WRC 2015, Document# 3405808). These were:

1. Water quality for swimming, taking food and healthy biodiversity well restored and protected.
2. Substantial improvement in water quality for swimming, taking food and healthy biodiversity.
3. Some improvement in water quality for swimming, taking food and healthy biodiversity.
4. No further degradation in spite of lags.
5. Projection given current state and trends, if no plan change put in place (later referred to as the business-as-usual scenario).

Three rounds of modelling were completed. These were:

C.2.2.11.1 'Round One'

C.2.2.11.2 'Round Two'

C.2.2.11.4 'Round Three'

In addition to the scenarios modelled above, two further scenarios were modelled:

Water quality in 1863

The 1863 scenario was considered as an alternative interpretation of the desired water quality to meet the Vision and Strategy. This represented the water quality aspiration of Waikato-Tainui, based on the maimai aroha of Kingi Taawhiao composed in 1863.

The modelling of the 1863 scenario was combined with historical records and other data sources, including contemporary water quality measurements from indigenous forests, to form a backward-estimation of the water quality at that time. This analysis showed that the water quality in 1863 was significantly better than that observed currently, although not all sites would have had water quality equivalent to the A band state for attributes as agreed by the CSG due to natural factors (for example, water clarity in the Waipa, phosphorus at several sites in the Waikato main stem). Comparison between 1863 and Scenario 1, showed that achievement of Scenario 1 would lead to a water quality approaching, but a little below, that in 1863 and could be seen as an interpretation of the modern day equivalent of the 1863 state of the Waikato and Waipa Rivers (Doole *et al.* 2016a).

Business as Usual

The HRWO model was used to predict water quality in the future if current trends continued and the Plan was not changed (business as usual). This scenario is characterised by a moderate level of continued intensification and a concerted effort to address highly-localised sediment and microbial loadings in a number of priority sub-catchments. In contrast to Plan Change 1, there is no integrated approach taken to reducing the losses of a broad range of contaminants to water. Additionally, intensification

occurs in terms of both intensity within existing land uses and through land-use change (Doole & Pannell, 2008). Under the business as usual case, water-quality outcomes are predicted to degrade significantly, relative to the current state and the policy mix in Plan Change 1 (Doole 2016b).

Scenario Modelling

The modelling work brought together contributions and knowledge of scientists and sector experts.

The models have uncertainty associated with them and that needs to be recognised when interpreting the outputs (that is, do not extend beyond their 'fit purpose'). Models are imperfect representations of reality. In the scenario modelling there are various assumptions made, there is variability around the relationships used, and there is 'lumping' of processes that operate at shorter time-scales and finer spatial scales. This results in uncertainty associated with the model outputs but that does not invalidate their use.

Economic model outputs provide important comparative signals on the nature of the changes required to meet water quality attribute limits, the locations of change, the relative magnitudes of change between scenarios, and the potential economic implications of those changes. The modelling represents where change has to occur, but not where costs fall.

The modelling analysis was carried out at the scale of 74 sub-catchments across the Waikato and Waipa catchment, with most of those sub-catchments having a monitoring site at their downstream point thereby allowing the water quality predicted in the scenarios to be compared with current state. In addition to predicting contaminant losses from the distribution of land use and land management within the sub-catchments, 24 point sources from both industrial and municipal sources are included.

The location of each of the numbered sub-catchments and the location of the Freshwater Management Units are shown maps in section C.2.2.11.6 'Sub-catchments and Freshwater Management Units'.

C.2.2.11.1 Round One

This section is a summary of the round one modelling, the detail of which is in the report of Doole *et al.* (2015a).

The CSG formulated four initial scenarios ('possible futures') to assist them in exploring improvements in water quality and the economic and social impacts of those improvements. The HRWO model was then used to provide indicative estimates of the cost of achieving the outcomes with respect to the water quality envisaged in the scenarios (social impacts are discussed in the integrated assessment section). The resulting estimates were used by the CSG in their deliberations and led to subsequent requests for the modelling of other scenarios (see C.2.2.11.2 'Round Two').

Description of scenarios

Scenario 1 envisioned substantial improvements in water quality such that, from the standpoint of the four contaminants, rivers and tributary streams in the catchment would be safe for swimming, taking food and maintaining a healthy biodiversity. This scenario was the most aspirational from a water quality viewpoint and viewed by the CSG as the scenario closest to that of the 'protect and restore' requirements of Te Ture Whaimana/Vision and Strategy.

Scenario 2 envisioned improving water quality in rivers and streams to a minimum acceptable state (above the national bottom line or minimum acceptable state if a NOF attribute) and preventing any degradation of water quality in all rivers and streams where their quality presently exceeds the minimum acceptable state.

Scenario 3 envisioned improving water quality in some, but not all, rivers and streams to the minimum acceptable state and preventing any degradation of water quality in all rivers and streams where their quality exceeds the minimum acceptable state.

Scenario 4 envisioned preventing any further degradation of water quality in the rivers and streams in the catchment. This scenario was not a 'do nothing' scenario but rather a 'hold the line' scenario, which requires mitigations be put in place to deal with the excess nitrogen currently in transit through the groundwater system (the 'load to come') before it is expressed as increases within the receiving waters.

Within the HRWO model runs for scenarios 1–4, the extent of land-use change possible was constrained to lie within the range observed over the last forty years, that is, no more additional land use change than the quantum that had occurred over the last 40 years. However, extra model runs were performed in which the extent of land-use change was unconstrained to test its effects on water quality improvement and cost.

Key findings

1. Overall, the water quality improvement scenarios require significant mitigation effort, with flow-on reductions in catchment profit, agricultural production and costs to the regional and national economy.
2. As the water quality requirements become more stringent, the economic impacts increase. Model output identifies that scenarios 1, 2, 3 and 4 reduce catchment-level annual profit accruing across all sectors each year by around 51 per cent, 35 per cent, 25 per cent, and 2 per cent respectively. Scenarios 1, 2, 3, and 4 are estimated to cost the regional economy \$623 million, \$310 million, \$311 million and \$97 million each year, respectively, in the value of outputs (using Value Added as a proxy for regional GDP). When expanded to the national level, scenarios 1, 2, 3 and 4 cost the economy around \$1,174 million, \$487 million, \$496 million and \$229 million each year, respectively.
3. Regional employment in key industries is also affected, especially dairy-processing activity with a predicted net loss of 2,000 jobs in scenarios 2 and 3 and 5,000 jobs in scenario 1. There is an estimated national loss of jobs of around 11,372; 3,794; 3,965 and 2448 jobs associated with scenarios 1, 2, 3 and 4, respectively.
4. These scenarios require the utilisation of a wide range of mitigation activities yet, within each scenario, at least one of the water quality limits proposed by the CSG remains breached. As the scenarios become more stringent, the number of breaches increases, indicating that the mitigations available are currently insufficient. Limits for clarity and 95th percentile *E. coli* are particularly difficult to satisfy across all scenarios.
5. The most efficient outcome is achieved in the modelling if land-use change was unconstrained - the water quality breaches are less and the cost of achieving the required water quality limits is lower if large-scale conversion of dairy farms to dry stock or forestry, and dry stock to forestry, is permitted.

C.2.2.11.2 Round Two

This section is a summary of the round two modelling, the detail of which is in the report of Doole *et al.* (2015b).

Description of scenarios

After deliberating on the water quality improvements and cost estimates provided for the initial four scenarios in Round One, the CSG wished to explore a set of scenarios that represented progression, or steps along the way, towards reaching Scenario 1. Costs were estimated for achieving 10 per cent, 25 per cent, 50 per cent and 75 per cent of the outcome described in Scenario 1 (recognising that breaches increase through this continuum) under a variety of cases: (1) land-use constrained to lie within those patterns observed historically; (2) land-use fixed at its current pattern and intensity for 10 per cent and 25 per cent movements towards Scenario 1, and land-use change unconstrained for all other steps; and (3) land-use constrained to lie within those patterns observed historically, but with Total Nitrogen (TN) only required to stay at or beneath its current level.

Key Findings

1. The catchment level reduction in annual profit to achieve 10 per cent and 25 per cent movements towards Scenario 1 are \$26 million (3 per cent) and \$68 million (7 per cent), respectively, when land-use change is constrained to lie within those patterns observed historically.
2. Catchment-level costs increase sharply for simulated steps towards Scenario 1 that are above 25 per cent with constrained land use. Indeed, the cost of a 50 per cent step is more than three times that level observed for a 25 per cent step (that is, the annualised cost is \$229m, compared with \$68m).
3. Most costs experienced for the 10 per cent and 25 per cent steps fall on the dairy sector, with around two-thirds of the direct costs imposed at the 25 per cent step falling directly on the dairy industry.
4. The 10, 25, and 50 per cent steps towards Scenario 1 lead to a reduction in value added of \$101m, \$164m, and \$221m in the greater Waikato region, respectively, and lead to the loss of around 1,198; 1,954; and 2,389 jobs, respectively as well.
5. Nationally, the 10, 25, and 50 per cent steps towards Scenario 1 are predicted to yield a reduction in value added of \$212m, \$339m, and \$438m, respectively, and lead to the loss of around 2,276; 3,742; and 4,684 jobs, respectively.
6. The main industries that are detrimentally affected by having to change farm management for water-quality improvement are the dairy; sheep, beef, and grain; and horticultural industries.
7. These negative impacts experienced within agricultural sectors flow onto the processing, utility, retail, and transport sectors. For example, the dairy-processing industry in the Waikato region loses between \$31–\$46m across steps of 10–50 per cent, while around 200 jobs are lost in the construction and retail sectors as a result of the changes observed at the 50 per cent step.
8. The 10 per cent and 25 per cent steps improve an index of median water-quality improvement by 14 per cent and 23 per cent, respectively, relative to the current state. The 50, 75, and 100 per cent steps improve this index by 33, 42, and 43 per cent, respectively, but impose significant catchment-level costs in doing so and have a significant number of breaches.

9. The mitigation packages that constitute the 10 per cent and 25 per cent steps contain a broad range of strategies. There is consistent upgrading to land based disposal of 2-pond effluent systems and additional use of stream fencing, riparian buffers, afforestation, erosion-control practices, improved phosphorus management, and edge of field strategies.
10. There is a step-change in the necessary level of adoption for mitigation practices, as the steps move above 25 per cent in progress towards Scenario 1. In particular, this is observable in the targeted use of farm plans and broad-scale adoption of edge of field strategies.
11. Unconstrained land-use change allows significant improvements in water quality and a reduction in abatement cost, but requires substantial change in land use (around 50 per cent of the catchment) in order to achieve these reductions.
12. Not defining limits for TN across the catchment (apart from maintenance of current state) has little effect on mitigation cost. A major reduction in TN occurs anyway to cost-effectively meet the simulated set of limits for the other contaminants, regardless of whether N itself is subject to limits or not. This arises from the fact that the most cost-effective strategies for phosphorus abatement (for example, de-intensification, point-source improvement, and edge of field strategies) have dual benefit for reducing both nitrogen and phosphorus losses.
13. Overall, this analysis emphasises that with the current set of mitigation tools there is a need for significant changes in land management, and eventually land use, required to achieve the water-quality objectives set out in the updated set of scenarios developed by the CSG. These changes impose economic costs that vary spatially across the Freshwater Management Units and the greater Waikato region itself.

C.2.2.11.3 Integrated assessment of Round One and Two scenario modelling

The Integrated Assessment of the modelled scenarios evaluated the effects (positive and negative) of the scenario outputs on environmental, economic, social and cultural values.

The Integrated Assessment was based on a set of indicators that were provided to the Integrated Assessment Panel, covering both Mātauranga Māori and other values:

Mātauranga Māori indicators

1. Waitemata (water clarity)
2. Te Rere (flow)
3. Paemakariri (temperature)
4. Pareparenga o te wai (Riparian margin – access and acceptability)
5. He kai pai (edible food)
6. Te nui o nga kai i te wai (abundance of fish species – koura)
7. Nga tarukino me nga ika rawaho i te wai (presence of pest weeds and fish)
8. Mātauranga ki nga wai kaukau (knowledge of swimming places)
9. Au Putea (economic benefit of water).

Social/community indicators

1. Employment with an emphasis on type, variety and diversity of jobs (including the opportunities from tourism)
2. Infrastructure (which only covers energy, water and waste; taking consideration of investment decisions that will be made by industry; risk, confidence)
3. Recreational use of the river (including access and safety)
4. Vibrant Resilient Communities (Round Two only).

Environmental indicators

1. Ecological effects in the waterways (including effects on macro-invertebrates, fish, habitat quality)
2. Riparian environment (habitat, biodiversity)
3. Wetlands.

Economic indicators

1. Regional GDP and sector breakdown
2. Waikato contribution to exports
3. Total value of employment.

The Vibrant Resilient Communities indicator added for Round Two required a more detailed look at local effects on communities at the FMU level.

A panel including scientists, social scientists and policy advisors, prepared a baseline of information for each of the indicators. The baseline contains quantitative and qualitative data and trends that describe the indicators. A narrative was recorded, which described the effects of the model generated activities on the baseline for each indicator.

To assist this process, Cochrane and Roskrug (2015) provided information on identifying baseline indicators, and a review of four other regional plan changes was carried out (GMD 2015). The report highlighted risks of narrowing development of indicators to environmental matters, a disconnect between indicators used to measure current and future state of identified values and desired outcomes, and any identified social trends and impacts. The report also highlighted that where iwi values are identified and where commonality exists with generic values, there tends to be a trend that a 'hybrid' indicator is used that does not reflect or provide visibility for the original iwi value. The review noted that differences existed between the Plan Change 1 process and the other assessments due to the influence of increased irrigation and intensification in the other regions.

Scenarios for Integrated Assessment

The Integrated Assessment was completed for four Scenarios, with Scenario 1 having steps of 10, 25, 50 and 100 per cent assessed. The assessments are described by Wedderburn and Coffin (2016a, 2016b, 2016c). Outcomes for assessment of Scenario 1 are summarised below.

Scenario 1

The Integrated Assessment of 100 per cent of Scenario 1 indicated that:

- clarity will improve;
- flow expected to remain static and not be affected by the reductions of the contaminants themselves;
- shading of water bodies, particularly tributary streams will see a small decrease in temperature;
- there is likely to be an improvement or decrease in *E. coli* through de-intensification, afforestation, and mitigations;
- fish species have the potential to increase in number; minimal impacts on the presence of pest weeds and fish;
- improved clarity (safety) and reduced *E. coli* (perceptions of safety) would improve the tendency to go to swimming places and therefore it is assumed that an increase in sharing of knowledge can occur;
- there is expected to be some increases in forestry but significant reductions in other primary sectors - horticulture and fruit growing, sheep and beef, and dairy;
- increased MCI and decreased 'cloginess' caused by macrophytes;
- the requirement for significant fencing to achieve the targets may need to include different management options that might mean, for example, omitting sheep from stock exclusion requirements;
- fencing of waterways with buffers may increase the public perception of accessible space adjacent to waterways;
- increased base flow in wetlands will have significant benefits through increased biodiversity, increased customary resources, increased sense of identity and increased food sources;
- communities that are already in decline will be more affected by a decrease in jobs;
- employment in non-forestry primary industries, particularly dairy farming, will decrease substantially;
- costs to the urban centres and the rural areas will be more equitable;
- overall, there may not be much change to access, but there are opportunities to increase the accessibility of the rivers' margins;
- Value Added for the Waikato region decreases by \$623m (3.5 per cent); and
- total employment for the Waikato region decreases by 5,272 (2.4 per cent).

10 per cent of Scenario 1; stage 1 or the first step

Ten per cent of Scenario 1 represents the first step of a staged approach to achieving the Vision and Strategy. See D.1 'Assessment of the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA' for more detail on the staged approach.

The Integrated Assessment for 10 per cent of Scenario 1 mirrored the trends identified in the 100 per cent of Scenario 1 assessment. However, some impacts and effects were significantly less at 10 per cent.

Looking at indicators:

- employment will remain much as it is with little overall change in diversity of employment in the Waikato and Waipa River catchment;
- the impact of this step on the reliability and affordability of water and river-related infrastructure would be minimal;
- no change in recreation use;
- stock exclusion will reduce grazing on macrophytes, and depending on the state of the riparian environment there may be an increase in shade, which will reduce macrophyte growth;
- very small increase in wetland area;
- effect on Value Add will be relatively small but still negative;
- total loss of \$110m of net international exports, relative to the baseline, in the Waikato region;
- water clarity begins to improve across all FMUs;
- increases food diversity and habitat variation for stream life; and
- no expected change in pest weed and pest fish populations.

C.2.2.11.4 Round Three

This section is a summary of the Round Three modelling (policy mix simulation), the detail of which is in the report of Doole *et al.* (2016b).

Subsequent to receiving the Round Two modelling results and the Integrated Assessment, the CSG:

- Discussed the findings and their implications, alongside other information and perspectives (including information on reductions required to achieve the 10 percent step (TLG 2016 Document# 8301277));
- Further engaged with sectors and the wider community to obtain feedback on policy options; and
- Deliberated on the policy options and arrived at a tentative policy mix that they wished to be tested from a range of perspectives, including an estimate of its cost and ability to achieve the water quality improvements sought.

The third round of scenario modelling therefore focused on estimating the costs of this policy mix contemplated by the CSG and whether it would achieve the 10 per cent step towards Scenario 1 water quality they were seeking for Plan Change 1. The HRWO model was therefore run in 'simulation mode' (that is, to simulate the costs and water quality benefits of a defined set of policies and associated rules) rather than in the 'optimization mode' used in Rounds One and Two (which were run to find the cost-optimal solution to achieve a pre-defined water quality outcome).

Model inputs

There were a number of components to the policy mix that required clarity and/or assumptions to be made and these were discussed and agreed with the CSG before simulation modelling began. In summary:

1. The policy mix included restrictions on changes to a more intensive land use but did not include any requirement for land use to change to a less intensive land use. For the purposes of modelling, it was assumed that no changes in land use occur.
2. Consistent with the policy mix intent, it was assumed that no farm can intensify from its current position.
3. An exception to the general approach in #1 and #2, was provision for the development of multiple Maori ownership land (MMOL) and land covered by the Central North Island (CNI) settlement. These changes consisted of the conversion of land from forestry to dairy or dry stock farming, or dry stock to dairy, depending on land use capability class. The extent of these conversions was estimated from information on conversions over the last 10 years for MMOL and provided by CSG members for CNI land (high, medium and low conversion rates were modelled).
4. Discharge of contaminants from point sources were assumed to remain at their 2010-2014 average levels (as used in prior modelling) over the 10 year period of Plan Change 1. This may be less than their current consented levels and, for the purposes of the modelling, was assumed to be an unbiased compromise between the potential for increases to occur up to the consented loads and the potential for decreases to occur by treatment plant improvements (sometimes as a result of re-consenting processes since 2014 or upcoming in the 10 year period).
5. Requiring the leaching of nitrogen (as kg/ha/year) from pastoral land above the 75th percentile of dairy N leaching (to be derived as set out in Plan Change 1) in each FMU to reduce to the 75th percentile for that FMU. Analysis of available data on the distribution of nitrogen leaching from dairy farms in the Waikato/Waipā indicated that, overall, total N leached from dairy farmland in the catchment would fall by approximately 5 per cent if such reductions occurred. In the modelling, these reductions were achieved by the implementation of one or more of the following mitigation actions: reducing the application of nitrogen fertiliser in autumn, increased use of feed pads, reduced use of high leaching crops in summer and winter, and reducing stocking rates by up to 20 per cent.

6. As per the policy mix, assuming all land in the Waikato/Waipā catchment with a slope less than 25 degrees and bordering a waterway was fenced within the 10 year period to exclude cattle, but not sheep.
7. Given the staged nature of the development of Farm Environment Plans across the sub-catchments over the 10 year period, a pragmatic assumption for the modelling was that the implementation of the required farm plan actions would also be staged with 100 per cent implementation of actions in Priority 1 sub-catchments, 50 per cent in Priority 2 sub-catchments, and 25 per cent in Priority 3 sub-catchments. The effect of variation in these implementation rates on water quality improvement was assessed as part of a sensitivity analysis.
8. Farm Environment Plans are a core part of the proposed policy mix, allowing a property-by-property risk assessment, and application of the most-appropriate set of mitigations that explicitly recognise and deal with the heterogeneity across the catchment, particularly in terms of Plan Change 1 water quality targets, land-use type, land-use mix, management options, production intensity, soil type, and slope. However, this approach is challenging to simulate and by necessity, assumptions need to be made in the simulation modelling. The mitigations selected are consistent in that they share a concerted focus on tuning the existing farming systems, based on their particular management system and biophysical resources, rather than typically involving large up-front capital costs.
 - In addition to actions on the above 75th percentile farms referred to in #5 above, mitigations for reducing nitrogen loss from other dairy farms included optimising the use of existing structures (for example, stand-off pads and feed pads), reducing the use of high-leaching crops (both summer and winter), decreasing N fertiliser use (especially in autumn), and applying some strategic reductions in stocking rate if feed resources declined as a result of lower input use.
 - Mitigations included that reduce nitrogen loss on dry stock farms were reducing stocking rate, stock age, cattle: sheep ratio, and crop area.
 - Mitigations included that reduce nitrogen loss on horticulture farms were improved timing of nitrogen-fertiliser application and reducing the total amount applied (by between 10–15 per cent).
 - Mitigations for phosphorus included optimizing the application of phosphatic fertilizer in response to measurements of plant-available phosphorus levels, the use of less-soluble forms of phosphatic fertilizer, and employing best management practice for applying phosphatic fertilizer. These mitigations are highly adoptable since they are relatively cost-effective and introduce little complexity to ongoing management of the farm system.
 - Implementation of several options for sediment management across pastoral farms were assumed. These consist of streambank fencing, edge of field technologies (detention bunds, sediment traps, small constructed wetlands), and soil-conservation plans. This is in addition to the effects of fencing of streams. Such mitigations also reduce loss of the other contaminants.
 - Large constructed wetlands were omitted because their cost and large scale mean that they are unlikely to be broadly used across the catchment within the 10 year span of the plan.
 - The discharge of *E. coli* (and to some extent the other contaminants) was reduced in the Farm Environment Plans by assuming all two-pond effluent systems were replaced and that low-rate land effluent application was fully adopted across the catchment on all suitable soil types.

Model outputs - Estimated costs

The estimated cost of implementing the policy mix (with varying levels of iwi land ⁽¹⁰⁾ development) are presented in table below titled annual profit under different levels of iwi land development. The “Sector profit” rows mainly represent change in farm profit as a result of farm management strategies that reduce losses of nitrogen and phosphorus. The “Costs” rows focus on the costs of converting land for the iwi land scenarios (transition costs) and additional mitigation strategies that are less embedded within the management of farm systems.

The “WRPC1 (none)” scenario represents the results of Plan Change 1 with no further development of iwi land. The profitability of the dairy and horticultural sectors declines by 2 per cent and 8 per cent, respectively. In contrast, dry stock profit improves, albeit very slightly. Additionally, there are substantial mitigation costs associated with other facets of the policy mix, especially soil-conservation activities and edge of field strategies.

The results associated with the development on iwi land (WRPC1 (low), WRPC1 (medium), and WRPC1 (high)) show, expectedly, total dairy and dry stock profit increase relative to the scenario with no development, while returns to plantation forestry decline. Nevertheless, this development does impose transition costs that seek to erode the economic benefits of land-use transition at the catchment level. Thus, overall, annual catchment profit are estimated to decline by \$38-41 million (approximately 4 per cent), irrespective of the degree to which iwi land is developed.

¹⁰ Multiple Maori ownership land and land covered by the Central North Island settlement.

The table below gives the elements of catchment-level, annual profit earned with the implementation of Plan Change 1 policy mix with no, low, medium, and high levels of development on iwi land. Transition denotes the costs arising from land-use conversion on iwi land.

| Variable | Units | Current | WRPC1 (none) | WRPC1 (low) | WRPC1 (med.) | WRPC1 (high) |
|-----------------------|-------|---------|-----------------|-------------|-----------------|-----------------|
| <i>Sector profit</i> | | | | | | |
| Dairy | \$m | 617.53 | 604.13 | 611.78 | 618.50 | 626.18 |
| Drystock | \$m | 210.15 | 210.99 | 213.89 | 216.09 | 217.74 |
| Horticulture | \$m | 28.21 | 25.91 | 25.91 | 25.91 | 25.91 |
| Forest | \$m | 58.86 | 58.86 | 57.71 | 56.56 | 55.43 |
| <i>Costs</i> | | | | | | |
| Transition | \$m | 0 | 0 | 9.53 | 18.54 | 28.40 |
| Stream fencing | \$m | 0 | 2.84 | 2.86 | 2.88 | 2.90 |
| Effluent upgrade | \$m | 0 | 3.46 | 3.47 | 3.47 | 3.47 |
| Erosion control | \$m | 0 | 8.32 | 8.36 | 8.37 | 8.43 |
| Edge of field | \$m | 0 | 8.35 | 8.28 | 8.31 | 8.36 |
| <i>Total profit</i> | \$m | 914.76 | 876.91 | 876.81 | 875.51 | 873.71 |
| <i>Loss in profit</i> | \$m | - | 37.85 | 37.95 | 39.25 | 41.05 |
| <i>Loss in profit</i> | % | - | 4 | 4 | 4 | 4 |

Annual profit under different levels of iwi land development ⁽¹¹⁾

The regional and national analysis of the policy mix with no, low, medium and high level of iwi land development, compared to the current state (McDonald and Doole 2016) indicated that:

1. The policy mix with no, low, medium and high iwi land development lead to a reduction in Value Added (proxy for GDP) of \$106m, \$86m, \$69m and \$50m in the greater Waikato region, respectively, and lead to the loss of around 938, 720, 531, and 314 jobs, respectively.
2. Nationally, the policy mix with no, low, medium, and high iwi land development lead to a reduction in Value Added of \$193m, \$154m, \$120m, and \$80m, respectively, and lead to the loss of around 1880, 1453, 1075, and 638 jobs, respectively.
3. The largest effects were seen in dairy farming and manufacturing with significant effects also for sheep, beef and grain farming and horticulture and flow through effects to other sectors in the economy such as retail, transport and professional services.

Model outputs - Estimated water quality improvements

The table below shows an overwhelming improvement in water quality brought about by the proposed policy mix, relative to the desired 10 per cent step towards the Scenario 1 goal. This is indicated by the high median percentage improvements (28 to 175 per cent) for each attribute under all scenarios relative to the 10 per cent. The median percentage improvement declines with iwi-land development for a number of attributes, though these changes are generally small.

The minimum value for TN improvement is *negative* across all land-development scenarios, as are the minimums for median and 95th percentile nitrate levels. These negative values highlight the legacy effects of the nitrogen 'load to come', which overwhelm any benefits of the policy mix and lead to predicted increases in nitrogen concentrations in some of the sub-catchments of the Upper FMU. This effect is further exacerbated for TN with iwi land development.

¹¹ Multiple Maori ownership land and land covered by the Central North Island settlement

The minimum value for percentage of TP improvement is *negative* (-11 per cent) under the medium and high iwi land development scenarios, indicating that the extra phosphorus losses from such development overwhelm the improvements associated with mitigations within the policy mix. In absolute terms this predicted TP change at the Waikato River at Ohaaki site is very small and can be regarded as inconsequential.

The table below gives the summary statistics for the percentage change in each water-quality attribute, relative to the relevant Scenario 1 goal, under Plan Change 1 policy mix with no, low, medium, and high development of iwi land.

| Attribute | WRPC1 | WRPC1 | WRPC1 | WRPC1 |
|--|---------------------|----------------------|----------------------|----------------------|
| | None | Low | Medium | High |
| | Median (Range) | Median (Range) | Median (Range) | Median (Range) |
| Median chlorophyll- <i>a</i> | 72 (37 to >100) | 71 (37 to >100) | 70 (37 to >100) | 69 (37 to >114) |
| Maximum chlorophyll- <i>a</i> | 94 (76 to >100) | 93 (75 to >100) | 93 (74 to >100) | 93 (73 to >100) |
| Total Nitrogen | 33 (-40 to 41) | 30 (-48 to 40) | 28 (-53 to 41) | 25 (-60 to 40) |
| Total Phosphorus | 31 (27 to 67) | 29 (22 to 64) | 28 (-11- to 60) | 28 (-11 to 57) |
| Median nitrate | 68 (-33 to >100) | 68 (-33 to >100) | 68 (-33 to >100) | 68 (-29 to 100) |
| 95th Percentile nitrate | 65 (162 to >100) | 63 (-162 to >100) | 63 (-162 to >100) | 63 (-145 to >100) |
| 95 th Percentile <i>E. coli</i> | 69 (35 to >100) | 69 (35 to >100) | 69 (35 to >100) | 69 (35 to >100) |
| Clarity | 175 (29 to >100) | 175 (29 to >100) | 175 (29 to >100) | 175 (29 to >100) |

Percentage change in water quality attributes, relative to Scenario 1 goal, under different levels of iwi land development ⁽¹²⁾

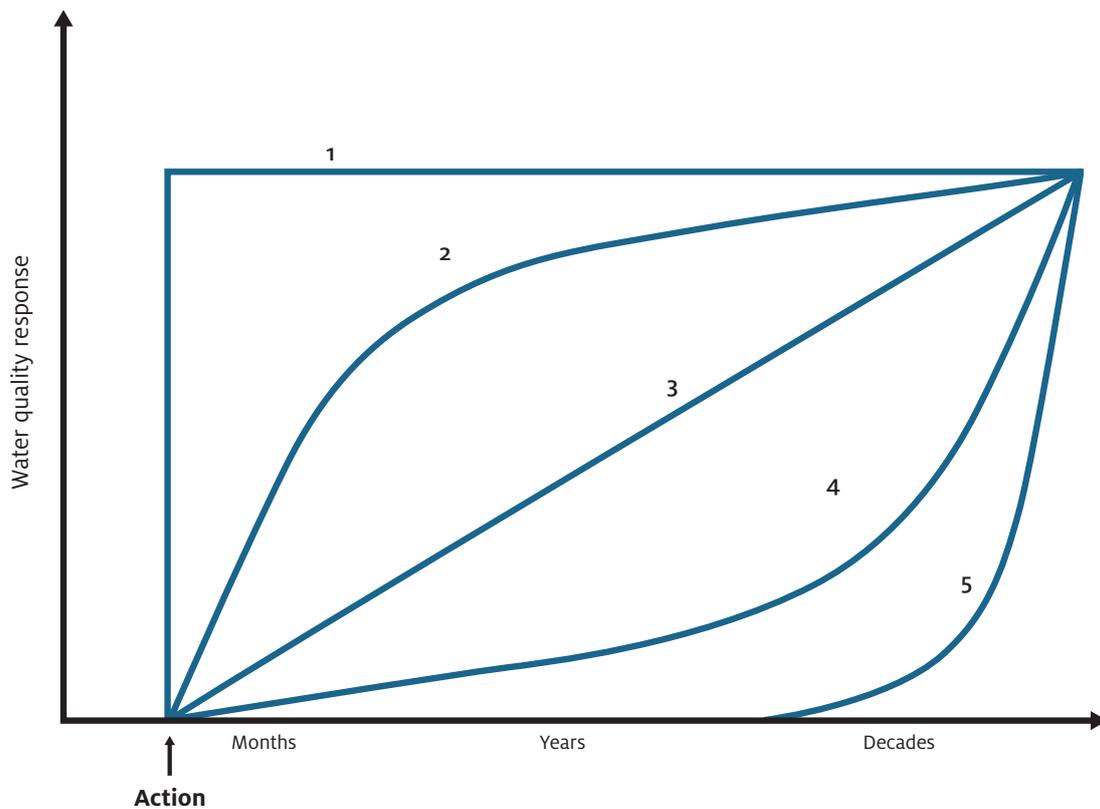
In addition to widespread achievement of the 10 per cent interim improvement target (apart from N at sites in the Upper FMU), the policy mix simulation also showed an increase in the number of sites that achieve the full Scenario 1 values (>100 per cent). This was particularly so for those attributes related to swimmability – 95th percentile *E. coli* and clarity. For 95th percentile *E. coli* 12 out of 61 sites currently meet Scenario 1 and this doubles to 25 sites with implementation of the policy mix, whilst for clarity,

3 out of 58 sites currently meet Scenario 1 and this increases 15-fold to 44 sites with implementation of the policy mix. The responsiveness of these contaminants to the policy mix reflects the efficacy of mitigations associated with stream fencing, soil conservation, and bunds and wetlands.

Sensitivity analysis shows that the achievement of the 10 per cent interim targets were robust and insensitive to varying the degree of farm environment plan implementation between 25 per cent to 100 per cent range. This reflects the degree to which the base-case policy mix simulation (25, 50 and 75 per cent implementation with each of the three tranches) over-achieved the 10 per cent interim targets.

Timing of the water quality responses

The above model findings are based on a future equilibrium state – that is, when the mitigation actions undertaken in the 10 years due to the policy mix have reached their full efficacy, and when the result of that has been fully expressed in receiving water quality. They do *not* describe what will be seen in the water in 10 years - water-quality response timeframes range from immediate to many decades depending on the mitigation, the contaminant, the location, and the receiving water body (depicted in the figure below).



Relationship between time of implementation for different mitigation actions and time that a water quality response is likely to be observed (Doole et al, 2016b) (note this is a representation of this relationship).

- Mitigation actions that reduce nitrogen will show a highly variable time for responses to appear in receiving water quality. For those sub-catchments where deep groundwater dominates the sources of flow, the long travel times will lead to slow response times (patterns #4 and #5 in figure above).
- Mitigation actions that reduce *E. coli* inputs to receiving waters are largely effective within a year, so implementation of the policy mix would be expected to lead to significant improvements in this attribute across the Waikato-Waipā catchment within the Plan Change 1 period (a combination of pattern #1 and #2 responses in figure above).
- Mitigation actions that reduce phosphorus inputs to receiving waters show a mix of timeframes for effectiveness (from months to up to 10 years), so implementation of the policy mix would be expected to lead to some improvements in this

attribute across the Waikato-Waipā catchment within the Plan Change 1 period (a combination of pattern #2, #3, and #4 responses shown in figure above).

- Mitigation actions that reduce sediment inputs to receiving waters largely show responses over a 2- to 10-year timeframe with increasing efficacy through that time. Implementation of the policy mix would, therefore, be expected to lead to some improvements in this attribute (clarity) across the Waikato-Waipā catchment within the Plan Change 1 period (largely consistent with patterns #3 and #4 responses shown in figure above). This outcome is significant given that the proposed policy mix is predicted to lead to a substantial improvement in clarity levels throughout the catchment.

The variables associated with implementing the Farm Environment Plans - that is, which actions will be implemented where and at what time, and with what response time in the receiving water - means that it is not possible to quantitatively determine the spatial pattern and time path of water-quality improvement arising from the policy mix, only the expected end-point. For the reasons given above, it is expected that *E. coli* will be most responsive and most likely to achieve its end-points earliest, followed by phosphorus and clarity, while nitrogen responses will likely be slowest and highly variable due to the overwhelming effects of the load-to-come in the Upper Waikato.

A comparison of attribute concentrations for Scenario 1, the policy mix interim targets, and those resulting from the policy mix scenarios modelled in Round Three was provided to CSG (TLG 2016 Document# 6551703).

C.2.2.11.4.1 Iwi land

The development potential of multiple Maori ownership land (MMOL) and land covered by the Central North Island (CNI) settlement was assessed by comparing current land use against land use capability. This spatial analysis was conducted by overlaying land use, land capability, soil drainage, and land ownership, and was undertaken by the council. The output of this overlay was then aggregated to give the total area for each sub-catchment of each combination of land use, land capability, soil drainage, and land ownership.

The existing land use information was that used in the rest of the modelling, which is aligned to Landcare Research's Land Cover Database 4 2012, and incorporates Assure Quality's AgriBase stocking information as an indicator of pastoral enterprise. This is the same dataset that has been used in other catchment prioritisation work (for example, Waikato Lite project). Potential land use was based on Landcare Research's Land Resource Inventory, with the land use capability simplified to the dominant categories (that is, 1-8). Land drainage was categorised based on the soil drainage field in the Fundamental Soils Layer published by Landcare Research. The MMOL and CNI properties were identified using different processes. MMOL parcels were initially selected based on the ownership indicator codes in the council rating database. These results were then manually checked against the online maps published by the Maori Land Court. CNI ownership was based on a parcel match using Schedule 1 of the Central North Island Forests Land Collective Settlement Act 2008. To verify the parcel match, a comparison was made with information from New Zealand Forest Managers Ltd, which was supplied to the council by Brough Resource Management Ltd. Discrepancies were found for four parcels, and these were manually verified against the ownership details in the council rating database.

This database (WRC 2016, Document# 8412836) informed the scenario modelling in Round Three.

The development of MMOL over 10 years from 2002 to 2012 was assessed to provide an indication of the extent of development that might occur (Hudson and Wadhwa 2016). This estimate informed the scenario modelling in Round Three.

C.2.2.11.5 Prioritisation of catchments for implementation of farm plans

Two approaches were considered by the TLG in response to a request from the CSG for a basis on which the 74 sub-catchments might be ranked and prioritised for implementation of Farm Environment Plans.

To assist with this, the model was used to provide estimates of the contaminant concentrations in the water and the loads to be removed from each sub-catchment at 10, 25, 50, 75 and 100 per cent of the way to Scenario 1. Data were provided on concentrations of contaminants at each step (TLG 2015 Document# 3646804) and on catchment loads, including loads to be removed per productive hectare (TLG 2015 Document# 3625036, #3591445, #3625060).

The first approach used for prioritising sub-catchments was based on the change of contaminant loads from each sub-catchment at 25 per cent of Scenario 1, as estimated by the scenario model. The model cost optimises to a single set of mitigations that simultaneously achieves at least the desired concentrations across the four contaminants. Because a mitigation can act on more than one contaminant, the minimum operator rule applies where mitigations that just achieve the desired concentration for the most 'difficult' contaminant will lead to coincident over-achievement for the other three. Therefore, while this approach is perfectly valid for modelling the effects of an optimised set of mitigations, such predicted load removals can be misleading if used in a policy context to determine priority sub-catchments for initial action.

Once it became apparent that the CSG potentially wanted to include, in their recommendation for Plan Change 1, a list of priority sub-catchments for initial action, the TLG sought an approach to prioritisation that was technically robust and consistent with the relevant CSG Policy Selection Criteria (for example, exhibit proportionality where those contributing to the problem contribute to the solution; prioritise efforts to achieve catchment solutions; implementable and technically feasible; and allows for flexibility). The approach chosen and agreed by the CSG is common in water quality management and has a simple logic that is easy for all to understand – prioritise action on those sub-catchments with the largest gap between the current water quality and the desired water quality, as defined by the CSG’s ‘Scenario 1’.

There are technical complexities associated with the routing of contaminants through the river network, where actions required to meet desired water quality in upstream sub-catchments obviously influence the residual action required in downstream sub-catchments to meet desired downstream water quality. Additionally, for nitrogen these calculations need to consider the nitrogen load to come. This approach uses the same water quality and river flow data and routing model as used in the optimisation modelling, but does not consider how (that is, by which mitigations) the gap in concentration will be addressed. This was consistent with the CSG’s desire to maintain flexibility in how the water quality improvements are achieved through tailored farm environment plans. The methodology used is described more fully by Semadeni-Davies (2016).

Based on the ranking of sub-catchments resulting from this approach, the TLG proposed three alternatives for grouping sub-catchments into three tranches – top priority, second priority and third priority (TLG 2016, Document# 3753077) plus charts (TLG 2016, Document# 3752949) (note in the Plan Change 1 these tranches are referred to as Priority 1, 2 and 3). The TLG considered alternative 2 best met all of the CSG’s guidance criteria that the top priority should include:

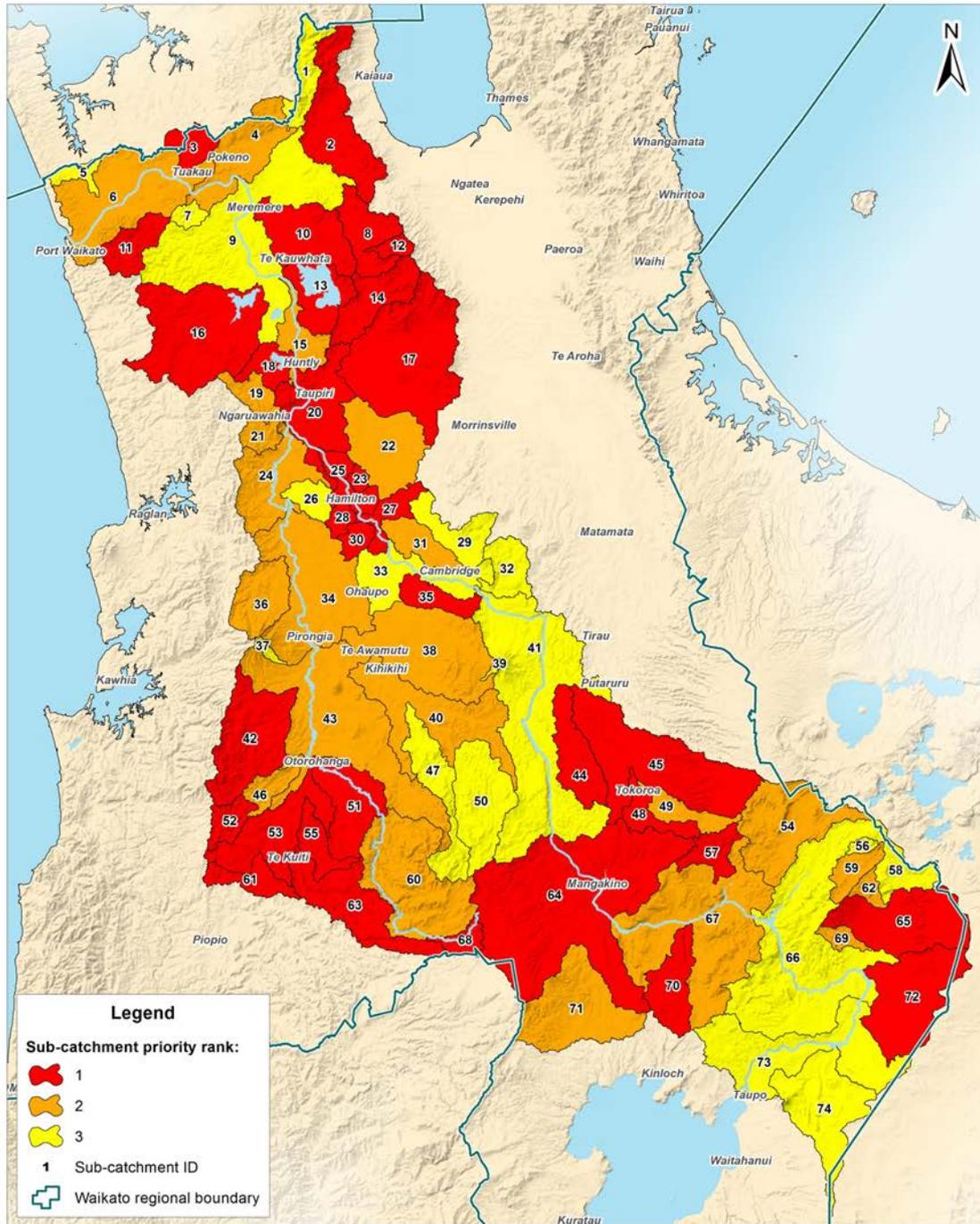
- sub-catchments where the combined rank across the four contaminants for water quality improvement was in the top 20 per cent
- sub-catchments draining to the Whangamarino-Lake Waikare system
- sub-catchments with at least one contaminant ranking in the top 10 per cent.

The TLG noted that the river sub-catchment prioritisation exercise did not adequately represent all lake types within all priority rankings. The TLG provided advice on options for staging the implementation of farm plans across lake catchments (TLG 2016 Document# 6175642), resulting in additional sub-catchments being ranked as high priority.

During the discussions on prioritisation of sub-catchments the CSG requested information on whether land use capability (LUC) was a useful tool. The TLG provided data on LUC class and farm type (TLG 2016, Document# 3711611 and Map Request No. 31411).

The TLG also provided a statement proposing a definition of land suitability based on fitness of the land for a defined use, which might be suitable for a land suitability approach in the future should the CSG wish to signal that (TLG 2016, Document# 6516385).

C.2.2.11.6 Sub-catchments and Freshwater Management Units



Legend

Sub-catchment priority rank:

- 1
- 2
- 3

1 Sub-catchment ID

Waikato regional boundary

Acknowledgements and Disclaimers

1. © Waikato Regional Council 2013-2018, Healthy Rivers: Plan for Change / Wai Ora: He Rautaki Whakapaipai Data.
2. Priority ranking by sub-catchment supplied by NIWA.
3. Digital political boundaries data sourced from Statistics New Zealand.
4. Hydrological data sourced from Land Information New Zealand. Crown Copyright Reserved.

Sub-catchments



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 File: 33102 Sub-Catchments by Priority Rank.mxd



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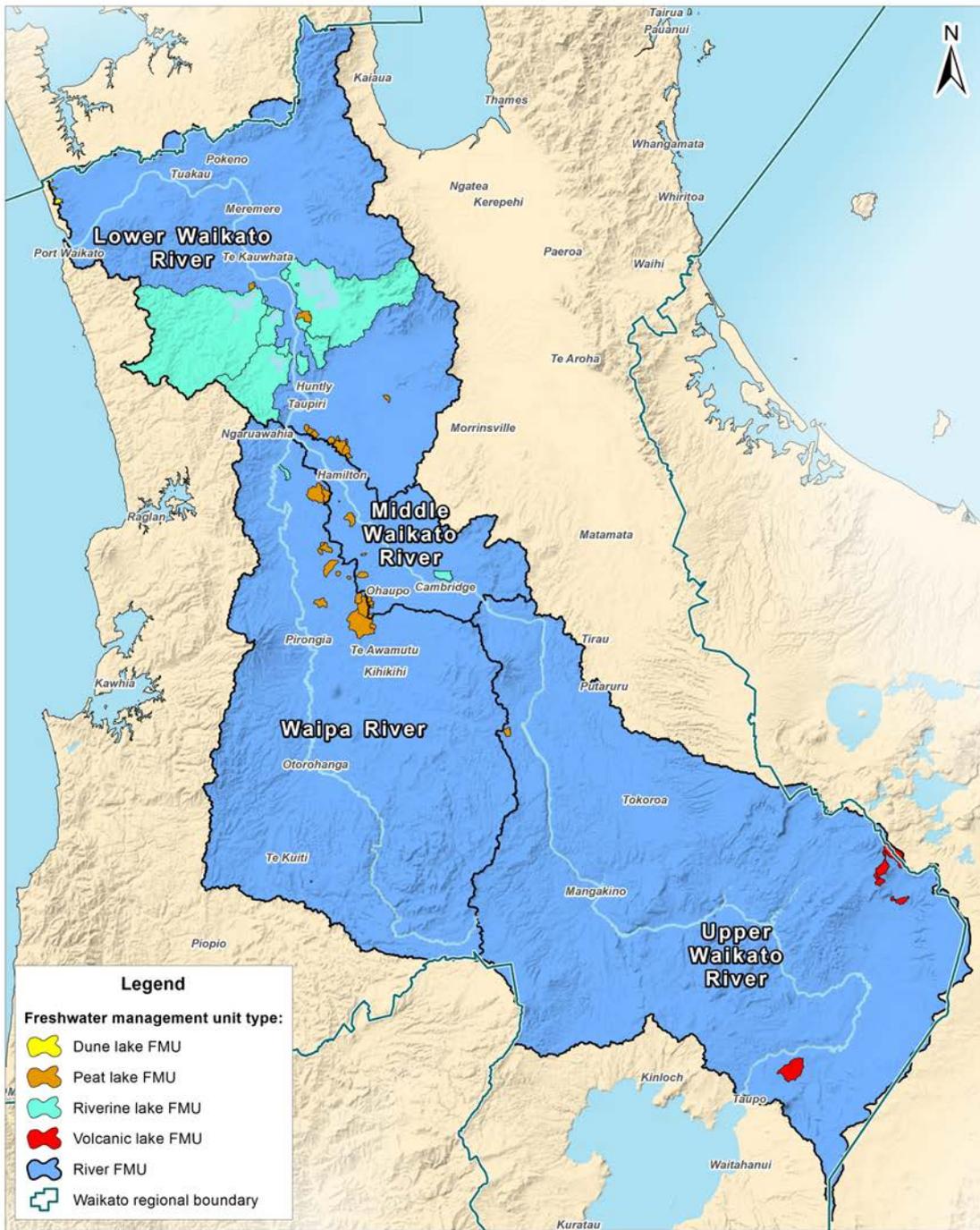
Map of the Waikato and Waipa River catchments, showing sub-catchments

| Sub-catchment identifier | Sub-catchment number | Priority |
|---|----------------------|----------|
| Mangatangi | 2 | 1 |
| Whakapipi | 3 | 1 |
| Whangamarino at Jefferies Rd Br | 8 | 1 |
| Whangamarino at Island Block Rd | 10 | 1 |
| Opuatia | 11 | 1 |
| Waerenga | 12 | 1 |
| Waikare | 13 | 1 |
| Matahuru | 14 | 1 |
| Whangape | 16 | 1 |
| Mangawara | 17 | 1 |
| Awaroa (Rotowaro) at Harris/Te Ohaki Br | 18 | 1 |
| Waikato at Huntly-Tainui Br | 20 | 1 |
| Kirikiriroa | 23 | 1 |
| Waikato at Horotiu Br | 25 | 1 |
| Waikato at Bridge St Br | 27 | 1 |
| Waitawhiriwhiri | 28 | 1 |
| Mangakotukutuku | 30 | 1 |
| Mangawhero | 35 | 1 |
| Moakurua | 42 | 1 |
| Little Waipa | 44 | 1 |
| Pokaiwhenua | 45 | 1 |
| Mangamingi | 48 | 1 |
| Waipa at Otorohanga | 51 | 1 |
| Waitomo at Tumutumu Rd | 52 | 1 |
| Mangapu | 53 | 1 |
| Mangarapa | 55 | 1 |
| Mangaharakeke | 57 | 1 |
| Mangarama | 61 | 1 |
| Mangaokewa | 63 | 1 |
| Waikato at Waipapa | 64 | 1 |
| Waiotapu at Homestead | 65 | 1 |

| | | |
|----------------------------------|----|---|
| Waipa at Mangaokewa Rd | 68 | 1 |
| Waipapa | 70 | 1 |
| Torepatutahi | 72 | 1 |
| Waikato at Tuakau Br | 4 | 2 |
| Waikato at Port Waikato | 6 | 2 |
| Waikato at Rangiriri | 15 | 2 |
| Awaroa (Rotowaro) at Sansons Br | 19 | 2 |
| Firewood | 21 | 2 |
| Komakorau | 22 | 2 |
| Waipa at Waingaro Rd Br | 24 | 2 |
| Mangaone | 31 | 2 |
| Waipa at SH23 Br Whatawhata | 34 | 2 |
| Kaniwhaniwha | 36 | 2 |
| Mangapiko | 38 | 2 |
| Puniu at Bartons Corner Rd Br | 40 | 2 |
| Waipa at Pirongia-Ngutunui Rd Br | 43 | 2 |
| Waitomo at SH31 Otorohanga | 46 | 2 |
| Whakauru | 49 | 2 |
| Tahunaatara | 54 | 2 |
| Otamakokore | 59 | 2 |
| Waipa at Otewa | 60 | 2 |
| Kawaunui | 62 | 2 |
| Waikato at Whakamaru | 67 | 2 |
| Mangakara | 69 | 2 |
| Mangakino | 71 | 2 |
| Mangatawhiri | 1 | 3 |
| Awaroa (Waiuku) | 5 | 3 |
| Ohaeroa | 7 | 3 |
| Waikato at Mercer Br | 9 | 3 |
| Ohote | 26 | 3 |
| Mangaonua | 29 | 3 |
| Karapiro | 32 | 3 |

| | | |
|----------------------|----|---|
| Waikato at Narrows | 33 | 3 |
| Mangauika | 37 | 3 |
| Mangaohoi | 39 | 3 |
| Waikato at Karapiro | 41 | 3 |
| Mangatutu | 47 | 3 |
| Puniu at Wharepapa | 50 | 3 |
| Whirinaki | 56 | 3 |
| Waiotapu at Campbell | 58 | 3 |
| Waikato at Ohakuri | 66 | 3 |
| Waikato at Ohaaki | 73 | 3 |
| Pueto | 74 | 3 |

List of sub-catchments showing Priority 1, Priority 2, and Priority 3 sub-catchments



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 2. Digital political boundaries data sourced from Statistics New Zealand.
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Freshwater management units

0 5 10 15 20 25 30 35 40 km

Scale at A3
= 1:630,000

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 Version: 1
 Job No.: 33102
 File: 33102 FMUs Lake and FMUs River.mxd

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Map of Waikato and Waipa River catchments, showing Freshwater Management Units

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Part D Objectives

D.1 Assessment of the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA

The following sections set out the approach taken in this evaluation report to meet the requirements of section 32 of the RMA. Section 32 evaluations are required for all proposed policy statements or plans prepared under the RMA (1st Schedule, Clause 5 (1)(a)). Decision makers are required to have particular regard to section 32 evaluations. The full text of section 32 is set out in A.4.1 'Appendix 1: RMA requirements for Section 32 Evaluation reports'.

In summary, an evaluation report must examine whether the proposed objectives of Plan Change 1 are the most appropriate way of achieving the purpose of the Act.

The following section reports on the extent to which the proposed objectives for Plan Change 1 are the most appropriate way to achieve the purpose of the RMA, guided by the Vision and Strategy (as the primary direction setting document), the NPS-FM and the RPS, all of which must be 'given effect to' by Plan Change 1.

The objectives have also been assessed against the CSG Policy Selection Criteria.

D.1.1 Objective 1 and Objective 3

D.1.1.1 Explanation of Objectives

How the Vision and Strategy was interpreted for setting long term outcomes in the Plan

The Vision and Strategy seeks the restoration and protection of the wellbeing of the Waikato and Waipa Rivers. The following principles (Collaborative Stakeholder Group 2016, Document# 3351821) were agreed as giving effect to that aim:

- Scenario 1, developed by CSG and modelled by the TLG, gives effect to the Vision and Strategy by representing water quality restoration everywhere, even where minimum swimming standards are already met. This scenario requires water quality in different areas of the rivers to improve to reach different numeric attribute states, determined by bands in the WOF (see C.2.2.8 'Waikato and Waipa river attributes'). This means all monitoring sites that are not already reaching the desired long term attribute targets in Table 11-1 need to improve.
- Overall, the rivers are degraded and should not be required to absorb further degradation as a result of human activities.
- Water quality is at different levels at different monitoring sites through the river catchments. Some parts of the rivers are currently very high quality. These monitoring sites must be protected and remain at a very high level of water quality, and therefore should not be allowed to decline.

The selection of objectives and water quality targets was driven by the need for a staged approach (see E.2 'Staging the transition to the 80 year goal') to achieving the water quality objectives of the Vision and Strategy. Objective 1 is the ultimate goal of restoration and protection. Scenario 1 modelling (see C.2.2.11.1 'Round One' Modelling) was the technical information that supported the decision on setting the targets in Objective 1. The modelling outputs and the Integrated Assessment (see C.2.2.11.3 'Integrated assessment of Round One and Two scenario modelling') informed the need for the staged approach and the requirement for short term targets as part of Objective 3.

Objective 1 contains the long term water quality targets, and is complemented by Objective 3, which guides shorter term water quality outcomes (see C.2.2.10 'Limits and targets'). The long term targets provide the final outcome for the staged approach. The scale of change required to achieve these targets required consideration of appropriate timeframes, and also how the changes would be staged over time.

Objective 3 provides an interim target, which addresses the urgency of halting and starting to reverse the decline, while establishing actions that can take in place in the 10 year regional plan timeframe. Due to the variable response of the contaminants to actions on the land, and spatial differences Objective 1 is required to guide actions that extend beyond the first 10 years. Objective 1 therefore applies to the Lakes FMUs that did not have their own targets developed as part of the modelling, and require a tailored approach that may take decades to see change in water quality.

These principles represent giving effect to the Vision and Strategy within the scope of Plan Change 1.

Objectives 1 and 3 also give effect to objectives of the RPS:

- 3.1 Integrated management
- 3.2 Resource use and development
- 3.3 Decision making
- 3.4 Health and wellbeing of the Waikato River
- 3.10 Sustainable and efficient use of resources
- 3.14 Mauri and values of freshwater bodies
- 3.16 Riparian areas and wetlands
- 3.19 Ecological integrity and indigenous biodiversity.

D.1.1.2 Assessment

Objectives 1 and 3 are an appropriate way of achieving the direction set out in the RMA Part 2, particularly sections 5, 6(a), and 7(f). The NPS-FM and the Vision and Strategy have provided the direction for how to give effect to Part 2 matters, and the Vision and Strategy has prevailed over the NPS-FM where there is inconsistency.

Section 30(1)(c) RMA includes as functions of regional councils the control of the use of land for soil conservation, water quality, maintenance and enhancement of ecosystems. The proposed Objectives 1 and 3 build on the operative provisions of the Waikato Regional Plan, by providing a more specific water quality target for the future management of the Waikato and Waipa Rivers.

Objectives 1 and 3 reflect that management of water quality is a complex issue and that people and communities will require time to adapt to new management approaches. The objectives provide for protection and restoration of water quality (RMA sections 6(a) and 7(f)), but in a timeframe that also allows people to provide for their social and economic wellbeing in line with the sustainable management purpose in section 5.

The NPS-FM and RPS require the identification of FMUs and appropriate limits and targets to be established. The RPS in Objective 3.14 (Mauri and values of fresh water bodies) identifies in particular that where fresh water bodies have been degraded, demonstrable progress is to be made by 2030. The proposed objectives give effect to the NPS-FM and RPS by setting targets and dates.

Through the development of Plan Change 1, it has been identified that there are limitations on the information available to set property specific limits for discharges. However, some actions are required to be undertaken now in order to take a staged approach to reducing contaminants in the Waikato and Waipa Rivers in the future.

The proposed objectives send a clear message that a staged approach will be taken to make measurable improvements in 80 years. There will need to be more information gathered and technology developed in order to be able to set limits and targets at a property level. Therefore the first stage is realistic for landowners to start understanding and making social and economic changes for the future. This staged approach is also more manageable for council, industry and landowners to resource.

FMUs are required by the NPS-FM and RPS, and will enable monitoring of progress towards meeting limits and targets set to achieve restoration of water quality (See C.2.2.9 'Freshwater Management Units' for more information). Community consultation about the values people hold for the waters of the Waikato and Waipa Rivers, combined with technical data on the water quality of different stretches of these rivers was used to define eight FMUs (Upper, Mid, and Lower Waikato River, Waipa River, Volcanic, Peat, Riverine, and Dune Lakes) with associated limits for contaminants (WRC 2015, Document# 3410308).

River iwi and sector groups were consulted throughout the development of Plan Change 1, to ensure a broad range of views were canvassed. The proposed objectives are consistent with this collaborative approach.

The attributes used in Plan Change 1 were selected from the attributes in the NPS-FM and supplemented by additional attributes that were identified by TLG. These attributes were deemed applicable for setting the targets to achieve the freshwater objectives (and therefore the Vision and Strategy), and are collectively referred to as the WOF. Refer to C.1.1 'Populating a Waikato Objectives Framework' for technical details on how the full set of attributes was developed.

The Vision and Strategy was interpreted to mean no decline in water quality at any monitoring site (that is, protect, in line with section 6(a) of the RMA), and improvement everywhere (that is, restore, in line with section 7(f)), measured using the WOF attributes. This description represents Scenario 1, which gives effect to the Vision and Strategy. See C.2.2.11 'Scenario modelling outputs' for more on scenarios and modelling.

The long term targets shown in D.4 'Appendices' indicate sites where water quality is not to decline, and sites where an improvement is required (the value to be achieved is indicated). Current state data are also provided as a reference point.

The long term targets identified in Scenario 1 are listed in Table 11-1 of Objective 1, by FMU. A long term approach was taken, recognising the social and economic implications of restoring water quality, as well as the lag effect between management actions being implemented and seeing results in water quality measurements. This long term approach also acknowledges that there are gaps in information and technological challenges in setting targets and limits.

Feedback was given during the intensive public engagement period (WRC 2015, Document# 3410308) regarding timeframes to achieve the values in 3.11.1 of Plan Change 1 (that is, the Vision and Strategy as it relates to Plan Change 1). This information, as well as feedback from River iwi (WRC 2015, Document# 3394090), informed the timeframe of 80 years, as well as identifying the need to start action immediately to halt any further degradation; that is, a staged approach.

River iwi also provided an outcome statement (River iwi 2015, Document# 3843800) affirming that the Waikato and Waipa Rivers must be restored so that they are safe to swim in and take food from over their entire length, and protected from further degradation; it is not enough to simply halt the decline of water quality - it must improve everywhere.

Implementing and measuring improvements in water quality will be needed over a number of stages within the 80 year period. The first stage is to undertake actions by 2026 required to achieve a 10% improvement in water quality. The focus on actions, rather than measuring changes in water quality, is due to the time required for changes on the land to be measurable in the water. This timeframe reflects the 10-year lifespan of RMA plans, and is a short term approach that provides a pragmatic and realistic pathway.

The positive social and community benefits arising from these two objectives include in particular:

- acknowledgement that water quality needs to improve so that people can continue to use it safely, gather food that is safe to eat, and that aquatic ecosystems are sustained; and
- acknowledgement that diffuse discharges are complex to manage and that the social and economic changes that will be required to manage this problem will take time to implement effectively.

CSG's Policy Selection Criteria

One relevant criterion, 'RMA (including the National Policy Statement for Freshwater Management)', has been captured in the above evaluation. The additional criteria are 'Gives effect to Te Ture Whaimana/the Vision and Strategy', 'Provides for aspirations of River iwi', 'Gives positive social and community benefits', and 'Achieves the restoration and protection of native habitats and biodiversity', which have been considered in this section, where relevant.

These objectives reflect the over-arching criteria of 'Gives effect to Te Ture Whaimana/the Vision and Strategy' and as outlined above the 'RMA (including the NPS Freshwater Management)'. The objectives also relate to the criterion 'Provides for aspirations of River iwi'. For River iwi, respect for the rivers lies at the heart of the spiritual and physical wellbeing of iwi and their tribal identity and culture. Collective stewardship is required and there is an important intergenerational equity concept within kaitiakitanga. The proposed objectives meet these aspirations as well as the principles that were identified as underlying Plan Change 1 (River iwi 2015, Document# 3483800).

These objectives contribute to 'Positive social and community benefits' and 'Achieving the restoration and protection of native habitats and biodiversity' through the focus on restoring and protecting water quality. Degraded water quality not only affects what the water can be used for, but also its life-supporting capacity for aquatic plants and other species.

D.1.2 Objective 2 and Objective 4

D.1.2.1 Explanation of Objectives

How the Vision and Strategy was interpreted for setting long term outcomes in the Plan

The selection of objectives below is driven by the need for a staged approach to achieving the Vision and Strategy. Objective 2 focuses on social, cultural and economic wellbeing that will come from achieving the Vision and Strategy, and is complemented by Objective 4, which aims to minimise social disruption during the transition.

The community, iwi and industry hold high expectations for water quality in the Waikato and Waipa Rivers. The Vision and Strategy has recorded these expectations as well as the aspirations for the relationships between the Waikato community and the Rivers. Restoring water quality is a complex problem and will require an intergenerational approach – that is, an approach that will have a series of stages spread over time. This is also true for the relationships people have with the Rivers. These objectives recognise the need to ensure a sustainable management approach to the implementation of the Vision and Strategy/Te Ture Whaimana and include social, economic and cultural needs alongside environmental aspirations.

Objectives 2 and 4 also give effect to objectives of the RPS:

- 3.1 Integrated management
- 3.3. Decision making
- 3.4 Health and wellbeing of the Waikato River
- 3.14 Mauri and values of fresh water bodies.

D.1.2.2 Assessment

Objectives 2 and 4 are an appropriate way of achieving the direction set out in section 5 of RMA Part 2. The NPS-FM and the Vision and Strategy have provided the direction for how to give effect to Part 2 matters, and the Vision and Strategy has prevailed where there is inconsistency.

Section 30(4) RMA includes as functions of regional councils the allocation of a natural resource, through the use of rules.

The proposed objectives address the social, economic and cultural wellbeing and resilience of communities. They recognise that people use the Rivers for a variety of social, cultural and economic purposes and that improving the quality of the water will also benefit future generations.

The proposed objectives acknowledge that the future allocation of the assimilative capacity of the Waikato and Waipa Rivers, will result in economic and social challenges for landowners and communities. Therefore the staged approach heralded in Objective 3 is complemented by Objective 4, which recognises the need for a transition over time to a new management regime.

Giving effect to the Vision and Strategy includes restoring and protecting the health and wellbeing of the Rivers for current and future generations. Objective 4 recognises that to achieve this, people will need to be informed and engaged in helping to resolve the issues of degrading water quality. Changes in attitudes and behaviours will be required over time, in order to improve land management practices.

The NPS-FM identifies that freshwater is essential to New Zealand's economic, environmental, cultural and social wellbeing. It is also highly valued for recreational activities as well as underpinning biodiversity and natural heritage. The NPS-FM sets out national guidance on managing land and water in a sustainable way that also recognises economic growth within set water quality and quantity limits. The NPS-FM also notes that it is up to communities and iwi to determine the pathway and timeframes for ensuring FMUs meet the attribute targets; and that where changes in behaviours are required, timeframes need to consider economic effects that result from the speed of change.

Within the RPS, Objective 3.1 (Integrated management) addresses integrated management and recognises the need of current and future generations as well as the relationships between environmental, social, economic and cultural wellbeing; and the complexities of interactions. Objective 3.3 (Decision-making) focuses on holistic and consistent decision-making, including adopting appropriate planning timeframes, adopting a precautionary approach, including adaptive management; basing decision on best available information including mātauranga Māori; and recognising that time may be required for change to occur. Objective 3.14 (Mauri and values of fresh water bodies) identifies the need to maintain and enhance fresh water bodies, including enabling people to provide for their social, economic and cultural wellbeing and their health and safety. The proposed objectives are complementary to these objectives.

In providing a pathway for the future, Plan Change 1 indicates what needs to occur in the 80 year timeframe, while providing guidance and actions for the next 10-year period. The proposed objectives send a clear message that the next 10 years will be used to inform landowners and to gather property-specific information on discharges. The key message is that further reductions in discharges will be required in subsequent plan changes over the next 80 years.

It is considered realistic for landowners to start understanding and making social and economic changes for their future land use activities.

One of the key reasons for this longer term approach is acknowledging the social and economic implications that new resource management requirements will have on people. Landowners will be required to change their land management practices in order to reduce diffuse source discharges. Therefore it is important to recognise at a practical level the changes that can be undertaken over time, recognising both the need for reductions in discharges and the need for landowners, businesses and communities to be able to adapt to new management requirements.

New management requirements are likely to have economic impacts as well as requiring the transfer of knowledge to change behaviours and practices. A staged transition over time will enable people to become aware of the issues involved and the responses required, and to change their approaches to managing land and diffuse discharges.

This reflects the desire to ensure that during the first stage of Plan Change 1 implementation that local and regional communities have the ability to provide for their social, cultural and economic wellbeing, and that any mitigation actions undertaken are both cost-effective and water quality-effective. Some of the predicted effects on communities have been identified through the Integrated Assessment, which followed on from the scenario modelling. This work looked at the economic, social and cultural costs and benefits associated with the changes required to achieve improved water quality. For more information refer to C.2.2.11 'Scenario modelling outputs'.

The positive social and community benefits arising from these objectives include in particular:

- acknowledgement that environmental wellbeing is intimately linked with social, economic and cultural wellbeing;
- acknowledgement that providing people and communities time to adapt will allow them to continue to provide for their social, economic and cultural wellbeing;
- acknowledgement that water quality is important for today as well as for future generations and that on-going degradation needs to be halted and water quality improved.

The objectives link to the values and the Vision and Strategy, which are provided for by these objectives with the staged approach, and also with the feedback from stakeholders on the transition (WRC 2015, Document #3410308, and refer to B.3 'Identifying Values and Uses' for more information). The objectives also seek to ensure that costs are spread over time to enable communities to adapt while maintaining their own wellbeing.

CSG's Policy Selection Criteria

One relevant criterion, 'RMA (including the National Policy Statement for Freshwater Management)', has been captured in the above evaluation. The additional criteria are 'Gives effect to Te Ture Whaimana/the Vision and Strategy', 'Provides for aspirations of River iwi', 'Gives positive social and community benefits' and 'Achieves the restoration and protection of native habitats and biodiversity', which have been considered in this section, where relevant.

These objectives relate to the criterion 'Provides for the aspirations of River iwi'. Waikato and Waipa River iwi have been involved in the collaborative development of Plan Change 1. In particular, the economic aspirations of Māori have been considered through the working group discussions relating to land use changes on settlement land and Māori freehold land under Te Ture Whenua Māori Act 1993.

These objectives recognise the linkages between the state of the water and the need to focus on diffuse source discharges from land. Freshwater habitats and biodiversity will become increasingly degraded if actions are not taken to reverse the current trends in declining water quality. This set of objectives 'Gives positive social and community benefits' in that they recognise that people value high water quality and that it is important for current and future users of the water.

D.1.3 Objective 5

Objective 5: Mana Tangata – protecting and restoring tangata whenua values/Te Whāinga 5: Te Mana Tangata – te tiaki me te whakaora i ngā uara o te tangata whenua

Tangata whenua values are integrated into the co-management of the rivers and other water bodies within the catchment such that:

- a. tangata whenua have the ability to:
 - i. manage their own lands and resources, by exercising mana whakahaere, for the benefit of their people; and
 - ii. actively sustain a relationship with ancestral land and with the rivers and other water bodies in the catchment; and
- b. new impediments to the flexibility of the use of tangata whenua ancestral lands are minimised; and
- c. improvement in the rivers' water quality and the exercise of kaitiakitanga increase the spiritual and physical wellbeing of iwi and their tribal and cultural identity.

D.1.3.1 Explanation of Objective

The Vision and Strategy/Te Ture Whaimana has its statutory basis in the settlement legislation (refer to A.2.1.1 'Waikato and Waipa River Legislation'). It is important that tangata whenua values are identified and integrated into the co-management of the Waikato and Waipa Rivers. In addition, restoring and protecting the relationship of the Waikato River iwi according to their tikanga and kawa, including their economic, social, cultural and spiritual relationships, is an objective within the Vision and Strategy.

The community, iwi and industry hold high expectations for water quality in the Waikato and Waipa Rivers. However, there is a tension between improving the environmental quality of the rivers and allowing for future economic development of Te Ture Whenua and settlement land.

The intent of this objective is to recognise the historical and contemporary legal impediments to flexibility around the use of land. The impediments have occurred in a number of ways, but directly relevant to Plan Change 1 are land confiscation and the legal ownership structures created by Te Ture Whenua Maori Act 1993/Maori Land Act 1993.

The concepts of mana whakahaere and kaitiakitanga are central to this objective. These concepts are described as follows:

1. Mana whakahaere (authority and rights of control)

- Mana whakahaere refers to the authority that River iwi have established in respect of the Waikato and Waipa Rivers over many generations. Mana whakahaere entails the exercise of rights and responsibilities to ensure that the balance and mauri (life force) of the Waikato River are maintained. It is based in recognition that if we care for the River, the River will continue to sustain the people.
- In customary terms mana whakahaere is the exercise of control, access to, and management of the Waikato and Waipa Rivers, including its resources in accordance with tikanga (values, ethics, governing conduct). For Waikato-Tainui, mana whakahaere has long been exercised under the mana of the Kiingitanga (Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010).

2. Kaitiakitanga

- Kaitiakitanga means the exercise of guardianship by the tangata whenua of an area in accordance with tikanga Māori in relation to natural and physical resources; and includes the ethic of stewardship (RMA 1991).

Objective 5 also gives effect to objectives of the RPS:

- 3.1 Integrated management
- 3.2 Resource use and development
- 3.3 Decision making
- 3.4 Health and wellbeing of the Waikato River
- 3.9 Relationship of tangata whenua with the environment
- 3.14 Mauri and values of water bodies.

D.1.3.2 Assessment

The Regional Plan must give effect to the Vision and Strategy/Te Ture Whaimana. Plan Change 1 must also give effect to RMA s6(e) by recognising and providing for the relationship of Māori and their cultural and traditions with their ancestral lands; as well as to s7(a) by having particular regard to kaitiakitanga and s8 by taking into account of the principles of Te Tiriti o Waitangi. Objective 5 recognises the co-management role for tangata whenua, including their kaitiaki connections to land and water and their aspirations for economic development in the future. Objective 5 aims to protect and restore tangata whenua values and to meet their social, economic and cultural wellbeing. The NPS-FM and the Vision and Strategy have provided the direction for how to give effect to Part 2 matters, and the Vision and Strategy has prevailed where there is inconsistency.

In Objective D1 and Policy D1 of the NPS-FM, tangata whenua are to be involved in the management of fresh water, including identifying tangata whenua values and interests. The NPS-FM also notes that freshwater objectives for a range of tangata whenua values are intended to recognise Te Mana o te Wai. Objective 5 recognises the importance of water quality to the Waikato and Waipa River iwi and their obligations as kaitiaki. Plan Change 1 has been a joint project between the Council, River iwi and key stakeholders. This collaborative project has enabled all parties to be aware of differing values and aspirations for the Waikato and Waipa Rivers. This Objective reflects the aspirations of tangata whenua in protecting and restoring the water quality of the Waikato and Waipa Rivers, and recognises their co-governance roles.

The Vision and Strategy/Te Ture Whaimana is embedded within the RPS (section 2.5 Vision and Strategy for the Waikato River and Objective 3.4 Health and wellbeing of the Waikato River) and restoration and protection are key policy directives. Objective 3.3 (Decision-making) focusses on holistic and consistent decision-making, including basing decisions on best information available, including matauranga Maori and working with tangata whenua. Objective 3.9 (Relationship of tangata whenua with the environment) requires that the relationship of tangata whenua with the environment is recognised and provided for.

The positive social and community benefits arising from this objective include in particular:

- acknowledgement of the co-management role that River iwi have for the Waikato and Waipa Rivers;

- acknowledgement that there is a tension between restoring and protecting waters and the aspiration for future land use changes;
- the exercise of kaitiakitanga as fundamental to cultural wellbeing.

Land confiscation and settlement processes are addressed between tangata whenua and the Crown, whereas in the context of Plan Change 1, the Regional Council is bound by the RMA functions in s30 RMA. However the use of Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land has been subject to a series of historical and legal impediments. These impediments are summarised in Coffin, 2016 (Document# 3751561). This historical and current context has affected the relationship of tangata whenua to their land, and their ability to make decisions on the use of that land. This in turn has affected their ability to exercise kaitiakitanga or provide for the social, cultural or economic wellbeing of tangata whenua. These matters are therefore considered to be directly related to RMA provisions.

This objective seeks to avoid adding any further restrictions on the use of Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land that would affect the ability of tangata whenua to provide for their social, cultural and economic wellbeing. Therefore within Plan Change 1 there is a need to ensure that further restrictions on the use of land (in order to achieve water quality outcomes) are not created, but rather that there are opportunities for the flexibility of land use. This is in order to avoid any additional effects on the relationship of tangata whenua to their ancestral lands. In the long term, however, all land will be subject to the targets in Objective 1.

CSG Policy Selection Criteria

One relevant criterion, 'RMA (including the National Policy Statement for Freshwater Management)', has been captured in the above evaluation. The additional criteria are 'Gives effect to Te Ture Whaimana/the Vision and Strategy', 'Provides for aspirations of River iwi', 'Gives positive social and community benefits' and 'Achieves the restoration and protection of native habitats and biodiversity', which have been considered in this section, where relevant.

This objective 'Provides for aspirations of River iwi' relating to Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land use changes, and allows for flexibility for decision making on land use for Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land.

This objective reflects the following points:

- Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land must be recognised as an important component of tangata whenua ancestral land;
- Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land is managed within a specific legislative framework;
- flexibility to determine appropriate development on a case-by-case basis and with acknowledgement of the knowledge held by tangata whenua about their land and resource management;
- economic activities on Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land supports social and cultural wellbeing, and opportunities are currently limited for economic development;
- Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land is disproportionately represented in undeveloped and under-developed land in the Waikato and Waipa River catchments (and nationally) due to the historical and legal impediments discussed above (Ministry for Agriculture and Forestry, 2011 and Te Puni Kokiri, 2014);
- Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land cannot be sold, and so there are no options for alternative locations for activities that recognise and provide for the relationship of tangata whenua with their ancestral land.

This objective helps to give effect to the co-management responsibilities set out in the Vision and Strategy and the settlement legislation.

The objective also 'Gives positive social and community benefits' in that it results in outcomes iwi and others can identify with, own and feel proud of.

D.1.4 Objective 6

D.1.4.1 Explanation of Objective

Whangamarino Wetland has been a Ramsar Convention site of international importance since 1989. It is made up of approximately 7000 hectares of swamps, fens and peat bogs around the Whangamarino and Maramarua Rivers. Whangamarino Wetland is noted particularly for its biodiversity values, including threatened plants, birds and fish. There has been an ongoing decline in the coverage of some wetland species. The main threats to this area have included sediment from flood waters and an

increase in nutrients, both of which affect the type and spread of plant species. Management of Whangamarino Wetland needs to recognise the challenge of protecting the biodiversity values while the wetland is used for significant flood mitigation purposes (TLG and WRC 2016, Document# 3697755, and WRC 2016, Document# 3645067).

The intent of the objective for Whangamarino Wetland was to:

- take action to reduce the decline in water quality in the catchment of Whangamarino Wetland; and
- ensure Whangamarino Wetland supports the full range of healthy, functioning wetland types that exist there.

The effort required to restore Whangamarino Wetland over 80 years is considerable and as a minimum needs to minimise further decline in the first 10 years. This objective describes how wetland restoration needs to be supported by restoration of the Lower Waikato FMU sub-catchments that flow into and through Whangamarino Wetland (TLG and WRC Document# 3697755 and WRC 2016, Document# 3645067)

Objective 6 gives effect to objectives of the RPS:

- 3.1 Integrated management
- 3.3 Decision making
- 3.4 Health and wellbeing of the Waikato River
- 3.8 Ecosystem services
- 3.14 Mauri and values of fresh water bodies
- 3.16 Riparian areas and wetlands
- 3.19 Ecological integrity and indigenous biodiversity.

D.1.4.2 Assessment

Objective 6 is an appropriate way of achieving the direction set out in the RMA Part 2, particularly sections 5, 6(a), 7(d) and (f) . The NPS-FM and the Vision and Strategy have provided the direction for how to give effect to Part 2 matters, and the Vision and Strategy has prevailed where there is inconsistency.

Section 30(1)(c) RMA includes as functions of regional councils the control of the use of land for soil conservation, water quality, maintenance and enhancement of ecosystems, and the avoidance or mitigation of natural hazards. The proposed objective builds on the operative provisions of the Regional Plan, by providing a more specific focus on improving the water quality that supports the ecosystems of the Whangamarino Wetland.

Plan Change 1 must give effect to the Vision and Strategy. This includes protecting the biodiversity values of the Whangamarino Wetland from the adverse effects of nutrients and sediment in the in-flowing waters, and undertaking restoration from the current degradation (in line with RMA sections 7(d) and (f)).

The NPS-FM and RPS require the identification of FMUs and appropriate limits and targets. It is accepted that Whangamarino Wetland has highly significant values and should be recognised as such, and accorded a priority in respect of addressing matters related to nitrogen, phosphorus, sediment and microbial pathogens through Plan Change 1 (WRC 2016, Document# 3710575).

Establishing an FMU for the Whangamarino Wetland was not considered appropriate at this time. Community consultation undertaken on FMUs did not specifically include the option of a Whangamarino Wetland FMU. Furthermore, although establishment of an FMU does not necessarily require numeric attribute limits to be set, advice from the TLG was that the absence of guidance on wetland attributes in the NPS-FM and a lack of technical data that would allow development of contaminant limits were impediments to the creation of a separate FMU that would have any real effect on management of the Whangamarino Wetland and its catchment. This advice was provided within the context that having the Whangamarino Wetland within the Lower Waikato River FMU means that contaminant inputs to the wetland from its catchment (including Lake Waikare) will reduce in order to meet the targets established for the Lower Waikato River FMU. Therefore, for the first stage of restoration and protection, the objective identifies a management approach where the inputting sub-catchment water quality targets can be used as a measure of water quality improvement for the Whangamarino Wetland (WRC 2016, Document# 3710575 and Document# 3709787).

The RPS has a specific objective, Objective 3.16 (Riparian areas and wetlands), for maintaining and enhancing wetlands, including water quality, biodiversity, natural hazard risk reduction, cultural values, riparian habitat quality and extent, and wetland quality and extent. This gives partial effect to the NPS-FM, and the proposed objective provides a complementary linkage between the RPS and Plan Change 1. It is anticipated that future plan changes will address any need for specific FMUs for wetlands.

There is limited information available on water quality for Whangamarino Wetland, however its status as a Ramsar Convention site of international importance warrants a specific management focus. Sediment and nutrient inflows are degrading the bog type ecosystems present within the wetland (Wildlands 2012, Document #3154305). It is important to assess and

implement initiatives to reduce nutrient and sediment flows in the sub-catchments that flow into Whangamarino Wetland. The Whangamarino Wetland catchment needs to be addressed urgently, given the existing and significant sediment loads present within Lake Waikare and the wider system. There is a need to recognise and provide for this reality over the first 10 years of the plan. The Council is currently preparing a catchment management plan for Lake Waikare and the Whangamarino Wetland, which will include interventions that contribute to the achievement of this objective.

The positive social and community benefits arising from this objective are consistent with iwi and community outcomes identified, and this includes in particular:

- acknowledgement that without significant management, this area will continue to degrade and potentially the values that make it internationally significant could be lost;
- acknowledgement that the Whangamarino Wetland plays a role in flood management, with associated benefits to downstream communities, productive land and infrastructure.

Costs related to the achievement of the objective will be spread over 80 years in a staged manner, which will help to minimise social disruption for the community.

The Department of Conservation has a key responsibility for managing Ramsar sites, and has undertaken work to improve the water quality of the wetland. One such improvement was the installation of a weir, which has raised the minimum water level in Whangamarino Wetland to assist in restoring approximately 1500ha of seasonally flooded swamp habitat. These water levels were significantly lowered due to the Waikato River bed lowering as part of the flood protection works. The catchment management plan would link to this and other restoration work done to date.

CSG's Policy Selection Criteria

One relevant criterion, 'RMA (including the National Policy Statement for Freshwater Management)', has been captured in the above evaluation. The additional criteria are 'Gives effect to Te Ture Whaimana/the Vision and Strategy', 'Provides for aspirations of River iwi', 'Gives positive social and community benefits' and 'Achieves the restoration and protection of native habitats and biodiversity', which have been considered in this section, where relevant.

This objective is fundamental to achieving the restoration and protection of water quality that supports native habitats and biodiversity. This objective recognises the inter-linkages between the state of Whangamarino Wetland and its biodiversity with improving water quality. Sediment and nutrients in waterways flowing into the Whangamarino Wetland are having a significant impact on the quality and extent of wetland species (flora and fauna) (Wildlands 2012, Document# 2904155).

D.1.5 Summary of the extent to which the objectives are the most appropriate way to achieve the purpose of the RMA

The purpose of the RMA is set out in s5 of the Act. Sections 6-8 apply to achieving the purpose of the Act. Section 32(1)(a) requires that an evaluation is made of the extent to which the objectives are the most appropriate way to achieve the purpose of the Act. The following table assesses the objectives as a combined package, recognising that they work inter-dependently.

Section 5 of the RMA sets out the purpose of the Act as promoting sustainable management of natural and physical resources.

| RMA sections | Appropriateness for achieving the purpose of the RMA |
|---|--|
| S5(2) managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety | Objectives 1 and 3 reflect that management of water quality is a complex issue and that people and communities will require time to adapt to new management approaches. The objectives provide for protection and restoration of water quality but in a timeframe that also allows people to provide for their social and economic wellbeing. Objectives 2 and 4 address the social, economic and cultural wellbeing and resilience of communities. Objective 5 aims to protect and restore tangata whenua values and to meet their social, economic, and cultural well-being. |
| S5(a) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations | Objectives 1 and 3 focus on restoration and protection of water quality, over a 10-year period and an 80-year period. Objective 6 recognises the need to protect and restore Whangamarino Wetland. Objectives 2, 4 and 5 recognise people use the Rivers for a variety of social, cultural and economic purposes and that improving the quality of the water is essential for future generations. |

| | |
|---|--|
| S5(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems | Objectives 1 and 3 set water quality limits and targets relating to an 80 year period, while also acknowledging the need for short term water quality targets. Objective 6 is specifically focused on safeguarding the ecosystems of Whangamarino Wetland, recognising the need to protect and restore them. Objectives 2, 4 and 5 acknowledge that safeguarding water is critical, but that there also needs to be time for landowners to adjust to a new and more restrictive management regime. |
| S5(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment | Objectives 1 and 3 are focused on addressing diffuse source discharges from land, with specific attention being given to four key contaminants: nitrogen, phosphorous, sediment and microbial pathogens. This will also contribute to achieving Objectives 5 and 6. Objectives 2, 4 and 5 recognise the human dimension of managing the adverse effects of activities. |
| S6 Matters of National Importance (recognise and provide for) | Objective 1, 3 and 6 recognise and provide for the preservation of natural character of wetlands, lakes and rivers. Objective 5 provides for the relationship of Maori and their culture and traditions with their ancestral lands. |
| S7 Other Matters (have particular regard to) | Objective 5 has particular regard to kaitiakitanga. Objectives 1, 3 and 6 seek to restore and protect under the Vision and Strategy, which aligns with maintenance and enhancement of the quality of the environment. |
| S8 Treaty of Waitangi (take into account) | In achieving the purpose of the RMA, s8 requires all persons exercising functions and powers to take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). The Waikato and Waipa River iwi have been partners in the development of the Plan Change 1, including identifying values of importance to iwi and principles that need to underlie Plan Change 1. |

Assessment of objectives

Having regard to the above assessment, it is considered that Objectives 1-6 are the most appropriate way to achieve the purpose of the RMA.

D.2 Summary of reasons for selection of objectives

The desired long term water quality outcomes were established through the values-setting exercise that CSG, project partners and the wider community were engaged in to develop Plan Change 1. The long term outcome is the water quality improvement that must be achieved in an 80 year period. This long term objective would require the defined numeric water quality attributes to be met by 2096.

In order to know that progress towards this long term outcome would be made, Plan Change 1 has also set some short term numerical water quality targets. This is the approach recommended in the NPS-FM (Policy CA2 e).

Whilst technical knowledge of water quality cause and effect is well established, precise quantification is not currently feasible. Difficulties include:

1. lag effects - timeframes for actions on land to create a water quality response;
2. the attribution of water quality response back to individual property-level mitigation actions.

Water quality monitoring is the only feasible way to assess whether the long term freshwater objectives will be achieved. However, in a step-wise approach to achieving the objective, it is not appropriate to rely solely on water quality monitoring as a measure of success in the early stages. This is because actions will be implemented over time and there will be lags in responses between actions and the effect on water quality. For these reasons, there will need to be a range of measures used to measure the effectiveness of Plan Change 1.

In exploring feasible options for managing diffuse discharges and in developing the objectives, consideration was given to the social and economic impacts that could potentially result from a policy shift in land use management regulation. Issues of equity across different farming sectors and landowners were considered, along with the ability of landowners to pay for significant land use policy/regulatory shifts. This reinforced the need for a staged approach to achieving the 80 year objective, in order to ensure landowners were well-informed and could begin to undertake mitigation measures.

Co-management is fundamental to Plan Change 1, and reflects the statutory requirements to give effect to the Vision and Strategy/Te Ture Whaimana. Tangata whenua values were identified and integrated into the co-management approach to the Waikato and Waipa Rivers. Iwi, community and industry all have high expectations for water quality. These are represented in the requirements to achieve the water attribute targets, while also recognising the need to provide flexibility for the use of Māori ancestral land.

Whangamarino Wetland is a Ramsar Convention site of international importance. However the area has been degraded by nitrogen, phosphorus and sediment, thereby affecting the range and spread of plant species. The protection of high biodiversity values need to be carefully balanced with the use of the area for flood management purposes. This sensitive area requires specific management attention in the short term, before any further degradation occurs.

Overall the objectives as a package are the most appropriate way to achieve the purpose of the RMA. They are complementary to the other objectives in the Regional Plan, and are focused in particular on providing a direction for managing diffuse source discharges in the Waikato and Waipa River catchments.

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D.4 Appendices

D.4.1 Appendix 1. Current state and long term desired water quality targets for the Waikato and Waipa River catchment

The following tables were used in the development of Plan Change 1 and are the basis for Table 11-1, which forms part of Objective 1. The tables show, by FMU, for each site, for each relevant attribute, both the desired and the current state.

For each FMU, the first set of tables show:

1. The desired state for each site, expressed as a National Objectives Framework band (A-D); and
2. Any changes in water quality that need to occur to meet the desired state; this can either be:
 - a. A decrease in concentration (or increase in visibility distance for clarity attribute) is required at that site to meet the desired water quality. The desired concentration (or visibility distance for clarity attribute) is stated numerically. This is equivalent to the 'cut-point' of the desired National Objectives Framework band; or
 - b. No increase in concentration (or no decrease for clarity attribute). These sites receive a tick mark as the current state already meets the desired state, and therefore this should be maintained.

The last set of tables show the current state, as a concentration (or visibility distance for clarity attribute) per site. Read in conjunction, these tables show the current state, the desired state, and whether any changes in water quality are required to move from the current to desired state or if water quality needs to be maintained at the current level. These tables were modified to show the desired state to be achieved in 80 years, expressed as a concentration (or visibility distance for clarity attribute), as well as adding a column showing the water quality to be achieved by actions in the short term. This resulted in Table 11-1 in Plan Change 1 and the accompanying explanatory note.

Upper Waikato River Freshwater Management Unit

| | | Attribute | | | | | | | | | | | | | | |
|-----------------------------------|---|-------------|-------------|--|--|-------------|-------------|-----|---|-------------|-------------|--|---|-------------|-------------|--|
| Site | Annual Median Chlorophyll <i>a</i> (mg/m ³) | | | | Annual Maximum Chlorophyll <i>a</i> (mg/m ³) | | | | Annual Median Total Nitrogen (mg/m ³) | | | | Annual Median Total Phosphorus (mg/m ³) | | | |
| | NOF Band | Decrease to | No increase | | NOF Band | Decrease to | No increase | | NOF Band | Decrease to | No increase | | NOF Band | Decrease to | No increase | |
| Waikato River Ohaaki Br | A | | ✓ | | B | | ✓ | | A | | ✓ | | A | | ✓ | |
| Waikato River Ohakuri Tailrace Br | B | | ✓ | | B | | ✓ | 160 | A | 160 | | | B | | ✓ | |
| Waikato River Whakamaru Tailrace | B | | ✓ | | B | | ✓ | 160 | A | 160 | | | B | | ✓ | |
| Waikato River Waipapa Tailrace | B | | ✓ | | B | | ✓ | 160 | A | 160 | | | B | 20 | | |

| | | Attribute | | | | | | | | | | | | | | | | |
|-------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|--|-------------|-------------|--|-------------|-------------|------------------|-------------|-------------|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | | Annual Median Ammonia (mg NH ₄ -N/L) | | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | | 95 th percentile <i>E. coli</i> (E. coli/100mL) | | | Clarity (metres) | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | Band | Increase to | No decrease |
| Waikato River Ohaaki Br | A | ✓ | A | | ✓ | | A | | ✓ | | | A | | ✓ | A | | ✓ | |

| | | Attribute | | | | | | | | | | | |
|-----------------------------------|---|-----------|--|-----|---|------|--|------|---|-----|------------------|-----|--|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> /100mL | | Clarity (metres) | | |
| | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | |
| Waikato River Ohakuri Tailrace Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | |
| Waikato River Whakamaru Tailrace | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | 3.0 | |
| Waikato River Waipapa Tailrace | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | 3.0 | |
| Pueto Stm Broadlands Rd Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | 3.0 | |
| Torepatutahi Stm Vaile Rd Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | ✓ | A | | |
| Waiotapu Stm Homestead Rd Br | A | 1.0 | A | 1.5 | A | 0.03 | A | 0.05 | B | ✓ | | | |
| Mangakara Stm (Reporoa) SH5 | A | 1.0 | A | 1.5 | A | ✓ | A | 0.05 | B | 540 | C | 1.0 | |
| Kawaunui Stm SH5 Br | B | 2.4 | A | 1.5 | A | ✓ | A | 0.05 | B | 540 | B | 1.6 | |

| | | Attribute | | | | | | | | | | | |
|--------------------------------------|---|-----------|--|---|---|------|--|------|--|-----|---|------------------|--|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (E. coli/100mL) | | | Clarity (metres) | |
| | A | ✓ | A | ✓ | B | 0.24 | A | 0.05 | A | ✓ | B | 1.6 | |
| Waiotapu Stm Campbell Rd Br | A | ✓ | A | ✓ | B | 0.24 | A | 0.05 | A | ✓ | B | 1.6 | |
| Otamakokore Stm Hossack Rd | A | ✓ | A | ✓ | A | | A | ✓ | B | 540 | B | 1.6 | |
| Whirinaki Stm Corbett Rd | A | ✓ | A | ✓ | A | | A | ✓ | A | ✓ | A | 3.0 | |
| Tahunaatara Stm Ohakuri Rd | A | ✓ | A | ✓ | A | | A | ✓ | B | 540 | B | 1.6 | |
| Mangaharakeke Stm SH30 (Off Jct SH1) | A | ✓ | A | ✓ | A | | A | ✓ | B | 540 | B | 1.6 | |
| Waipapa Stm (Mokai) Tirohanga Rd Br | A | 1.0 | A | ✓ | A | | A | ✓ | B | 540 | B | 1.6 | |
| Mangakino Stm Sandel Rd | A | ✓ | A | ✓ | A | | A | ✓ | A | ✓ | A | 3.0 | |
| Whakauru Stm SH1 Br | A | ✓ | A | ✓ | A | | A | ✓ | B | 540 | C | 1.0 | |

| Attribute | | | | | | | | | | | | |
|---|---|-----|--|-----|---|------|--|------|--|-----|------------------|-----|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (E. coli/100mL) | | Clarity (metres) | |
| | B | 2.4 | A | 1.5 | A | 0.03 | A | 0.05 | B | 540 | C | 1.0 |
| Mangamingi Stm Paraonui Rd Br | | | | | | | | | | | | |
| Pokaiwhenua Stm Arapuni - Putaruru Rd | A | 1.0 | A | 1.5 | A | √ | A | √ | B | 540 | B | 1.6 |
| Little Waipa Stm Arapuni - Putaruru R | A | 1.0 | A | 1.5 | A | √ | A | 0.05 | B | 540 | B | 1.6 |

Upper Waikato River Freshwater Management Unit – current state 2010-2014

| Site | Attribute | | | | | | | | | | |
|--------------------------------------|---|--|--|--|--|---|--|---|---------------------------------------|------------------------------|--|
| | Median Chlorophyll a (mg/m ³) | Maximum Chlorophyll a (mg/m ³) | Median Total Nitrogen (mg/m ³) | Median Total Phosphorus (mg/m ³) | Median Nitrate (mg NO ₃ -N/L) | 95th percentile Nitrate (mg NO ₃ -N/L) | Median ammonia (mg NH ₄ -N/L) | Maximum ammonia (mg NH ₄ -N/L) | 95th percentile E.coli (E.coli/100ml) | Clarity Median BlackDisk (m) | |
| Waikato River Ohaaki Br | 1.5 | 13 | 134 | 10 | 0.039 | 0.062 | 0.002 | 0.013 | 70 | 3.83 | |
| Waikato River Ohakuri Tailrace Br | 3.2 | 11 | 211 | 17 | 0.084 | 0.172 | 0.003 | 0.017 | 15 | 3.44 | |
| Waikato River Whakamaru Tailrace | • | • | 271 | 20 | 0.101 | 0.230 | 0.003 | 0.010 | 60 | 1.87 | |
| Waikato River Waipapa Tailrace | 4.1 | 25 | 336 | 25 | 0.164 | 0.320 | 0.007 | 0.017 | 162 | 1.92 | |
| Pueto Stm Broadlands Rd Br | | | 540 | 93 | 0.450 | 0.530 | 0.003 | 0.009 | 92 | 1.64 | |
| Torepatutahi Stm Vaile Rd Br | | | 625 | 96 | 0.500 | 0.800 | 0.002 | 0.011 | 216 | • | |
| Waiotapu Stm Homestead Rd Br | | | 1860 | • | 1.285 | 1.570 | 0.121 | 0.190 | 281 | • | |
| Mangakara Stm (Reporoa) SH5 | | | 1580 | 74 | 1.300 | 1.600 | 0.008 | 0.063 | 1700 | 0.86 | |
| Kawaunui Stm SH5 Br | | | 2990 | 82 | 2.600 | 3.000 | 0.006 | 0.083 | 2535 | 1.35 | |
| Waiotapu Stm Campbell Rd Br | | | 1955 | 73 | 0.915 | 1.100 | 0.297 | 0.345 | 18 | 1.17 | |
| Otamakokore Stm Hossack Rd | | | 990 | 144 | 0.740 | 1.190 | 0.006 | 0.024 | 696 | 1.10 | |
| Whirinaki Stm Corbett Rd | | | 810 | 63 | 0.770 | 0.870 | 0.002 | 0.012 | 98 | 2.70 | |
| Tahunaatara Stm Ohakuri Rd | | | 780 | 45 | 0.555 | 0.830 | 0.003 | 0.015 | 810 | 1.27 | |
| Mangaharakeke Stm SH30 (Off Jct SH1) | | | 685 | 48 | 0.525 | 0.750 | 0.003 | 0.015 | 700 | 1.02 | |

| | | | | | | | | | | |
|---------------------------------------|--|--|------|-----|-------|-------|-------|-------|------|------|
| Waipapa Stm (Mokai) Tirohanga Rd Br | | | 1355 | 95 | 1.210 | 1.500 | 0.003 | 0.005 | 1215 | 1.13 |
| Mangakino Stm Sandel Rd | | | 760 | 47 | 0.650 | 0.860 | 0.003 | 0.012 | 251 | 1.62 |
| Whakauru Stm SH1 Br | | | 470 | 42 | 0.260 | 0.450 | 0.003 | 0.033 | 2280 | 0.79 |
| Mangamingi Stm Paraonui Rd Br | | | 3495 | 325 | 2.800 | 3.300 | 0.098 | 0.323 | 2330 | 0.82 |
| Pokaiwhenua Stm Arapuni - Putaruru Rd | | | 2010 | 106 | 1.755 | 2.100 | 0.002 | 0.020 | 1455 | 1.26 |
| Little Waipa Stm Arapuni - Putaruru R | | | 1780 | 68 | 1.580 | 2.100 | 0.002 | 0.089 | 1470 | 1.53 |

Middle Waikato River Freshwater Management Unit

| Attribute | | | | | | | | | | | | |
|---------------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|---|-------------|-------------|
| Site | Annual Median Chlorophyll <i>a</i> (mg/m ³) | | | Annual Maximum Chlorophyll <i>a</i> (mg/m ³) | | | Annual Median Total Nitrogen (mg/m ³) | | | Annual Median Total Phosphorus (mg/m ³) | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase |
| Waikato River Narrows Boat Ramp | B | 5 | | B | | ✓ | B | 350 | | B | 20 | |
| Waikato River Horotiu Br | B | 5 | | B | | ✓ | B | 350 | | B | 20 | |

| Attribute | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|------------------|-------------|-------------|------|-------------|-------------|---|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | | Annual Median Ammonia (mg NH ₄ -N/L) | | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100mL) | | | Clarity (metres) | | | | | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | Band | Increase to | No decrease | |
| Waikato River Narrows Boat Ramp | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | A | 260 | | B | | | B | | | ✓ |
| Waikato River Horotiu Br | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | B | | | B | 1.6 | | |
| Karapiro Stm Hickey Rd Bridge | A | | ✓ | A | 1.5 | | A | | ✓ | A | | ✓ | B | 540 | | C | | | C | 1.0 | | |
| Mangawhero Stm Cambridge-Ohaupo Rd | A | 1.0 | | A | 1.5 | | A | 0.03 | | A | 0.05 | | B | 540 | | C | | | C | 1.0 | | |

| Site | Attribute | | | | | | | | | | | |
|---|---|-----|--|-----|---|------|--|------|---|-----|------------------|-----|
| | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100mL) | | Clarity (metres) | |
| Mangaonua Stm Hoeka Rd | A | 1.0 | A | 1.5 | A | 0.03 | A | 0.05 | B | 540 | C | 1.0 |
| Mangaone Stm Annebrooke Rd Br | B | 2.4 | A | 1.5 | A | ✓ | A | ✓ | B | 540 | C | 1.0 |
| Mangakotukutuku Stm Peacocks Rd | A | ✓ | A | 1.5 | A | 0.03 | A | 0.05 | B | 540 | C | 1.0 |
| Waitawhiriwhiri Stm Edgecumbe Street | A | ✓ | A | 1.5 | B | 0.24 | A | 0.05 | B | 540 | C | 1.0 |
| Kirikirihoa Stm Tauhara Dr | A | ✓ | A | 1.5 | A | 0.03 | A | 0.05 | B | 540 | C | 1.0 |

Middle Waikato River Freshwater Management Unit – current state 2010-2014

| Site | Attribute | | | | | | | | | | |
|---------------------------------------|---|--|--|--|--|---|--|---|-------------------------------------|------------------------------|--|
| | Median Chlorophyll a (mg/m ³) | Maximum Chlorophyll a (mg/m ³) | Median Total Nitrogen (mg/m ³) | Median Total Phosphorus (mg/m ³) | Median Nitrate (mg NO ₃ -N/L) | 95th percentile Nitrate (mg NO ₃ -N/L) | Median ammonia (mg NH ₄ -N/L) | Maximum ammonia (mg NH ₄ -N/L) | 95th percentile Ecoli (Ecoli/100ml) | Clarity Median BlackDisk (m) | |
| Waikato River - Narrows Boat Ramp | 5.5 | 23 | 410 | 28 | 0.235 | 0.500 | 0.009 | 0.018 | 340 | 1.68 | |
| Waikato River - Horotiu Br | 6.2 | 23 | 441 | 36 | 0.260 | 0.530 | 0.007 | 0.029 | 800 | 1.35 | |
| Karapiro Stm at Hickey Rd Bridge | | | 860 | 86 | 0.520 | 1.710 | 0.008 | 0.031 | 4960 | 0.93 | |
| Mangawhero Stm at Cambridge-Ohaupo Rd | | | 2930 | 210 | 2.100 | 2.600 | 0.042 | 0.074 | 3185 | 0.25 | |
| Mangaonua Stm at Hoeka Rd | | | 1905 | 54 | 1.505 | 1.920 | 0.037 | 0.052 | 7020 | 0.94 | |
| Mangaone Stm at Annebrooke Rd | | | 3060 | 118 | 2.600 | 3.100 | 0.009 | 0.020 | 2220 | 0.97 | |
| Mangakotukutuku Stm at Peacock Rd | | | 1875 | 415 | 0.800 | 1.820 | 0.082 | 0.141 | 12600 | 0.41 | |
| Waitawhiriwhiri Stm at Edgecumbe St | | | 2110 | 91 | 0.880 | 1.240 | 0.258 | 0.347 | 6520 | 0.38 | |
| Kirikirihoa Stm at Tauhara Dr | | | 1490 | 63 | 0.815 | 1.580 | 0.103 | 0.198 | 2300 | 0.40 | |

Lower Waikato River Freshwater Management Unit

| Attribute | | | | | | | | | | | | |
|--------------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|---|-------------|-------------|
| Site | Annual Median Chlorophyll <i>a</i> (mg/m ³) | | | Annual Maximum Chlorophyll <i>a</i> (mg/m ³) | | | Annual Median Total Nitrogen (mg/m ³) | | | Annual Median Total Phosphorus (mg/m ³) | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase |
| Waikato River Huntly-Tainui Br | B | 5 | | B | | ✓ | B | 350 | | B | 20 | |
| Waikato River Mercer Br | B | 5 | | B | 25 | | B | 350 | | B | 20 | |
| Waikato River Tuakau Br | B | 5 | | B | 25 | | B | 350 | | B | 20 | |

| Attribute | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|------------------|-------------|-------------|------|-------------|-------------|--|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | | Annual Median Ammonia (mg NH ₄ -N/L) | | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100mL) | | | Clarity (metres) | | | | | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | Band | Increase to | No decrease | |
| Waikato River Huntly-Tainui Br | A | | ✓ | A | | ✓ | | | ✓ | A | | | | | B | 540 | | C | 1.0 | | | |
| Waikato River Mercer Br | A | | ✓ | A | | ✓ | | | ✓ | A | | | | | B | 540 | | | | | | |
| Waikato River Tuakau Br | A | | ✓ | A | | ✓ | | | ✓ | A | | | | | B | 540 | | C | 1.0 | | | |

| | | Attribute | | | | | | | | | | | |
|---|---|-----------|--|-----|---|------|--|------|---|-----|------------------|-----|--|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100mL) | | Clarity (metres) | | |
| | A | 1.0 | B | 3.5 | A | 0.24 | B | 0.40 | B | 540 | C | 1.0 | |
| Komakorau Stm Henry Rd | A | | A | | B | | A | | B | | C | | |
| Mangawara Stm Rutherford Rd Br | A | | A | 1.5 | A | 0.03 | A | 0.05 | B | 540 | C | 1.0 | |
| Awaroa Stm (Rotowaro) Sansons Br @ Rotowaro-Huntly Rd | A | ✓ | A | | A | | ✓ | 0.05 | B | 540 | C | 1.0 | |
| Matahuru Stm Waiterimu Road Below Confluence | A | ✓ | A | 1.5 | A | | ✓ | 0.05 | B | 540 | C | 1.0 | |
| Whangape Stm Rangiriri-Glen Murray Rd | A | ✓ | A | | A | | ✓ | 0.05 | B | 540 | C | 1.0 | |
| Waerenga Stm SH2 Maramarua | A | ✓ | A | | A | | ✓ | | B | 540 | C | 1.0 | |
| Whangamarino River Jefferies Rd Br | A | ✓ | A | 1.5 | A | | ✓ | 0.05 | B | 540 | C | 1.0 | |
| Mangatangi River SH2 Maramarua | A | ✓ | A | | A | | ✓ | | B | 540 | C | 1.0 | |

| Attribute | | | | | | | | | | | | |
|--|---|-----|--|-----|---|---|--|------|---|-----|------------------|-----|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100mL) | | Clarity (metres) | |
| | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | B | ✓ |
| Mangatawhiri River Lyons Rd At Buckingham Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | B | ✓ |
| Whangamarino River Island Block Rd | A | ✓ | A | ✓ | A | ✓ | A | 0.05 | B | 540 | C | 1.0 |
| Whakapipi Stm SH22 Br | B | 2.4 | B | 3.5 | A | ✓ | A | 0.05 | B | 540 | C | ✓ |
| Ohaeroa Stm SH22 Br | A | 1.0 | A | 1.5 | A | ✓ | A | ✓ | B | 540 | C | 1.0 |
| Opuatia Stm Ponganui Rd | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | C | 1.0 |
| Awaroa River (Waiuku) Otaua Rd Br opp Moseley Rd | A | 1.0 | A | 1.5 | A | ✓ | A | 0.05 | B | 540 | C | 1.0 |

Lower Waikato River FMU - current state 2010-2014

| Site | Attribute | | | | | | | | | | |
|--|---|--|--|--|--|---|--|---|-------------------------------------|------------------------------|--|
| | Median Chlorophyll a (mg/m ³) | Maximum Chlorophyll a (mg/m ³) | Median Total Nitrogen (mg/m ³) | Median Total Phosphorus (mg/m ³) | Median Nitrate (mg NO ₃ -N/L) | 95th percentile Nitrate (mg NO ₃ -N/L) | Median ammonia (mg NH ₄ -N/L) | Maximum ammonia (mg NO ₄ -N/L) | 95th percentile Ecoli (Ecoli/100ml) | Clarity Median BlackDisk (m) | |
| Waikato River at Huntly-Tainui Br | 6 | 19 | 585 | 45 | 0.365 | 0.900 | 0.005 | 0.015 | 2100 | 0.87 | |
| Waikato River at Mercer Br | 10.5 | 30 | 662 | 52 | 0.365 | 0.870 | 0.003 | 0.010 | 1600 | • | |
| Waikato River at Tuakau Br | 12 | 38 | 595 | 53 | 0.325 | 0.880 | 0.003 | 0.008 | 1700 | 0.61 | |
| Komakorau Stm at Henry Rd | | | 2900 | 90 | 1.310 | 4.500 | 0.251 | 0.421 | 3800 | 0.17 | |
| Mangawara Stm at Rutherford Rd Br | | | 1890 | 210 | 0.765 | 2.900 | 0.111 | 0.185 | 5445 | 0.25 | |
| Awaroa Stm (Rotowaro) at Sansons Br Rotowaro-Huntly Rd | | | 990 | 12 | 0.700 | 1.190 | 0.021 | 0.093 | 1940 | 0.81 | |
| Matahuru Stm at Waiterimu Road Below Confluence | | | 1310 | 98 | 0.715 | 1.710 | 0.016 | 0.060 | 6770 | 0.31 | |
| Whangape Stm at Rangiriri Glen Murray Rd | | | 2116 | 122 | 0.004 | 0.690 | 0.006 | 0.143 | 589 | 0.17 | |
| Waerenga Stm at Taniwha Rd | | | 1115 | 46 | 0.820 | 1.410 | 0.005 | 0.022 | 5605 | 0.84 | |
| Whangamarino River at Jefferies Rd Br | | | 1085 | 89 | 0.625 | 1.880 | 0.011 | 0.055 | 5175 | 0.51 | |
| Mangatangi River at SH2 Maramarua | | | 493 | 72 | 0.110 | 1.120 | 0.005 | 0.038 | 6125 | 0.54 | |
| Mangatawhiri River at Lyons Rd At Buckingham Br | | | 181 | 23 | 0.013 | 0.370 | 0.003 | 0.011 | 5615 | 1.63 | |

| | | | | | | | | | | |
|---|--|--|------|-----|-------|-------|-------|-------|------|------|
| Whangamarino River at Island Block Rd | | | 1831 | 152 | 0.075 | 0.700 | 0.012 | 0.158 | 668 | 0.20 |
| Whakapipi Stm at SH22 Br | | | 3875 | 51 | 3.500 | 5.300 | 0.006 | 0.084 | 1910 | 1.10 |
| Ohaeroa Stm at SH22 Br | | | 1825 | 26 | 1.525 | 1.840 | 0.003 | 0.015 | 5125 | 0.81 |
| Opuatia Stm at Ponganui Rd | | | 1070 | 31 | 0.740 | 1.060 | 0.005 | 0.016 | 3160 | 0.53 |
| Awaroa River (Waiuku) at Otaua Rd Br opp Moseley Rd | | | 2095 | 47 | 1.410 | 2.400 | 0.021 | 0.144 | 1070 | 0.37 |

Waipa River Freshwater Management Unit

| | | Attribute | | | | | | | | | | | | | | | | |
|--------------------------------------|---|-------------|-------------|--|-------------|-------------|---|-------------|-------------|--|-------------|-------------|--|-------------|-------------|------------------|-------------|-------------|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | | Annual Median Ammonia (mg NH ₄ -N/L) | | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | | 95 th percentile <i>E. coli</i> (E. coli/100mL) | | | Clarity (metres) | | |
| | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | NOF Band | Decrease to | No increase | Band | Increase to | No decrease |
| Waipa River Mangaokewa Rd | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | B | 1.6 | |
| Waipa River Otewa | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | B | | ✓ |
| Waipa River SH3 Otorohanga | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | B | 1.6 | |
| Waipa River Pirongia-Ngutuunui Rd Br | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | C | 1.0 | |
| Waipa River Whatawhata Bridge | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | C | 1.0 | |
| Ohote Stm Whatawhata/Horotiu Rd | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | C | 1.0 | |
| Kaniwhaniwha Stm Wright Rd | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | C | 1.0 | |
| Mangapiko Bowman Rd Stm | A | 1.0 | | A | 1.5 | | A | | ✓ | A | | ✓ | B | 540 | | C | 1.0 | |
| Mangaohoi Stm South Branch Maru Rd | A | | ✓ | A | | ✓ | A | | ✓ | A | | ✓ | B | 540 | | B | 1.6 | |

| | | Attribute | | | | | | | | | | | |
|---|---|-----------|--|---|---|---|--|------|--|-----|------------------|-----|--|
| Site | Annual Median Nitrate (mg NO ₃ -N/L) | | Annual 95 th percentile Nitrate (mg NO ₃ -N/L) | | Annual Median Ammonia (mg NH ₄ -N/L) | | Annual Maximum Ammonia (mg NH ₄ -N/L) | | 95 th percentile <i>E. coli</i> (E. coli/100mL) | | Clarity (metres) | | |
| | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | A | ✓ | |
| Mangauika Stm Te Awamutu Borough W/S Intake | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | A | ✓ | |
| Puniu River Bartons Corner Rd Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | C | 1.0 | |
| Mangatutu Stm Walker Rd Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | B | 1.6 | |
| Waitomo Stm SH31 Otorohanga | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | C | 1.0 | |
| Mangapu River Otorohanga | A | ✓ | A | ✓ | A | ✓ | A | 0.03 | B | 540 | C | 1.0 | |
| Waitomo Stm Tumutumu Rd | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | B | 1.6 | |
| Mangaokewa Stm Lawrence Street Br | A | ✓ | A | ✓ | A | ✓ | A | ✓ | B | 540 | B | 1.6 | |

Waipa River Freshwater Management Unit current state 2010-2014

| Site | Attribute | | | | | | | | | | |
|--|--|---|--|--|-----------------------|--------------------------------|-----------------------|------------------------|-------------------------------------|------------------------------|--|
| | Median Chlorophyll <i>a</i> (mg/m ³) | Maximum Chlorophyll <i>a</i> (mg/m ³) | Median Total Nitrogen (mg/m ³) | Median Total Phosphorus (mg/m ³) | Median Nitrate (mg/l) | 95th percentile Nitrate (mg/l) | Median ammonia (mg/l) | Maximum ammonia (mg/l) | 95th percentile Ecoli (Ecoli/100ml) | Clarity Median BlackDisk (m) | |
| Waipa River at Mangaokewa Rd | | | 85 | 16 | 0.380 | 0.600 | 0.003 | 0.017 | 2625 | 1.51 | |
| Waipa River at Otewa | | | 366 | 20 | 0.228 | 0.502 | 0.003 | 0.008 | 2203 | 2.13 | |
| Waipa River at SH3 Otorohanga | | | 600 | 23 | 0.370 | 1.050 | 0.004 | 0.020 | 3595 | 1.11 | |
| Waipa River at Pirongia-Ngutunui Rd | | | 860 | 49 | 0.565 | 1.270 | 0.008 | 0.023 | 4875 | 0.63 | |
| Waipa River at Whatawhata Bridge | | | 911 | 71 | 0.673 | 1.319 | 0.009 | 0.026 | 4003 | 0.59 | |
| Orote Stm at Whatawhata/Horotiu Rd | | | 1320 | 76 | 0.495 | 1.370 | 0.023 | 0.053 | 2320 | 0.55 | |
| Kaniwhaniwha Stm at Wright Rd | | | 590 | 29 | 0.350 | 0.890 | 0.007 | 0.022 | 2070 | 0.87 | |
| Mangapiko Stm at Bowman Rd | | | 2095 | 240 | 1.410 | 2.600 | 0.022 | 0.079 | 7800 | 0.60 | |
| Mangaohoi Stm at South Branch Maru Rd | | | 365 | 53 | 0.230 | 0.390 | 0.003 | 0.008 | 987 | 1.56 | |
| Mangauika Stm at Te Awamutu Borough W/S Intake | | | 275 | 8 | 0.210 | 0.280 | 0.002 | 0.003 | 1060 | 3.33 | |
| Puniu River at Bartons Corner Rd Br | | | 910 | 48 | 0.650 | 1.280 | 0.007 | 0.029 | 3040 | 0.94 | |
| Mangatutu Stm at Walker Rd Br | | | 510 | 20 | 0.380 | 0.880 | 0.003 | 0.012 | 760 | 1.53 | |
| Waitomo Stm at SH31 Otorohanga | | | 755 | 31 | 0.520 | 0.830 | 0.008 | 0.025 | 1555 | 0.59 | |
| Mangapu River at Otorohanga | | | 1235 | 60 | 0.860 | 1.360 | 0.015 | 0.058 | 4700 | 0.61 | |

| | | | | | | | | | | |
|--------------------------------------|--|--|-----|----|-------|-------|-------|-------|------|------|
| Waitomo Stm at Tumutumu Rd | | | 765 | 22 | 0.630 | 0.800 | 0.004 | 0.013 | 2430 | 1.00 |
| Mangaokewa Stm at Lawrence Street Br | | | 780 | 36 | 0.530 | 0.980 | 0.004 | 0.013 | 6855 | 1.41 |

Dune, Riverine, Volcanic and Peat Lakes Freshwater Management Units

| Attribute | | | | | | | | | | | | | | |
|-----------|---|-------------------|--|-------------------|---|-------------------|---|-------------------|--|-------------------|--|-------------------|-------------|-------------------|
| Lake FMU | Annual Median Chlorophyll α (mg/m ³) | | Annual Maximum Chlorophyll α (mg/m ³) | | Annual Median total Nitrogen (mg/m ³) | | Annual Median total Phosphorus (mg/m ³) | | 95 th percentile <i>E. coli</i> (E. coli/100ml) | | 80 th percentile cyanobacteria (biovolume mm ³ /L) | | Clarity (m) | |
| | NOF Band | Value to achieve* | NOF Band | Value to achieve* | NOF Band | Value to achieve* | NOF Band | Value to achieve* | NOF Band | Value to achieve* | NOF Band | Value to achieve* | Band | Value to achieve* |
| Dune | C | 12 | C | 60 | C | 750 | C | 50 | B | 540 | C | 1.8 ⁺ | C | 1 |
| Riverine | C | 12 | C | 60 | C | 800 | C | 50 | B | 540 | C | 1.8 ⁺ | C | 1 |
| Volcanic | C | 12 | C | 60 | C | 750 | C | 50 | B | 540 | C | 1.8 ⁺ | C | 1 |
| Peat | C | 12 | C | 60 | C | 750 | C | 50 | B | 540 | C | 1.8 ⁺ | C | 1 |

* unless a lake is already above this value, in which case the water quality is to not decline

+1.8mm³/L biovolume equivalent of potentially toxic cyanobacteria or 10mm³/L total biovolume of all cyanobacteria

Current state data for monitored lakes

| Lake | FMU | Attribute | | | | | | |
|-------------|----------|--|---|--|--|--|--|--|
| | | Median Chlorophyll α (mg/m ³) | Maximum Chlorophyll α (mg/m ³) | Median total Nitrogen (mg/m ³) | Median total Phosphorus (mg/m ³) | 95 th percentile <i>E. coli</i> (E. coli/100ml) | 80 th percentile cyanobacteria (biovolume mm ³ /L) | |
| Otamatearoa | Dune | 2 | 8 | 440 | 10 | 0.01 | | |
| Waikare | Riverine | 91 | 300 | 2600 | 154 | 0.01 | 21.0 | |
| Whangape | Riverine | 57 | 850 | 1860 | 119 | 0.01 | 17.0 | |

| Lake | Attribute | | | | | | |
|------------------|-----------|--|---|--|--|---|--|
| | FMU | Median Chlorophyll <i>a</i> (mg/m ³) | Maximum Chlorophyll <i>a</i> (mg/m ³) | Median total Nitrogen (mg/m ³) | Median total Phosphorus (mg/m ³) | 95 th percentile <i>E. coli</i> (<i>E. coli</i> /100ml) | 80 th percentile cyanobacteria (biovolume mm ³ /L) |
| Ohinewai | Riverine | 49 | 105 | 2200 | 110 | 0.01 | |
| Okowhao | Riverine | 50 | 130 | 1700 | 120 | 0.01 | |
| Hakanoa | Riverine | 37 | 172 | 1440 | 96 | 0.01 | 3-9 |
| Waahi | Riverine | 23 | 380 | 1100 | 62 | 0.01 | 0.6 |
| Rotoroa | Peat | 9 | 18 | 710 | 21 | | |
| Mangahia | Peat | 66 | 120 | 3030 | 650 | 0.22 | |
| Millich | Peat | 29 | 300 | 1610 | 75 | 0.03 | |
| Maratoto | Peat | 8 | 55 | 1970 | 23 | 0.55 | |
| Mangakaware | Peat | 83 | 230 | 1770 | 235 | 0.04 | |
| Rotomanuka | Peat | 11 | 22 | 1010 | 18 | 0.10 | |
| Serpentine North | Peat | 13 | 74 | 1280 | 29 | 0.04 | |
| Serpentine East | Peat | 10 | 42 | 1320 | 26 | 0.08 | |
| Serpentine South | Peat | 17 | 49 | 1100 | 38 | 0.01 | |
| Ngaroto | Peat | | | | | | 6.4 |
| Tutaenanga | Volcanic | 15 | 180 | 1600 | 160 | 0.02 | |
| Ngahewa | Volcanic | 32 | 100 | 950 | 140 | 0.01 | |

Part E Provisions

E.1 Overview of the sections in Part E

An evaluation report must examine whether the proposed provisions (including policies, rules, associated tables, maps, and schedules) in Plan Change 1 are the most appropriate way of achieving the objectives. To determine this, the provisions in Plan Change 1 are grouped in the manner set out below, and an evaluation is then carried out for each group that:

- identifies other reasonably practicable options (section 32(1)(b)(i));
- examines the efficiency and effectiveness of the proposed provisions at achieving the identified objectives (section 32(1)(b)(ii));
- provides an overall evaluation summary of the reasons for deciding on Plan Change 1 provisions (section 32(1)(b)(iii)); and
- uses a level of detail in the assessment that corresponds with the scale and significance of the effects anticipated from the implementation of Plan Change 1 provisions (section 32(1)(c)).

The evaluation does not include full details of the technical assessments undertaken that support Plan Change 1. A full list of the technical reports and other information relied on is included in the reference list contained in Part C 'Technical Information'.

In addition to what is specified in s32 of RMA, and in the Ministry for the Environment guidance,⁽¹³⁾ relevant criteria from the PSC have also been considered in the evaluation of the provisions' effectiveness and efficiency criteria.

For the purposes of evaluation, the provisions have been grouped into topics as set out below. This approach has been taken because these topics are the drivers behind Plan Change 1. Due to the interrelated nature of the issues, the responses proposed to address them (that is, the provisions in Plan Change 1) are an integrated package, and therefore the evaluation, while broken into topic groupings, should be considered as a whole.

Plan Change 1 represents a change in management of water and land from the current Waikato Regional Plan to ensure that Waikato Regional Council is adapting to changing legislative requirements and water quality issues that have arisen.

The following chapters identify reasonably practical options (policies, rules and methods) that could be adopted to achieve the objectives. The evaluation then considers which options are the most appropriate given their likely effectiveness and efficiency, and identifies those policies, rules and methods to be recommended for inclusion in Plan Change 1 and summarises the reasons for deciding on the provisions.

There are seven key policy areas discussed in this section:

1. E.2 'Staging the transition to the 80 year goal'
2. E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'
3. E.4 'Restricting land use changes'
4. E.5 'Managing point source discharges'
5. E.6 'Managing Whangamarino Wetland'
6. E.7 'Flexibility of the use of Te Ture Whenua and settlement land'
7. E.8 'Prioritisation and sub-catchment planning'

E.9 'National Environmental Standards' are also addressed in this Part of the document.

Each key policy area is assessed under the following headings:

- Plan Change 1 provisions
- Reasonably practicable options considered for achieving the objective
- Explanation of the options
- Evaluation of options and reasons for the preferred options, with a focus on efficiency and effectiveness
- Effectiveness of the preferred approach

¹³ Ministry for the Environment 2014. A guide to section 32 of the Resource Management Act 1991. Wellington, New Zealand.

- Effectiveness has been evaluated as the success of the proposed policy package in achieving the Plan Change 1 objectives, or the extent to which progress will be made towards achieving the objectives (if it is not practical to meet them). Refer to table 'Explanation of the effectiveness criteria for evaluation in this Section 32' for details on the criteria for the effectiveness evaluation.
- Efficiency of the preferred approach
 - The efficiency assessment includes assessing the anticipated benefits and costs of the effects of the preferred policy package on: environmental, economic (including opportunities for economic growth to be provided or reduced, and employment to be provided or reduced), social, and cultural matters, along with the CSG's Policy Selection Criteria (optimising environmental, social and economic outcomes). (Refer to section B.4 'Developing the Policy Selection Criteria'.)
- Assessment of risk: certainty and sufficiency of information
- Overall assessment of appropriateness and reasons for deciding on the provisions for Plan Change 1
- Bibliography of reports and documents.

Approach to efficiency and effectiveness assessments

The assessment of the efficiency and effectiveness of the proposed provisions relates to the achievement of Plan Change 1 objectives. The full list of Plan Change 1 objectives are set out in Part D 'Objectives'. While all the objectives must be considered, some are more relevant than others for evaluation of particular groupings of provisions. Both efficiency and effectiveness are therefore assessed against the particularly relevant objectives for each group of provisions.

The efficiency and effectiveness assessment identifies and assesses the benefits and costs of the environmental, economic, social, and cultural effects anticipated from the implementation of the provisions, including expected changes to economic growth and employment opportunities (section32(2)(a)). Where practicable, costs and benefits are quantified (section32(2)(b)).

| | |
|---------------------------------|--|
| Relevance | How effective provisions are in achieving the objective(s) Provide clear policy direction and decision making |
| Feasibility | Within council's powers, responsibilities and resources Degree of risk and uncertainty of achieving objectives Ability to implement, monitor and enforce |
| Acceptable | Level of equity and fair distribution of impacts Level of community acceptance Likely political acceptance |
| CSG's Policy Selection Criteria | Realistic to implement, monitor and enforce Acceptable to the wider community Allows for flexibility and inter-generational land uses |

Explanation of the effectiveness criteria for evaluation in this Section 32

Scale and significance

Section 32(1)(c) requires that the evaluation report contains a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

The level of detail contained in the evaluation sections of this report reflects the scale and significance of the changes proposed.

It is noted that the effects of the provisions will be widespread and will affect many rural properties, as the controls applying to farming activities are changing.

Plan Change 1 is considered to be a departure from the current approach to resource management in the Waikato and Waipa River catchments. The evaluation sections have taken these considerations into account, and therefore the level of detail in the analysis corresponds with the scale and significance of the proposed changes.

Integration with current Waikato Regional Plan provisions

When considering changes to the Regional Plan the following principles were identified:

- Do not duplicate what is in the Regional Plan, or other RMA documents, such as the RPS.
- If provisions are working satisfactorily there is no need to remove or duplicate them in new rules. For example, permitted activity conditions for roading, tracking and vegetation clearance.
- Ensure that existing rules do not cut across the intent or application of the new rules.

E.2 Staging the transition to the 80 year goal

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to staging the transition to the 80 year goal.

E.2.1 Plan Change 1 Provisions

The policies being evaluated are:

Policy 5: Staged approach/Te Kaupapa Here 5: He huarahi wāwāhi

Policy 7: Preparing for allocation in the future/Te Kaupapa Here 7: Kia takatū ki ngā tohanga hei ngā tau e heke mai ana

Policy 17: Considering the wider context of the Vision and Strategy/Te Kaupapa Here 17: Te whakaaro ake ki te horopaki whānui o Te Ture Whaimana

The methods being evaluated are:

Method 3.11.4.7: Information needs to support any future allocation/Ngā pārongo e hiahiatia ana hei taunaki i ngā tohanga o anamata

Method 3.11.4.8: Reviewing Chapter 3.11 and developing an allocation framework for the next Regional Plan/Te arotake i te Upoko 3.11, te whakarite hoki i tētehi anga toha mō te Mahere ā-Rohe e whai ake ana

Method 3.11.4.10: Accounting system and monitoring/Te pūnaha kaute me te aroturuki

Method 3.11.4.11: Monitoring and evaluation of the implementation of Chapter 3.11/Te aroturuki me te arotake i te whakatinanatanga o te Upoko 3.11

Method 3.11.4.12: Support research and dissemination of best practice guidelines to reduce diffuse discharges/Te taunaki i te rangahautanga me te tuaritanga o ngā aratohu mō ngā mahi tino whai take hei whakaiti i ngā rukenga roha

The relevant objectives are:

Objective 2: Social, economic and cultural wellbeing is maintained in the long term/Te Whāinga 2: Ka whakaūngia te oranga ā-pāpori, ā-ōhanga, ā-ahurea hoki i ngā tauroa

Waikato and Waipa communities and their economy benefit from the restoration and protection of water quality in the Waikato River Catchment, which enables the people and communities to continue to provide for their social, economic and cultural wellbeing.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

Objective 4: People and community resilience/Te Whāinga 4: Te manawa piharau o te tangata me te hapori

A staged approach to change enables people and communities to undertake adaptive management to continue to provide for their social, economic and cultural wellbeing in the short term while:

- a. considering the values and uses when taking action to achieve the attribute targets for the Waikato and Waipa Rivers in Table 11-1; and
- b. recognising that further contaminant reductions will be required by subsequent regional plans and signalling anticipated future management approaches that will be needed to meet Objective 1.

E.2.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long term and short term numerical and narrative freshwater objectives.

| | Reasonably Practicable Options | Description |
|---|--|--|
| 1 | No staging - achieve Vision and Strategy in the life of Plan Change 1 | Set policies and methods, including rules, that can achieve the objectives in the life of Plan Change 1 |
| 2 | Staged approach, make a start at reductions and prepare for future reductions and future allocation that considers principles including land suitability outlined in Plan Change 1 | Set up a staged approach to achieve the 80 year water quality objective over time. Require reductions now that achieve the first stage of change, and signal that future reductions will be required, outlining the principles for setting future property-level limits. Gather information for the next plan change, to enable the allocation of property-level limits for discharge of contaminants based on land use suitability in the future. |

Reasonably practicable options for staging the transition to the 80 year goal

E.2.3 Explanation of options

Option 1: No staging - policies, methods and rules are a complete package to achieve objectives of Plan Change 1

This option aims to develop a complete package of policies, rules and non-regulatory methods that will achieve the objectives of Plan Change 1. The provisions are a comprehensive means of achieving objectives. While they may be reviewed as part of the standard RMA requirement to review plans that have been operative for ten years, at the time Plan Change 1 is notified, the provisions are considered sufficient to meet the objectives.

Option 2: Staged approach, make a start at reductions and prepare for future reductions and future allocation that considers principles including land suitability outlined in Plan Change 1

This policy option involves implementing Plan Change 1 as a 10 year programme of work that is the first of a number of subsequent plan changes. Together with Plan Change 1, these plan changes will achieve the overall 80 year water quality targets.

Under this approach, the detail of what is needed to fully meet the 80 year water quality goal is left for future plan reviews. The focus is on making a start at reductions, with preparatory work undertaken to inform further reductions in contaminant discharges in future. This option has methods that support gathering information for any future setting of property-level limits for discharges, by collecting reference information, which would then be used in aggregate to estimate catchment loads and therefore inform future decisions on how to manage the level of individual landowners' discharges.

A staged approach that does not set out the detail of each stage in the form of rules that come into effect in future years, can only indicate the preferred direction for future plan reviews. The aim is to signal to landowners the preferred option of introducing a future allocation approach for property-level limits based on principles for allocation including land use suitability. Preparing for future reductions can include seeking opportunities to undertake actions, such as those that support biodiversity outcomes and contribute to long term achievement of the Vision and Strategy. This seeks to encourage actions now that are anticipated to contribute to the full range of long term goals.

E.2.4 Evaluation of options and reason for preferred option

Option 1: No staging - policies, methods and rules are a complete package to achieve the objectives of Plan Change 1

This option focuses on developing policies, non-regulatory methods and rules as a comprehensive and complete package that will achieve the objectives of Plan Change 1. This means that the provisions will achieve both the biophysical-focused Objectives 1, 3 and 6, and the people and community-focused Objectives 2, 4 and 5. For instance, the provisions would ensure sufficient

uptake of mitigations that will reduce contaminants from diffuse and point sources, and sufficient supporting provisions that will restore Whangamarino wetland and ensure people and communities can provide for their wellbeing as actions are being carried out.

Some sort of step-wise approach over many years is anticipated by Objective 4, where the outcome sought is that people and communities continue to provide for their social, economic and cultural wellbeing and are able to undertake adaptive management. One way that policy provisions could be designed to meet this objective is for Plan Change 1 to contain rules that do not come into force immediately. Policies and rules could explicitly set out a series of numerical reductions in diffuse and point source contaminants. The key aspect of Option 1 is that both the desired outcomes and the pathway to get there is known and written into Plan Change 1. In that case, implementing the provisions in stages is more about spreading the implementation effort. Therefore Plan Change 1 is complete but is implemented in a series of steps that could span many years.

This option is in contrast to provisions in Option 2 below, where the policies, non-regulatory methods and rules are acknowledged to be a transitional approach that will be necessary to adapt into a new approach in ten years.

Information needs to enable a comprehensive package to achieve objectives

In order for policy provisions in Plan Change 1 to be a complete package to achieve the objectives, there must be confidence that sufficient information is available now to make decisions. There are risks associated with acting when insufficient information is available. For example, if rules containing specific numerical reductions at a property scale are put in place under this option to achieve the long term water quality targets in Objective 1, the risk is that resource users undertake changes that have to be reversed if the policy provisions are reviewed and found to be ineffective. Therefore, to be the most appropriate way of achieving the objectives, this option would rely on information that would allow for robust decisions now on allowable aggregate catchment level loads and how to allocate them to individual properties. In addition, policy provisions would be sufficiently developed to include clear criteria for allocating rights to discharge.

Objective 1 contains long term water quality targets in the form of attributes that are linked to nitrogen, phosphorus, sediment and microbial pathogens. The level at which the targets are set is consistent with the Vision and Strategy/Te Ture Whaimana. This included a need to see no decline in water quality at any monitoring site, and an expectation of improvement everywhere (consistent with protecting and restoring water quality). When this future scenario was modelled (Doole 2015), the modelling showed that achieving the water quality would require many changes on the land. Even with full use of the current suite or 'toolbox' of mitigations available and with major land use change anticipated, not all of the attribute bands associated with Objective 1 could be achieved, with the closest approximation still requiring over 290,000 hectares of land to move out of pasture and into trees. An 'innovation gap' was referred to, meaning that full achievement of the water quality in Objective 1 would require technologies or practices that are not yet available.

Discharges of contaminants have different effects depending on where they occur. In order to choose policy provisions that are the most effective and efficient, a spatial element would be part of the decision making. Rather than apply the same requirements regardless of the location of the existing or new discharge, a spatial approach would include taking into account the downstream flow of water, and the underlying rock and soil type. A contaminant may also be delayed or removed through attenuation processes, which may occur from the time it is first discharged, to when it reaches surface or groundwater or later as it is carried downstream. A spatial approach could target particular sub-catchments and identify the reductions in contaminants needed at a property level, to find the most cost-effective ways of achieving the objectives. This approach was considered and set aside due to information gaps. These included gaps in knowledge about land uses and practices currently being undertaken, and the resulting level of discharges, as well as uncertainty about the timing and effect in the rivers due to lag times and attenuation factors.

Specifying future limits and property-level allocations now would mean that landowners may not be able to be recognised for, or take advantage of, any developments made in technology or practice innovation in that time.

This option is not considered the most appropriate way to achieve the objectives.

Option 2: Staged approach, make a start at reductions and prepare for future reductions and future allocation that considers principles including land suitability outlined in Plan Change 1

Policy 5 sets out the course of action. The focus is on making a start on discharge reductions and preparing for further reductions and allocation of property-level discharges over time. This policy option recognises that the land use changes required to meet the water quality goal of the Vision and Strategy/Te Ture Whaimana would result in significant social and economic effects on landowners, if implemented too rapidly.

This option clearly sets the 80 year goal and focuses on actions and information collection that needs to happen to get the first step along the way, while preparing for future policy development.

An example of policy provisions that take a staged approach where new provisions are implemented in stages, and where it is acknowledged that the package is not comprehensive and that more information is needed to fully achieve the objectives, is the Selwyn Waihora Catchment Regional Plan Change, currently being implemented by Canterbury Regional Council. When the Regional Plan is reviewed, these provisions would be assessed as to their effectiveness, and could either be adjusted or remain as they are.

This option seeks to minimise social disruption and allow for innovation and new practices to develop, by setting a realistic approach for the next 10-year period, while recognising that in the future more stringent policy requirements and targets and limits will be needed. Importantly, this option enables the use of innovations and development of new practices, and adaptive management in light of new information collected.

This policy option (Policy 7) supports the implementation of the policies and methods in Chapter 3.11, focusing on the collection of information and research to prepare for further reductions, and principles for allocation of discharges based on land suitability in the future.

Policy 7 signals the allocation principles regarding how responsibility for reducing contaminant discharges will be allocated in the next plan change. This option also supports the collection of property-specific information from landowners, in order to inform the setting of catchment-level loads in the future. This option would involve collecting information, developing processes and standards and commissioning research (if required) to support any future setting of property level limits for contaminants, including information that assists in defining the key principle of land suitability.

Policy 7 signals to the community that future allocation will occur and will use the data collected from farms and other discharges to set aggregate catchment loads. This option signals that any opportunity for increased discharges would need to be consistent with the principles for the future allocation framework (for example, some may be able to change use under a land suitability style of allocation) (WRC 2015, Document# 3673247). The inclusion of the concept of land suitability in Policy 16 ensures that decision making on consents for the change in the use of Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land considers the suitability of land for development, increasing the likelihood that land use change allowed now can remain into the future.

The constraints on land use change (refer to the section evaluating E.4 'Restricting land use changes') are proposed as an interim measure, until a future plan change introduces a new approach to allocating discharges of sediment, nutrients and microbial pathogens from point sources and diffuse discharges. At that point, the principles for allocation that are described in Plan Change 1 can be brought into the allocation framework to support property-level limits. The principles for future allocation include the concept of land suitability as the starting point for decisions on the allocation process in the future. Land suitability reflects biophysical and climate properties, the risk of contaminant discharges from that land, and the sensitivity of the receiving water body. Further information gathered about lake condition could also feed into assessing land suitability.

Policy 17 supports the preparation for the future by encouraging actions now to enhance biodiversity, wetland values, ecosystem functioning, access, and recreational values that are part of the wider goals of the Vision and Strategy/Te Ture Whaimana.

It is acknowledged in Method 3.11.4.7 that Plan Change 1 is a transition, and that future plan reviews will involve a discharge allocation framework for reducing contaminants.

On its own, this approach would not manage any increased discharges from intensification over the life of Plan Change 1. This therefore requires complementary provisions that manage discharges during the preparation period.

These policies in isolation do not contribute to water quality outcomes in Plan Change 1, but support the intergenerational approach being taken to addressing water quality problems. This approach signals that property-specific limits for the allocation of contaminant discharges are likely to be a critical part of any future plan changes.

This option is considered the most appropriate way to achieve the objectives.

Having regard to this information, it is the Council's view that policies and other methods to implement Option 2 (Staged approach, make a start at reductions and prepare for future reductions and future allocation that considers principles including land suitability outlined in Plan Change 1) is the most appropriate way to achieve the objectives of Plan Change 1.

E.2.5 Effectiveness of Option 2: staged approach, make a start at reductions and prepare for future reductions and future allocation

Effectiveness is evaluated as the success of the proposed provisions in achieving the long term and short term numerical and narrative objectives, or the extent to which progress will be made even if the objectives are not to be met. Refer to [Explanation of the effectiveness criteria for evaluation in this Section 32](#) for criteria used in the effectiveness evaluation.

E.2.5.1 Relevance

The staged approach makes a start on reducing discharges, taking actions that contribute to the Vision and Strategy/Te Ture Whaimana, and gathering information, with the aim of preparing for property-level limits for contaminants based on land suitability in the future. The preferred policy approach seeks to build the momentum in Plan Change 1 towards meeting the aspirational limits and targets in the water (80 years). Future plan changes would need to continue this focus and work towards long term limits and targets under the guidance of the policy provisions in Plan Change 1. These policies are supported by other methods that emphasise the importance of collecting data and developing systems to support limits set for contaminant discharges based on land suitability in the future.

Setting short term targets ensures that the necessary work is not delayed, becoming the responsibility for future generations.

The Council must also be able to monitor progress towards these targets, with provision for review and modification, including consideration of the need for more stringent policies and rules being set out in future plan changes to ensure the long term targets will be met in 80 years.

What needs to occur between 2016 and the next plan change?

Waikato Regional Council, with partners and other agencies, will need to keep working together, so that when Plan Change 1 is reviewed in ten years, there is substantive progress to report, including the following:

- Land use conversion is controlled, rules have addressed the most risky land management practices, and there have been reductions in diffuse contaminants leaving farming properties.
- Progress is recorded on changes to land practices (and point source discharges), and some changes in the water are starting to be seen.
- Sufficiently robust information is collected to support new policy development.
- More knowledge exists about the effect of discharges in different locations in the catchment – spatial differences, and suitable use of land from a water quality point of view.
- Locations in sub-catchments have been identified to maximise the benefits from ‘large scale’ mitigations such as afforestation and large constructed wetlands.
- Research and trials have been conducted of farm mitigations or land uses that lower the environmental footprint of pastoral/cropping/vegetable farms, that can be applied in future action and policy.
- Confidence about property-level modelling of diffuse contaminants has increased (*Overseer* and other models), so that modelling can be used by all sectors and properties, and used in aggregate to support allocation.
- Systems to support allocation based on land suitability have been developed.
- Experience and relationships have been continuously built at a co-governance and agency level, to implement current provisions of Plan Change 1 and to support future progress towards achieving the Vision and Strategy/Te Ture Whaimana.

The methods in Plan Change 1 encourage the processes above, and the policies and rules are designed to support the actions that will contribute to progress. It is expected that this progress will be further supported by other Council programmes.

E.2.5.2 Feasibility

The policy package, including the emphasis on landowners providing information (through the rules) is a feasible way to highlight the importance of managing contaminants to all landowners.

There are additional benefits from these policies that support opportunities beyond Plan Change 1, and the gathering of information will support decision making and strengthen programmes undertaken by council, landowners and industry.

The ability for Plan Change 1 to direct what happens in the next plan change may be somewhat uncertain however, the judgement has been made to include principles to signal how property level limits may be set in the future.

This approach stops short of implementing the desired allocation framework now, but focuses on collection of information that will support the development of this framework in a robust way to enable the setting of appropriate property-level limits possibly based on land suitability in the future. In the interim, it still gives a level of certainty about achieving the objectives (by providing the means to track progress and assess whether more needs to be done in the future if short term limits are not met).

In order to prepare for allocation based on land suitability, two types of information will need to be gathered - land management information, in terms of both land use practices (such as, fertiliser use, stocking rate) and mitigations that have been implemented, and information on the effect on water quality of these land use practices (TLG 2016, Document# 8751223). Information on land use practices will provide a direct measure of policy effectiveness, and will also provide data for modelling the water quality benefits that will accrue as a result of implementation of the policy, taking into account the best knowledge of attenuation factors and time lags. Knowledge of the changes in land management (including the actual mitigations undertaken and the sub-catchment they are in), will provide the detailed input data required for modelling to predict the expected state of water quality once it reaches equilibrium. It is feasible to collect an appropriate level of information over the next ten years, if data is gathered and supplied by landowners through the rules in Plan Change 1. This data could be aggregated and used for the sizable task of technical modelling to determine sub-catchment loads for allocation.

Plan Change 1 will dramatically increase the number of properties that will need to collect and submit information to the council. The council expects approximately 10,000 properties will need to register, and approximately 5000 properties will need to develop a Farm Environment Plan and calculate a Nitrogen Reference Point. At minimum, some 2500 properties are expected to need a resource consent to farm. The Council will need to develop new information technology systems to capture this information. In order to minimise data handling and administration, the Council anticipates developing an online e-portal, which will assist landowners to directly submit their land management information in the Council's databases. Other councils and industries are already using this type of system, and Waikato Regional Council expects to be able to benefit from their knowledge. While the information capture will be challenging, it is considered achievable.

While guidance can be provided in Plan Change 1, the policies, rules and methods are reliant on the next plan change following the directions provided (that is, the approach to allocation and choosing to set property level limits to achieve a greater scale of reductions across the catchments).

E.2.5.3 Acceptability

The staged approach enhances acceptability for landowners by allowing them time to adjust current practices and make progress towards the long term targets, while minimising social disruption in the transition. This approach can also provide the community with some assurance regarding not only the changes required now, but also that there is a pathway forward, with the future approach being signalled in Plan Change 1. Some may feel that a faster pace of change and more controls are justified in the short term. Others may consider that the timeframes set out are too ambitious.

This approach means that the public would have information on the short term and long term targets, the actions required to meet the short term targets, and future monitoring will indicate whether the water quality is responding to the actions taken. This information would also be available to inform subsequent plan changes, when more is known on the lag effect of mitigation actions on the land and past land uses and management. Provisions and actions can then be modified in line with this information. This supports an intergenerational responsibility for managing water quality over time.

E.2.5.4 CSG's Policy Selection Criteria

Some relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

The changes required to meet the long term limits and targets are far-reaching and could have major implications on maintaining vibrant communities and the region's economy. The staged approach provides the opportunity for people to adjust, and review the approach through subsequent plan changes. This recognises there is a need to move forward with some caution in light of gaps in current knowledge and the potential that further mitigations could be available longer term to meet the water quality objectives.

This approach recognises the value in collecting information from landowners on farm-level management actions to provide data to help determine sub-catchment loads that can then be allocated to landowners. It allows time to develop the most appropriate allocation framework and to fully understand how to apply the concept of land suitability as the starting point for that framework.

Therefore the policy package chosen is to apply a set of rules that are focused on information gathering from landowners and supporting this with other methods focused on developing contaminant discharge property-level limits for the future. This information will be used to prepare for and assist in the development of future plan changes. With a stronger information base it is considered that future policy can be developed to further manage water quality beyond the short term targets. This needs to be complemented by policy provisions that manage, and start making reductions in, contaminant discharges during the first stage.

E.2.5.5 Summary of effectiveness

It is expected that the implementation of 'Option 2: Staged approach, make a start at reductions and prepare for further reductions and allocation based on land suitability in the future', would provide a sound platform for moving towards the 80 year target for water quality. Some of these policy package components (rules requiring information, or methods preparing for future allocation and collection of information) on their own would not make a direct difference to water quality in the short term. Rather, the approach sets a pathway forward by indicating that there will need to be a series of plan changes over time and that these need to be informed by additional data and system development. Property-level limits can then be set in a future plan change, using information collected in this Plan Change, and incorporating the allocation principles signalled.

These policies (Policy 5, 7 and 17) and supporting methods provide guidance on the need for an inter-generational approach to managing water quality, in order to meet the 80 year target for water quality.

This approach would be supported by, and integrated with, the other proposed provisions as set out in Plan Change 1, while recognising that there are economic and social adjustments that people will need to make over time, in order to meet the water quality objectives.

E.2.6 Efficiency of Option 2: staged approach, make a start at reductions and prepare for future reductions and future allocation

| Option 2: Staged approach, make a start at reductions and prepare for future reductions and future allocation | | |
|---|---|--|
| | Benefits | Costs |
| Environmental | <p>Actions to bring about water quality change are encouraged in the short term.</p> <p>Future allocation and limits will be based on a better understanding of land suitability and improved data gathered at property level, rather than modelling estimates.</p> <p>Intervention efforts would be prioritised to those areas where the water quality needs the most improvement. This can support more focus on cost-effective efforts to improve lakes and wetlands.</p> <p>Additional monitoring of water quality will inform understanding of trends and support limit setting.</p> <p>Support for opportunities for enhancement of Vision and Strategy matters outside scope of Plan Change 1.</p> | <p>Long term limits and targets would not be met until 80 years' time, so environmental benefits will not be fully achieved in Plan Change 1.</p> <p>There will be lag effects of past management before tangible benefits are seen for the rivers and water bodies from the actions arising from Plan Change 1.</p> |

| | | |
|---|---|--|
| <p>Economic</p> <p>(including opportunities for economic growth or reduction and employment to be provided or reduced)</p> | <p>It will cost less to start on the pathway now, than to address worsening water quality in the future (if nothing is done now).</p> <p>Allocation based on land suitability set in the future will be based on a more robust analysis and data set, and can be fully canvassed with the community before coming into effect.</p> <p>Allocation principles for the future are signalled now, allowing for business planning.</p> | <p>Some impacts are expected on catchment level profit, with flow-through effects to the regional and national economy and jobs.</p> <p>Not setting allocation based on land suitability in place immediately creates a degree of uncertainty for landowner investment decisions.</p> <p>Costs to ratepayers and the community will be incurred as they pay to support plan changes in the short term and in the future.</p> |
| <p>Social</p> | <p>Staged approach provides some time for landowners to plan for and take action, providing people and communities with time to adapt.</p> <p>The options together reduce potential social disruption by allowing a transition.</p> <p>The emphasis on information gathering is a key way of informing landowners of water quality issues and future challenges.</p> | <p>Some community and stakeholder values and uses will not be fully met in the short term due to the staged approach and actions needing to occur in the future.</p> <p>Having to wait for improvements towards meeting the community values and uses for water quality may have flow-on effects on people's use and enjoyment of water resources.</p> |
| <p>Cultural</p> | <p>Recognition of the need for an intergenerational approach to improving water quality to meet the Vision and Strategy.</p> | <p>Some impacts on cultural values and uses dependent on water quality will continue to be felt over time until long term targets are met.</p> |
| <p>CSG's Policy Selection Criteria</p> <p>Optimising environmental, social and economic outcomes</p> | <p>The approach allows for any future allocation limits to incorporate data that is gathered at a property level, as opposed to only a modelling estimate.</p> <p>The approach gives all landowners early signals on the need to make increasing levels of reduction in contaminants over time, and the anticipated allocation principles.</p> <p>Sets up systems to allow for further reduction over 80 years.</p> | <p>While Plan Change 1 signals the intent for the future, the policy approach to allocation could also vary in the future, reducing certainty that works invested in now by landowners are recognised or relevant in any future policy framework.</p> |

Efficiency of staged approach, make a start at reductions and prepare for future reductions and future allocation

E.2.6.1 Summary of efficiency

To effectively implement an intergenerational approach to meeting the water quality aspects of the Vision and Strategy within the scope of Plan Change 1, careful consideration has been given to the timeframe, the costs of the change and the broader environmental, social, cultural and economic impacts. This approach aims to strike a balance between improving water quality and providing time for landowners and the broader community to adjust and prepare for the future changes that will be required to make meaningful long term improvements to water quality.

The full benefit of information collected for determining future allocation regimes will not be realised until future plan changes set property-level limits based on land suitability. However, the learning, research and processes identified will still provide some value during the life of Plan Change 1.

Setting progressive limits and targets will provide time for landowners to make changes, and for communities to adjust to the impacts of those changes. It does, however, mean that there is a time delay for some community values and uses to be fully realised. This recognises the significance of the 80 year goal for desired water quality.

E.2.7 Assessment of risk: certainty and sufficiency of information

Section 32 of the RMA requires the evaluation of the efficiency and effectiveness of the provisions in achieving the objectives to take account of the risk of acting or not acting, if there is uncertain or insufficient information about the subject matter of the policies, rules or other methods.

Regarding fresh water, there is sufficient information available to analyse the appropriateness of acting or not acting, because there is sufficient information to demonstrate the scale and extent of the effects of resource use on the water resource. In particular, for contaminants in some sites the water quality in the Waikato and Waipa River catchments is declining, or does not meet the expectations of the Vision and Strategy, and/or does not meet the bottom lines in the NPS-FM.

There was significant data collection, analysis and modelling undertaken to support the Plan Change 1 process. This included catchment modelling of a range of scenarios for water quality improvement, including the mitigation actions that would be required. This work identified that there are currently insufficient mitigation tools to meet the 80 year water quality objectives (large scale land use change was the only mitigation tool that achieved the long term objectives).

Reports were commissioned by TLG to consider the potential environmental, economic, social and cultural impacts of choices for freshwater objectives and limits. The modelling of economic impact and integrated assessment evaluated a range of scenarios for improving water quality. As with all modelling of this nature, the results generated needed to be interpreted with care. The purpose of these studies was to integrate environmental and economic information in a way that can support discussions and decisions about the potential impacts of different water quality choices.

The modelling shows that there will be costs imposed on resource consent applicants and landowners to bring about the changes in water quality required. Other costs will be borne by local authority ratepayers.

There is a risk that by choosing not to act earlier on setting property level limits (that is, leaving allocation to be addressed in the next plan change) that the job of improving water quality in future plan changes will be more onerous. This is only a risk if Plan Change 1 fails to hold discharges at current levels and begin the process of making reductions. This means that the provisions to hold and reduce contaminants (land use change rule, rules supporting the no increases in discharges from the Nitrogen Reference Point and reduction to the 75th percentile nitrogen leaching value) are important as part of this staged process.

There is a risk that public and community expectations around the pace of water quality improvement will not be met. Any shortcomings in Plan Change 1 will mean that more responsibility for improving water quality will be borne by dischargers in the future.

The risk of not acting in the way proposed is that Waikato Regional Council would not be acting in accordance with Section 30(1)(c)(ii) and (fa) of the Resource Management Act, which includes the control of the use of land for the purpose of the maintenance and enhancement of the water quality in water bodies and the establishment of rules in a regional plan to allocate the capacity of water to assimilate the discharge of a contaminant. Further, not including additional policies and methods would mean that the adverse effects of land use activities would continue to occur and result in the continued degradation of the quality of freshwater. This would also be contrary to the NPS-FM and the Vision and Strategy.

E.2.8 Overall assessment of appropriateness and reasons for deciding on provisions

There are significant social and economic implications arising from meeting the long term water quality goals and the Vision and Strategy. Landowners and communities will need to make adjustments over time to the way they use land and manage discharges of nitrogen, phosphorus, sediment and microbial pathogens. This has been weighed against the efficiency and effectiveness of the the preferred option (staged approach, make a start at reductions and prepare for further reductions and future allocation that considers principles including land suitability outlined in Plan Change 1), against alternative, more abrupt, approaches. The decision has to been made to start with taking manageable steps that will build on each other over time.

This does present its own tensions that impact on the efficiency of the options, such as a delay in landowners knowing what they are working towards, or accessing opportunities for flexibility of land use.

The judgement has been made that further work is needed to set allocation limits from land using an allocation framework that is not derived from current discharges, but is based instead on land suitability. This includes collecting data at a property level to establish catchment loads, and developing knowledge of the land's ability to assimilate contaminants that is spatially specific enough to support property-level limits.

Continuing reductions in diffuse discharges of contaminants will be required over a timeframe well beyond the scope of Plan Change 1. Therefore the proposed policy provisions give guidance on future actions and signal that future reductions that will be required.

To achieve the long term and short term freshwater objectives, improving the quality of current diffuse discharges will be an important management challenge. This requires an awareness of the need to take reasonably practical options over time to reduce contaminant levels, recognising that future plan changes will also be required to bring about further reductions under new regulatory controls.

E.2.9 Bibliography for Part E.2

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E.3 Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to making reductions in diffuse discharges.

E.3.1 Plan Change 1 Provisions

The policies being evaluated are:

Policy 1: Manage diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens/Te Kaupapa Here 1: Te whakahaere i ngā rukenga roha o te hauota, o te pūtūtae-whetū, o te waiparapara me te tukumate ora poto

Policy 2: Tailored approach to reducing diffuse discharges from farming activities/Te Kaupapa Here 2: He huarahi ka āta whakahāngaihia hei whakaiti i ngā rukenga roha i ngā mahinga pāmu

Policy 3: Tailored approach to reducing diffuse discharges from commercial vegetable production systems/Te Kaupapa Here 3: He huarahi ka āta whakahāngaihia hei whakaiti i ngā rukenga roha i ngā pūnaha arumoni hei whakatupu hua whenua

Policy 4: Enabling activities with lower discharges to continue or to be established while signalling further changes may be required in the future/Te Kaupapa Here 4: Te tuku kia haere tonu, kia whakatūria rānei ngā tūmahi he iti iho ngā rukenga, me te tohu ake ākuanei pea me panoni anō hei ngā tau e heke mai ana

Policy 8: Prioritised implementation/Te Kaupapa Here 8: Te raupapa o te whakatinanatanga

The rules, schedules and other methods being evaluated are:

Rule 3.11.5.1: Permitted Activity Rule - Small and low intensity farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi iti, ngā mahi pāiti hoki i runga pāmu

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ētehi atu mahi i runga pāmu

Rule 3.11.5.3: Permitted Activity Rule - Farming activities with a Farm Environment Plan under a Certified Industry Scheme/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.4: Controlled Activity Rule - Farming activities with a Farm Environment Plan not under a Certified Industry Scheme/Te Ture mō ngā Mahi ka āta Whakahaerehia – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu kāore i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.5: Controlled Activity Rule - Existing commercial vegetable production/Te Ture mō ngā Mahi ka āta Whakahaerehia – Te whakatupu hua whenua ā-arumoni o te wā nei

Rule 3.11.5.6: Restricted Discretionary Activity Rule - The use of land for farming activities/Te Ture mō ngā kōwhiringa mahi e herea ana – te whakamahinga o te whenua mō ngā mahinga pāmu

Schedule A - Registration with Waikato Regional Council/Te Āpitihanga A – Te rēhita me te Kaunihera ā-Rohe o Waikato

Schedule B - Nitrogen Reference Point/Te Āpitihanga B – Te tohu ā-hauota

Schedule C - Stock exclusion/Te Āpitihanga C – Te aukatinga o ngā kararehe

Schedule 1 - Requirements for Farm Environment Plans/Te Āpitihanga 1: Ngā Herenga i ngā Mahere Taiao ā-Pāmu

Schedule 2 - Certification of Industry Schemes/Te Āpitihanga 2 – Te whakamana i ngā tohu o ngā Kaupapa Ahumahi

Method 3.11.4.1: Working with others/Te mahi tahi me ētehi atu

Method 3.11.4.2: Certified Industry Scheme/Te kaupapa ā-ahumahi kua whai tohu

Method 3.11.4.3: Farm Environment Plans/Ngā Mahere Taiao ā-Pāmu

The relevant objectives are:

Objective 1: Long-term restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 1: Te whakaoranga tauroa me te tiakanga tauroa o te kounga wai ki ia riu kōawaawa me te Wae Whakahaere i te Wai Māori

By 2096, discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water result in achievement of the restoration and protection of the 80 year water quality attribute targets in Table 11-1.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

E.3.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long term and short term numerical and narrative freshwater objectives.

Overview of options:

- Option 1 retains the status quo - the policies, methods and rules in the Waikato Regional Plan.
- Option 2 aims to set property level limits on phosphorus, sediment and microbial pathogens.
- Option 3 aims to set a modelled property level limit and reduction target to reduce diffuse nitrogen discharges (nitrogen leaching).
- Option 4 is an input tax.
- Option 5 aims to set catchment wide rules.
- Option 6 aims to manage specified activities related to nitrogen, phosphorus, sediment and microbial pathogens through mandatory Farm Environment Plans, mandatory mitigations, property cap and reduction in nitrogen for some, and no increase in nitrogen discharges.

| | Reasonably Practicable Options | Description |
|---|--|--|
| 1 | Existing policies, rules and methods in the Waikato Regional Plan | Maintain the status quo |
| 2 | Set property limits or standards for phosphorus, sediment, microbial pathogen discharges | Include a specific property-level limit for phosphorus, sediment or microbial pathogens |
| 3 | Modelled property level limit and reductions for nitrogen discharge loss | Include a specific property-level nitrogen limit or catchment cap and trade. |
| 4 | Tax on inputs such as a fertiliser tax | Introduce input controls, for example, a tax on fertiliser use. |
| 5 | Catchment-wide rules | Rely on rules that manage activities across the whole catchment to control diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens. |

| | | |
|---|---|---|
| 6 | Mandatory Farm Environment Plans, mandatory mitigations, no increase in nitrogen discharges for any farm, property cap and reduction in nitrogen discharges for high dischargers. | Control activities on-farm and require mitigations to reduce the effects on water through a combination of mandatory mitigations and mandatory Farm Environment Plans. Require landowners to determine, and provide to council, the levels of nitrogen discharged from their land, and not exceed that number. Require farms with high diffuse nitrogen discharges to reduce. |
|---|---|---|

Reasonably practicable options for making reductions

E.3.3 Explanation of options

Note: The following comments apply to all the options in this section of the report:

- Some policy instruments are only feasible if a contaminant leaving the property can be readily and reliably measured or estimated. These options work best if the discharge can be directly measured at a property level. Where it is not practicable to measure discharges from every property, it is possible to use an alternative, or proxy. The starting point for some of the policy instruments aligned with making reductions are those that rely on a discharge measurement or a proxy. Some of the options below focus on these tools.
- Using models to estimate contaminant lost from an individual property can be a feasible proxy for direct measurements. A model may be used to estimate losses from a paddock scale, rather than measuring the effect once diffuse contaminants enter water. Models are approximations of reality and can be complex, requiring detailed inputs and computer-based calculations, or may simply be a spreadsheet linking management practices to discharges.
- Diffuse discharges of sediment, nutrients and microbial contaminants can be reduced at their source (for instance, by management practices that keep soil on hill slopes) or captured (for instance, by mitigation practices that trap and hold sediment that has been washed off slopes before it enters streams). Ideally any model or measure will take account of both of these ways to reduce contaminant discharges.
- Plan Change 1 is the start of a staged reduction in contaminants entering water from diffuse sources. Future plan changes will require further reductions across all discharge sources and there will be a need to identify cost-effective actions. Refer to sections on E.2 'Staging the transition to the 80 year goal' and E.8 'Prioritisation and sub-catchment planning' for more information.

Option 1: Existing Regional Plan policies, rules and methods

This option means retaining the status quo, with no additional policies, rules or methods applied to the Waikato and Waipa River catchments. Current rules and non-regulatory methods in the Regional Plan would remain in place and apply to the Waikato and Waipa Rivers and their catchments.

In the Regional Plan, diffuse source discharges of nitrogen, phosphorus, sediment and microbial pathogens are largely managed through non-regulatory tools such as providing information, extension, and financial incentives. Regulatory controls on managing diffuse source contaminant discharges have focused on a defined set of land management practices (limiting particular activities), for example plantation forestry harvesting, disposal of effluent, earthworks, cultivation and fertiliser application. The Regional Plan also contains rules relating to activities in river and lake beds and earthworks and other soil disturbance activities within high risk erosion areas (defined as slopes above 25 degrees, or riparian areas of varying width depending on slope).

The plan contains a water management classification system, which outlines the characteristics of water bodies and their values. The classes and standards include in-stream suspended sediment measures that landowners need to meet by ensuring their activities do not result in a breach of these standards. This may apply, for example, when undertaking activities on farm that may generate discharges into water from roading, tracking and vegetation clearance, or from livestock activity.

Option 2: Set property limits or standards for phosphorus, sediment or microbial pathogens discharges

The aim of this option is to manage diffuse discharges (for the contaminants phosphorus, sediment and microbial pathogens) from individual properties through numeric targets to be met. This would be achieved by placing a property-level limit on the amount of diffuse discharge leaving a property, or setting a standard in the water. A measure or proxy for the discharges would be used to set the limits, and landowners would be required to remain within the limits.

There are three variations to this option:

Variation A - Sediment or microbial pathogens property-level limit

Variation B - Phosphorus property limit using *Overseer*

Variation C - Phosphorus property limit using Olsen P

Option 3: Modelled property level limit and reduction for nitrogen discharge loss

The aim of this option focuses on managing diffuse discharges of nitrogen by placing a property-level numeric output limit and including a specified reduction target that landowners would have to meet, on all properties.

Three variations were considered for nitrogen discharge output controls:

Variation A - Modelled property-level output limit to require reductions in nitrogen discharges across all or most properties.

The first variation is a property-level limit, which is a regulation or rule that sets a particular standard or limit to be met by landowners. This would require reductions in existing leaching in order to achieve a catchment or sub-catchment load reduction target. The aim of this is that aggregated individual source reductions, in conjunction with other policy approaches or tools, would contribute to meeting the water quality thresholds in sub-catchments.

Variation B - Modelled property-level output limit requiring landowners to hold or make reductions in nitrogen discharges, applied to some properties only.

The second variation uses a property-level limit but targets or sets thresholds for certain landowners. For example, a lower leaching discharger might be allowed to increase up to a set threshold. This approach is to allow some flexibility (ability to increase discharges up to a certain discharge cap) for lower leaching properties.

Variation C - Modelled property-level output limit to hold and require reductions in nitrogen discharges across all or most properties with trading or transfers allowed between landowners.

The third variation is when a property limit is used in conjunction with a cap-and-trade market for nutrient discharges. This approach is based on rules that set a property-level limit for nitrogen, and cap the catchment discharge levels, with the cap being reduced over time. In addition rules are included to allow transfers such as trading of nitrogen discharge allowances.

A variation on this is often referred to as offsets, which also provide the landowner with flexibility to operate. An offset is an action that compensates for a loss in environmental quality (Greenhalgh *et al.* 2014, Document# 3811284). The environmental damage is offset by positive action elsewhere (WRC 2016, Document# 3687921). The offset or environmental compensation approach, was also considered for point source discharges (refer to E.5 'Managing point source discharges').

An example of a cap and trade approach is in Lake Taupō catchment under Chapter 3.10 in the Regional Plan, where property-level limits are being set using *Overseer* to reduce nitrogen loads discharged to the lake. One option considered was to take this approach and apply it throughout the Waikato and Waipa River catchments to bring about catchment-wide reductions.

In any of these three variations, landowners have the flexibility to choose the activities or mitigations they undertake in order to meet the property-level limit, provided these actions can be accounted for in *Overseer* or by other means specified in the rules.

Option 4: Tax on inputs such as a fertiliser tax

This option would manage diffuse discharges by controlling inputs, such as fertiliser, bought-in feed, or stocking rate, that are related to the rate of contaminant discharge from the farm system.

This approach could use a market mechanism that targets inputs to the farm. This could be in the form of a charge or a tax (for example, a tax on inputs such as fertiliser). The aim of the tax is to create a driver to reduce the amount of inputs used on a property that contribute to discharges of contaminants. Charges or taxes work by imposing an additional cost such that the tax acts as a disincentive for the use of the input.

Option 5: Catchment-wide rules

This option would rely on the use of catchment-wide rules for specific activities to manage diffuse discharges. These rules would apply thresholds, which would apply to all farming activities throughout the Waikato and Waipa catchment, with the intent of managing activities that increase discharges, disturb the bed of waterways or use land, and would do so through permitted activity conditions and/or requiring a resource consent. Two examples of catchment wide rules are rules for cultivation, or requiring a setback for grazing livestock or cultivating soil.

Option 6: Mandatory Farm Environment Plans, mandatory mitigations, no increase in discharges, property cap and reduction in nitrogen for some.

There are six parts to this option for controlling discharges arising from the use of land across the catchment.

Part 1 - Existing Waikato Regional Plan policies, rules and methods: This part of the option retains the existing Waikato Regional Plan policies, methods and rules, but supplements them with the additional parts to form a complete package.

Part 2 - Identifying small, low intensity and low risk farming activities: This part of the option includes permitting low intensity and low risk activities. This enables low intensity and low risk activities to continue if rule thresholds and actions are met (meaning some properties do not need to prepare a Farm Environment Plan).

Part 3 - Catchment-wide rules for stock exclusion, forestry harvest and property registration: This option would avoid increases in the level of diffuse discharges through the use of catchment-wide rules for the specific activities of stock in waterways, forestry harvest and property registration, where activities that increase discharges, disturb the bed of waterways or use land, would be managed through permitted activity conditions and/or requiring a resource consent.

Part 4 - Controls that require a Farm Environment Plan: This option would manage the use of, and discharges from, land through property-specific Farm Environment Plans. For nitrogen, phosphorus, sediment and microbial pathogens, actions would be specified in the Farm Environment Plan following a risk-assessment focused on reduction in discharges, and on developing actions and timeframes for completion. The degree of reduction required would be proportionate to the amount of current discharge and the scale of water quality improvement required in that sub-catchment.

Part 5 - Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit: This part of the option sets a threshold or cap (as a definition), which properties or enterprises above the set threshold (75th percentile nitrogen leaching value) will be required to meet by a certain date (2026). Actions and timeframes to do so will be included in the Farm Environment Plan.

This part of the option uses a property-level limit, but reductions are required only by some landowners (that is, those with the highest leaching levels make reductions). This approach would provide a numerical figure against which landowners can assess their operations and make changes where necessary to meet the leaching levels required in the plan rule. The *Overseer* model would be used by the landowner to assist them to choose which farm practices they need to change to in order to reduce nitrogen leaching.

Part 6 - Nitrogen Reference Point and no increase in discharges: This part of the option requires landowners to determine, and provide to council, the level of nitrogen leaching loss from their property or farm enterprise. This records information about amounts of nitrogen leaching at or around 2016 when Plan Change 1 is notified. The reference point for nitrogen leaching is used as a property-specific limit or 'cap' for the life of Plan Change 1. Each landowner would be required to operate at or below that set level (hold to their Nitrogen Reference Point).

Those properties or enterprises below the threshold or cap in Part 5 (75th percentile nitrogen value) must not increase above their Nitrogen Reference Point (measured on a 5 year rolling average). These properties or enterprises must also include actions and timeframes to reduce nitrogen discharges. Plan Change 1 does not include a set amount for that reduction for these landowners. The approach does, however, include the concept of proportionality, where the degree of reduction would be proportionate to the amount of current discharge, and the scale of water quality improvement required in that sub-catchment.

Landowners would provide information on nitrogen leaching from an individual property based on certain years. The reference years are financial years covering 2014/15 and 2015/2016 for everyone except commercial vegetable production enterprises, whose reference period is 1 July 2006 to 30 June 2016.

The intent of this part of the option is to gather information and hold nitrogen leaching; council and landowners would maintain records and landowners would be required to update information. This option uses the Farm Environment Plan to record and describe how the farm will be managed within the nitrogen figure (WRC 2015, Document# 3476854). This requires data collection and ongoing monitoring by the landowner and council to ensure that nitrogen-related activities do not exceed the Nitrogen Reference Point established. This option would be used in conjunction with a Farm Environment Plan, through which the farm activities most related to nitrogen leaching would be managed.

E.3.4 Evaluation of options and reason for preferred option

Option 1: Existing policies, rules and methods

The Regional Plan contains provisions that apply to all landowners, and which contribute to managing the effects of diffuse discharges from particular activities.

This option would only partially achieve the objectives of Plan Change 1 as the existing policies, rules and methods were developed to meet different objectives and there are indications that increased management of discharges is needed, based on the trend for declining water quality for some attributes in some parts of the Waikato and Waipa River catchments. A Regional Plan Effectiveness Review confirmed that there is work to be done to make improvements to existing rules, including farm activities, land and water management and water treatment (Focus 2014, Document #3240387), to meet current Regional Plan objectives. Based on this, the current measures are considered to be clearly insufficient to meet the new objectives.

The Regional Plan rules that apply across the region have been drafted to cover most situations. A limitation of this approach is that the rule may not adequately address potential adverse effects that only arise on some soil types, slopes or rainfall zones. More action may be needed from a particular sector to manage discharges because of the particular risk presented by their type of land use, such as the potential for sediment loss from grazed hill slopes. For these types of risk the difference in required mitigation actions would be better captured in a risk assessment for that individual property and mitigated through the use of tailored actions.

In summary, the direction taken for Plan Change 1 is to maintain the current policies, methods and rules in the Waikato Regional Plan while implementing a new approach to land use and diffuse source discharges, through policies, rules and methods that would contribute to meeting the Waikato and Waipa River water quality outcomes and the outcomes sought under the Vision and Strategy/Te Ture Whaimana.

Option 1 is not considered the most appropriate ways to achieve the objectives.

Option 2: Set property limits or standards for phosphorus, sediment, and microbial pathogen discharges

The aim of this option is to manage diffuse discharges of the contaminants phosphorus, sediment and microbial pathogens by setting limits or standards for individual properties. As described above, this option relies on property-specific tools that can measure or model diffuse discharges. Three variations to this option are evaluated below.

Variation A - Sediment or microbial pathogens property-level limit

This option would allow landowners the flexibility to determine their own actions to mitigate diffuse discharges in order to meet the standard. Models are available that predict losses of sediment and microbial pathogens from different land uses, soils types and topography. However, these have been used at a sub-catchment scale, and there is insufficient confidence to apply them to a quantitative property-level regulation. Because there is currently no suitable model that could provide an adequate property-level assessment for sediment or microbes, a numeric output-based option was set aside (WRC 2015, Document# 3258508). Modelling of sediment at the sub-catchment scale can be used to identify those sub-catchments where sediment losses are high and where tailored soil conservation measures can be applied to lower the risk of soil leaving hill slopes (Hughes 2015, Document# 3933053). This information can be used to inform Farm Environment Plans.

This variation is not reasonably practicable.

Variation B- Phosphorus property limit using *Overseer*

This approach for phosphorus relies on the ability to measure or use a proxy (*Overseer*) to determine discharges.

The majority of phosphorus leaving a property reaches waterways through overland flow. There are certain places on any given property where there is a higher risk of overland flow of water containing soil/dung and attached phosphorus. These are referred to as critical source areas. The *Overseer* model provides information to landowners on likely phosphorus surplus based on inputs and outputs in their farming system, but does not consider spatial variability that can affect overland flow. There is a further model called MitAgator under development (which is not yet released for widespread use or available for the public), that uses *Overseer* and includes a spatial component that considers critical source areas for overland flow on a property.

- It was considered that the current tools such as *Overseer* do not represent the source-pathway relationship and therefore that at this time *Overseer* is not a suitable proxy for phosphorus losses from individual properties.
- *Overseer* was seen as suitable for informing tailored farm plans on a property about the magnitude of phosphorus losses. In the future, a spatial element would need to be added to *Overseer* to better represent where the critical source areas are, as highlighted by recent guidance about the use of *Overseer* (Freeman *et al.* 2016).
- There was insufficient confidence that modelled phosphorus losses from a property could be used for regulation and compliance.

It was considered that at this point in time, there is not a sufficient level of confidence in the proxy or models available to measure the amount of phosphorus leaving a property. Therefore it was determined that the practicability of a quantitative approach based on *Overseer* would be limited overall.

This variation is not reasonably practicable.

Variation C - Phosphorus limit using Olsen P

An alternative measure considered for phosphorus was the use of soil sampling and setting a limit based on Olsen P levels (an indicator of the level of plant-available phosphate). It was considered that the potential for counter-productive outcomes in the response of landowners to this approach is likely to be high. This is because Olsen P results vary widely across paddocks, making the sampling approach important. For this reason, effective implementation including monitoring and enforcement would be difficult.

This approach for phosphorus relies on the use of a proxy for discharges and it was considered that at this point in time there is not a sufficient level of confidence in the proxy (Olsen P levels). Therefore it was determined that the practicability of a property limit based on Olsen P would be limited overall, relative to the costs of implementation of this type of approach.

This variation is not reasonably practicable.

Option 2 is not considered the most appropriate way to achieve the objectives.

Option 3: Modelled property level limit and reductions for nitrogen discharge loss

The aim of this option is similar to Option 2 for phosphorus, sediment and microbial pathogens, but Option 3 focuses on nitrogen. It involves placing a property-level output limit on nitrogen and requiring specified reductions, taking effect immediately when Plan Change 1 is notified.

General information on managing nitrogen discharges and the use of *Overseer*

Nitrogen leaching from different land uses

During the development of Plan Change 1, information about the range of nitrogen leaching from different land uses was considered, as set out in Menneer *et al.* (2004, Document# 1134869) and Hudson *et al.* (2015, Document# 3700008).

In broad terms, high stocking rates and inputs of nitrogen will result in higher nitrogen leaching from below the root zone of plants. This is exacerbated at high risk times of year (when there are greater quantities of nitrate in the soil, but where plants are growing slowly and drainage through the soil is high). Some crops receive high inputs of nitrogen fertiliser at these high risk times of year, such as potatoes grown for the spring market. A recent study analysed the impact of mitigation practices on the environmental and economic performance of Pukekohe vegetable farms (Agribusiness Group, 2014). Results showed a range of nitrogen leaching from vegetable production, with the differences in *Overseer* outputs being generally due to the intensity of the crop rotation that occurs in different years. For nitrogen, the report finds:

"the major source of N leaching is derived from fertiliser and crop residue and that fertiliser N management strategies are key when devising mitigation strategies." (Agribusiness Group 2014, Document# 8727329 p8).

Measuring or modelling nitrogen discharges

Nitrogen outputs could be modelled or measured. For property-level measurements, it is expensive to put in place accurate and cost-effective in-situ measures of the actual loss of nitrogen from a particular property. Multiple measuring sites on each farm would be required, using instruments (lysimeters) to measure the amount of nitrogen that has travelled below the root zone of plants, and is therefore unavailable for uptake. This measurement of nitrogen leaching currently only occurs in research contexts; other regional plans in New Zealand do not require nitrogen loss to be measured for regulatory purposes.

For reasons of practicability, when being used in a regulatory framework, nitrogen leaching would be modelled at a property scale rather than measured.

Nitrogen property level limits using the *Overseer* model

A level of confidence in the proxy or model used is an important consideration when evaluating the potential for a property-level limit to manage water quality.

The *Overseer* model is recognised as an important tool in understanding activities undertaken on land and the potential for nitrogen leaching.

Overseer uses environmental parameters (such as climate, soils, topography, and aspect) and farm management parameters (such as stock type, stock numbers, fertiliser and feed, and product outputs) to estimate nitrogen losses. In order to have a high degree of confidence in the modelled estimate of nitrogen loss, there needs to be a high degree of confidence in the accuracy of the input parameters. This requires accurate records of farm management, and confidence is increased where there is a

detailed and robust auditing process to ensure landowners' farm management is consistent with what was modelled. This process can be labour-intensive, especially in the early stages of implementation. The size of the cost is, to a large extent, dependent on the amount of one-to-one time spent between council officers and landowners (WRC 2015, Document# 3258508).

Overseer generates information about nutrients for different blocks on the farm, which together provide a nutrient output for the farm, based on the nutrient-relevant inputs. For nitrogen, nitrate leaching farm output is at the root zone. *Overseer* does not provide any information about the fate of nutrients once they cannot be taken up by plants.

New versions of the model are released approximately once a year, which replace the current version; older versions of the model are then no longer publicly available.

There are mitigations that could be used by a landowner that are not currently set out in *Overseer*. Recent guidance on the topic (Freeman *et al.* 2016, Document# 6309849 p23), notes that there is a risk that if policy provisions focus solely on the achievement of an *Overseer* threshold, this ignores other methods of reducing nutrient losses that are not currently recognised in *Overseer*.

In summary, holding landowners to an "absolute" number or property level limit that is generated by *Overseer* has the following advantages:

1. It provides the community with a sense of a clear quantum of nitrogen being capped or reduced at property level.
2. The policy can be designed to facilitate transfers of nitrogen between properties, provided landowners choose to negotiate with each other, and there is a system to track the changed property-level limits that result from the transfer (such that there is no overall increase in nitrogen, but one property has increased and one has decreased nitrogen losses by the equivalent amount). The addition of a trading component to the nitrogen limit increases the overall economic efficiency for the community.

However, an option of regulating the "absolute" number or property level nitrogen limit that is generated by *Overseer* has certain constraints:

1. Some property-level mitigations are not in the current version of *Overseer*. Hence, if regulation specifies that *Overseer* must be used as the sole means to demonstrate compliance, a landowner may get no recognition for these actions.
2. *Overseer* is regularly upgraded, resulting in version changes. Following a version change, the results from the model could change, even if the approaches used on the farm have not changed. In other words, the same property-level inputs to each new *Overseer* version could give a higher or lower nitrogen output. It is not possible to predict how each landowner will be impacted, because each property has a different mix of inputs, and the changes are not constant for each version change. This means each farm is affected differently by a version change (for some more favourably, some unfavourably). There are ways to work around changing versions, but they take extra resources to run original input data through each changed version and public perception could be that landowners are not complying with property limits if nitrogen leaching numbers change.

Nitrogen discharge output controls

Three variations were considered for nitrogen discharge output controls:

Variation A - Modelled property-level output limit to require set numeric reductions in nitrogen discharges across all/ most properties.

Variation B - Modelled property-level output limit requiring landowners to make reductions in nitrogen discharges, applied to some properties only. This approach could be used to provide flexibility for properties or enterprises considered to have "low" nitrogen leaching loss, in order to make provision for some increase.

Variation C - Modelled property-level output limit to hold and require reductions in nitrogen discharges across all /most properties with trading or transfers between landowners.

Variation A: Implementing a modelled property-level output limit to require set numeric reductions in nitrogen discharges across all/ most properties

The first variation under Option 3 (Option 3 Variation A) is to use a nitrogen model to require reductions in nitrogen discharges across all/ most properties. This allows a set catchment or sub-catchment load to be allocated among different properties.

Regulating diffuse nitrogen from properties in other parts of the region has occurred. For example the Lake Taupō cap-and-trade system in Chapter 3.10 of the Regional Plan is considered to be an effective option to manage discharges in that catchment, providing flexibility to landowners and meeting water quality outcomes. In Lake Taupo catchment, approximately 86 farms were

benchmarked, and now operate under a nitrogen property limit (Dragten 2016, Document# 8405574). In the Waikato and Waipa River Catchments, initial estimates suggest there may be approximately 5000⁽¹⁴⁾ farms where a property level nitrogen limit could be required (Dragten 2016, Document# 8405574). A case study of implementing nitrogen limits in Lake Taupō catchment (WRC 2014, Document# 2325986) found that the cost to ratepayers, taxpayers and individual landowners of regulation to maintain a property level limit (or 'cap') on diffuse nitrogen over a farm implementing Rule 3.10.5.3 of the Regional Plan is significant. This is due to the one-on-one time needed to benchmark historic discharges, develop a nitrogen management plan and apply for and implement a resource consent. Therefore, setting and monitoring numeric nitrogen reductions from all properties in an areas the size of the Waikato and Waipa catchments would be a significant undertaking.

Setting property-level reductions requires knowledge of the total catchment load of nitrogen to be allocated. In order to set the amount of nitrogen discharge that can be allocated, the first task is to collect information on the amount of nitrogen currently being discharged from each property. In the Lake Taupō Catchment Regional Plan Chapter 3.10, this was called 'benchmarking'.

In more spatially variable situations such as across the whole Waikato and Waipa River catchments, the allocable load needs to be distributed amongst sub-catchments in such a way that it will achieve the required water quality outcomes for nitrogen throughout the rivers.

Technical information was sought during investigation of this option to determine whether the HRWO scenario model could provide this spatial information. Data was extracted from the optimisation model used in the scenario modelling process (see C.1.2 'Economic model' and C.2.2.11 'Scenario modelling outputs' for more information). The data showed the change of contaminant loads from each sub-catchment to achieve 25 per cent of Scenario 1 (which is the long term desired water quality outcome), as estimated by the HRWO scenario model. The model cost-optimises to a single set of mitigations that simultaneously achieves the desired concentrations across the four contaminants. Because a mitigation can act on more than one contaminant, the minimum operator rule applies, whereby mitigations that just achieve the desired concentration for the most 'difficult' contaminant will lead to coincident over-achievement for the other three. Therefore, while this approach is perfectly valid for modelling the effects of an optimised set of mitigations, such predicted load removals can be misleading if used in a policy context when the specific policy is aimed at a single contaminant (in this case, nitrogen).

In addition, the mitigations chosen by the model based on cost optimisation, and the subsequent load reductions, may differ from the mitigations chosen by individual landowners when required to reduce discharges.

Finally, relating property-level nitrogen load reductions below the root zone (as provided by *Overseer*) to resultant changes in N concentration through the river network is complicated by the spatial variability in water travel times and attenuation processes, which differ between sub-catchments. These sub-catchment differences need to be accounted for when establishing robust load reduction targets.

It was therefore considered that there is currently insufficient information in the public domain about nitrogen leaching losses, incorporating landowner data at a property scale for all sectors, or information to determine what reduction targets would be required at a sub-catchment scale in order to meet the in-stream water quality goals. It was not expected that robust information would be obtainable in a timely fashion to support this type of allocation of property-level reductions when Plan Change 1 is notified.

Variation B: Modelled property-level output limit requiring landowners to make reductions in nitrogen discharges, applied to some properties only.

The second variation of policy option 3 (Option 3 Variation B) is to establish restrictions that apply only to some landowners. An example is to allow for some increase by setting a threshold, below which the requirement to hold or reduce current discharges would not apply. This provides flexibility for landowners whose properties exhibit lower leaching, allows for response to seasonal and market variability, and could provide for these landowners to focus more on bringing about reductions in other contaminants to which the property might be making a more significant contribution. The concern with this approach is that if this flexibility applied across a large number of properties or significant land area, there would be less certainty around holding and reducing nitrogen across the catchments and therefore achieving the nitrogen targets.

Variation C: Property-level numerical nitrogen limits with trading or transfers allowed

The third variation (Option 3 Variation C) to the use of property-level numerical nitrogen limits is to include a trading or transfer mechanism. In an evaluation of the Lake Taupō catchment cap-and-trade system, Duhon *et al.* (2015) found that:

- The introduction of a cap on nitrogen has worked to limit the amount of nitrogen leaving agricultural land.
- Trading has improved the cost-effectiveness of achieving the policy's environmental target.

14 report provides an evaluation of number of landowners that would be affected by this rule

- The trading system has provided useful flexibility for landowners and has decreased the cost of achieving the community's environmental goal.
- The policy approach has placed significant costs and restrictions on those affected (Duhon *et al.*, 2015).

These findings are not unexpected, as this restriction is in line with the aim of the policy to control discharges from properties to meet the overall aggregate cap.

It is the imposition of a property-level limit that has created the majority of the cost to landowners and the complexity and resources needed for implementation of the Lake Taupō catchment regulation of diffuse nitrogen (Chapter 3.10 of the Regional Plan). Adding a trading or transfer element to the policy option is feasible if trading occurs in a way where the commodity being traded is consistent. The two aspects to this are that if *Overseer* is used, the outputs must be directly comparable. For instance, a nitrogen-related farm practice using one version of the model can not be compared with a later version of the model. The other aspect is that the trading system must account for any spatial differences in the effect of nitrogen on the river, so in a catchment the size of Waikato and Waipa, the location of the transfers would need to be considered. This was not the case in Taupō.

Because of the constraints outlined above on sufficient information to inform a property-level allocation aligned with transfers within Plan Change 1, trading and transfer were considered to be more appropriately left for consideration under future plan changes.

Summary of assessment of requiring numeric property-level reductions in nitrogen

Reliance on a model to bring about wide-scale reductions across properties in order to achieve a catchment limit requires sufficient confidence in that model to capture the range of mitigation actions available, and determination of a load that is then allocated among properties. This derives from a robust understanding of current catchment loads and a well-developed framework for allocation. Trading and transfer mechanisms can then be developed. At this time, the available modelling tools and information base were not considered sufficiently robust to set numeric property-level reductions for all/ most properties across the Waikato and Waipa catchments. Other uses of the modelling tools were considered to be more appropriate for Plan Change 1.

Option 3 is not considered the most appropriate way to achieve the objectives at this time.

Option 4: Tax on inputs such as a fertiliser tax

This option would seek to manage diffuse discharges of contaminants by influencing the use of inputs that are related to the discharge of those contaminants from a property.

Implementing this option is most likely to be based on a tax on inputs. An input tax can be placed on technologies, products or inputs with negative environmental impacts, creating a price signal aimed at reducing demand for the taxed good (Greenhalgh *et al.*, 2014, Document #3811284 p18). Examples of inputs include stocking rate, brought-in feed and fertiliser. By placing a tax on an input like fertiliser, the response sought from landowners is a reduced use of fertiliser in response to the increased cost for use. The tax must be high enough to change behaviour.

The reasons for setting aside the use of a fertiliser tax are as follows:

- It is difficult to measure the impact of the tax on outcomes (for example, whether the tax is sufficient to reduce the use of fertiliser). This makes setting the level of the tax a trial-and-error process. The tax level would therefore need to be adjusted regularly.
- It is difficult to determine how effective the tax on fertiliser would be; for example different effects might occur in different areas and this might not align with where reductions would have the most effect on water quality.
- Landowners could take other actions/ substitute inputs that result in other discharges. Ideally all sources of input nitrogen and phosphorus would be taxed, not just fertiliser.
- It could be difficult to levy the tax at a property level.
- It is unclear if it is possible to administer a tax at a catchment level (WRC 2015, Document# 3425911), but it could potentially be achieved through Central Government, or a RMA charging regime.

This option is not reasonably practicable and is not considered the most appropriate ways to achieve the objectives.

Option 5: Catchment-wide rules

This option would rely on the use of catchment-wide rules for specific activities to manage the diffuse discharges. Specific activities that increase discharges, disturb the bed of waterways or use land would be managed through permitted activity conditions and/or requiring a resource consent.

Catchment-wide rules result in a blanket approach to regulating activities on the land, across a variety of properties and situations. This can be in the form of regulating the technology or the 'hardware' used, by specifying standards, or by regulating the practices or actions taken by landowners. Regulating technology is often more observable and measurable, while regulating practices can be difficult to monitor as they rely on landowners undertaking actions on-farm on an ongoing basis. For example it is easy to observe that a pipe installed has a specified diameter, but harder to observe that a landowner does not graze their paddocks between June and August on slopes over 20 degrees. In addition, each rule needs to have a threshold within it, and that threshold then applies to all properties in the catchment. This does not take into account the differences in topography, soil, rainfall, farm system or existing infrastructure between properties.

Catchment-wide rules that were considered but not investigated in detail due to their difficulty to implement include rules for:

- managing actively eroding sediment sources or requiring sediment traps for these areas
- managing winter crops, including their location and grazing
- prohibiting grazing, or specifying the carrying of stock of a certain size or density on certain slopes.

Consideration was given to a catchment-wide rule requiring no cultivation of slopes above 15 degrees. Cultivation of steeper slopes creates the risk of overland flow carrying sediment and nutrients to waterways. However, the source-pathway relationship is important in determining the actual effect of cultivation activities and so it was considered more appropriate to include an assessment of risk from cultivating slopes in the Farm Environment Plan process.

Catchment-wide rules stipulating setbacks were also considered. A setback is a strip of land next to a water body that is not used for productive purposes (for instance, an uncultivated grass strip where the rest of the paddock is in production).

There is variability in the effectiveness of setbacks in intercepting contaminants before they reach water bodies (see summary in Table 1 of Doole, 2015, Document #3606268). A range of site-specific factors give rise to this variability in setback effectiveness (TLG, 2015, Document# 3644089). While a specified setback does not provide the same benefits everywhere, in principle there are benefits from having a buffer between farming activities and a waterway. Therefore, it was considered that the requirement of landowners to incorporate setbacks from waterways into their mitigation actions was more suitably assessed through a Farm Environment Plan process. Strong guidance was considered appropriate through the requirements for preparing a Farm Environment Plan (such as specifying cultivation setbacks and minimum grazing setback distances). This approach allows for consideration of the practicality and efficacy of applying minimum setbacks. Specified setbacks were also considered appropriate as a factor in determining low-risk properties (see above).

In summary, catchment-wide rules provide a degree of simplicity and certainty, but do not take into account the site-specific features of individual situations. Overall, land-use activities and the effects they have on water quality depend greatly on the specific factors of the property, including soil, topography, rainfall, farm system and existing infrastructure. Establishing blanket thresholds as the main mechanism to manage diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens does not recognise those differences.

This option is not considered the most appropriate way to achieve the objectives.

Option 6: Mandatory Farm Environment Plans, mandatory mitigations, property cap and reduction in nitrogen for some, no increase in nitrogen discharges

Six parts for controlling discharges and the use of land across the catchment are discussed under this option:

Part 1 - Existing Waikato Regional Plan policies, rules and methods

Part 2 - Identifying small and low intensity farming activities

Part 3 - Catchment-wide rules for stock exclusion, forestry harvest and property registration

Part 4 - Controls that require a Farm Environment Plan

Part 5 - Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Part 6 - Nitrogen Reference Point and no increase in nitrogen discharges

Part 1: Existing Waikato Regional Plan policies, rules and methods: The approach proposed is to retain the existing policies, rules and methods, and review these during the forthcoming full review of the Regional Plan, to provide a level of consistency across the region.

There are some provisions in the Regional Plan that support options considered for Plan Change 1. These include the earthworks provisions that set thresholds and conditions related to managing the adverse effects of activities that result in bare soil being exposed, increasing the risk of runoff of sediment and other contaminants during rainfall events. Rules for activities that are considered appropriate to retain in the Regional Plan, and which support Plan Change 1, include sediment-focused controls on roading and tracking, forestry harvesting, and land contouring, and controls on farming activities such as fertiliser application, dairy shed effluent and offtal holes.

Many of these are permitted activities where no resource consent is needed if conditions are complied with. The intent of the operative Regional Plan was to manage adverse effects of activities on land or in beds of water bodies, and for the most part the existing Regional Plan rules do not distinguish between land use sectors or locations within the region. An example of an exception to this is the more stringent rule for forestry harvesting in the Coromandel Peninsula (WRC 2015, Document# 3450520; Rule 5.1.4.16).

While some new catchment-wide rules are introduced in Plan Change 1, for reasons of consistency across the Waikato Region, the existing rules in the Regional Plan will remain in place until the forthcoming full Regional Plan review. For example, there will not be any new catchment-wide rules for the Waikato and Waipa River catchments about earthworks, vegetation clearance or point source discharges. Retaining the foundation of the region-wide approach provides clarity for implementation, as all properties are subject to the same requirements. When raising awareness of any additional new provisions, the implementing agency and sectors can summarise the actions a landowner will have to undertake.

Part 2: Small, low intensity and low risk farming activities: The principles applied to permitting low risk farming activities and small and low intensity farming enterprises include: using the best knowledge available to determine suitable proxies for intensity (for example, stocking rate), suitable physical indicators of risk (for example, slope) and suitable risk factors associated with management actions (for example, winter grazing of forage crops). Taken together, these matters were added into rules relating to enterprises that could be considered to be low intensity or low risk. Another filter used for the choice of these factors was the ability to implement, monitor and enforce a rule and whether the landowner could reasonably determine compliance.

This is an appropriate approach for farming activities that are judged to be at low risk of contaminant discharges (due to physical factors or management action already undertaken on the property or enterprise). The cost and resources of requiring farming activities at that scale to undertake an individual risk assessment, prepare a Farm Environment Plan and/or gain resource consents is considered to exceed the benefits of doing so at this time.

Part 3: Catchment-wide rules for stock exclusion, forestry harvest and property registration: Catchment-wide rules can give confidence to the wider community that everyone is contributing to manage discharges.

Regarding **stock exclusion from water**, the existing Regional Plan rules for excluding stock from waterways (4.3.5.4 - 4.3.5.6) provide a means for managing the effects of livestock that enter and cross water. The focus of these rules is on the disturbance to the beds and banks of water bodies, and the associated adverse effects on sediment in waterways and erosion of banks. Experience with this rule suggests improvements could be made, and currently this area is also of interest nationally.

For the Waikato and Waipa River catchments, a new catchment-wide rule is considered appropriate. This new rule would apply to all stock (except sheep, as it is generally accepted that sheep do not tend to enter water voluntarily), expanding on the current focus and efforts on dairy farms via the voluntary approach in the Dairy Accord.⁽¹⁵⁾

There are a range of options for thresholds and timeframes for a rule to manage stock entry into waterways, including thresholds around stock type, type of water body (perennial or intermittent), and slope of surrounding land (either to set timeframes or to determine a threshold for the requirement for stock exclusion).

Slope is currently used in the Regional Plan to apply more stringent requirements for earthworks on land over 25 degrees; in this instance a careful site inspection is needed to ascertain slope. A slope threshold linked to timeframes for stock exclusion was considered. However, the slope of land surrounding streams in rolling hill country may be difficult to assess, and a slope threshold could result in a situation where a fence was required for only part of a stream's length. Slope thresholds have therefore been included in Schedule 1 that guides Farm Environment Plans, rather than in the rule itself. The Farm Environment Plan Schedule requires a risk assessment that includes a description of where and how stock shall be excluded from water bodies for stock exclusion including; fencing and livestock crossing structures to achieve compliance; and for areas with a slope exceeding 25 degrees and where stream fencing is impracticable, the provision of alternative mitigation measures. The provision for land over 25 degrees to have alternative measures to stock exclusion was based on the judgement that it is probable these

¹⁵ The Dairy Water Accord launched in 2013 sets out the dairy industry's commitment to New Zealand and improving water quality. The Dairy Water Accord includes commitments to targeted riparian planting plans, effluent management, comprehensive standards for new dairy farms and measures to improve the efficiency of water and nutrient use on farms.

areas will be lightly stocked, with a lesser effect on waterways, and riparian setbacks are likely to be less effective on steep land. Also there are more practical impediments to fencing waterways in steep land, and fencing is likely to be more costly; fence construction on steep land could also have unintended effects from earthworks and soil disturbance.

Staging of exclusion requirements allows time for implementation actions such as fencing and water reticulation. Linking the timing requirements for fencing to the Farm Environment Plan priority area dates (which themselves are based on water quality priorities) provides a greater degree of consistency for landowners. Also this approach allows for fencing needs to be assessed in the Farm Environment Plan and located in a planned way. The proposed dates for landowners to develop Farm Environment Plans have been staggered, with three priority areas proposed based on the relative scale of the water quality issues in the particular sub-catchment. High priority areas are to have stock exclusion in place first, followed by medium priority areas and low priority areas, with all to be completed within ten years. These dates are aligned with the implementation dates for Farm Environment Plans, with stock exclusion to be completed three years after a Farm Environment Plan is to be developed, or by 2026, whichever is sooner.

Consideration of the issues in terms of practicability, cost, achievement of community-held values was obtained through community engagement events (WRC 2015, Document# 3615281 and WRC 2015, Document# 3603167), and advice and experience sought from implementation staff within the council.

In light of this input, the proposed new stock exclusion rule has focused on excluding all stock (except sheep), and requiring fencing and livestock crossing structures, while also recognising that individual properties have specific situations that could be dealt with in a risk assessment process under a Farm Environment Plan.

In terms of **forestry**, the current rules in the Regional Plan manage activities that cause or have the potential to cause erosion, and these rules have in-stream sediment standards embedded in them. There are some specific variations in the rules (for example, different conditions or standards relate to vegetation clearance of plantation production forestry compared to general vegetation clearance). Existing controls on production forestry are considered sufficient to control the adverse effects of contaminant loss to water over the life of the forestry rotation, with an additional requirement discussed below. In effect, the list of conditions that apply to managing land use activities through the permitted activity in the Regional Plan in section 5.1.5, could be seen as replacing the need to take a property-specific or tailored approach.

To improve implementation of existing rules, a minor forestry-related adjustment to the Regional Plan rules is appropriate. The change applies to existing conditions for permitted activity rule 5.1.4.11 (soil disturbance, roading and tracking and vegetation clearance) as set out in section 5.1.5 of the Regional Plan. The key feature of this adjustment is the addition of a requirement signalled in the draft National Environmental Standard for Plantation Forestry, to submit harvest plans to council, and to notify council prior to undertaking these activities. In addition to the forestry rules in the current Regional Plan, this adjustment would mean council is aware of when harvesting is to occur within the Waikato and Waipa River catchments. At present, this occurs on a voluntary basis, where some forestry companies contact council implementation staff to notify them of their intention to harvest.

In terms of **registration of properties**, the intent of this rule is to assist in the implementation of the policies, rules and methods of Plan Change 1, and most significantly the Farm Environment Plans, by gathering baseline information that is not currently held by any agency. Each landowner of properties over two hectares would be required to register general property information with the council, which could then be used to help council set implementation priorities and assist in identifying landowners who may comply under the permitted activity rule proposed for small and low intensity farming activities. It will also assist the council with implementation of the stock exclusion schedule and the land use change rule, see E.4 'Restricting land use changes'. It is estimated there are approximately 10,000 rural properties in the Waikato and Waipa catchments that would be required to register (Dragten 2016, Document# 8405574). It is intended that the administrative burden of registering be kept to a minimum by developing an online portal to guide landowners through the registration process, and to enable information already held by Council to be verified by the landowner.

Part 4: Controls that require a Farm Environment Plan to be produced

This part of the option identifies a tailored process of planning, implementing mitigations and adjusting management based on a comprehensive risk assessment of a farming property.

All landowners, other than those who can meet rule thresholds and conditions for small, low intensity and low risk farming activities, would be required to have a Farm Environment Plan. The Farm Environment Plan would set out the actions tailored to each specific property, to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, along with timeframes to do these actions.

Farm Environment Plans involve the development of a tailored risk assessment and strategy for each farm, identifying specific actions to achieve mitigation across the different parcels of land present within it (Doole 2015, Document# 3606268).

The approach includes requirement for some level of reduction for all contaminants, with a set amount of reduction in nitrogen required for some landowners (those above the 75th percentile value - see Part 5 of this option). Properties or enterprises below that value must also include actions and timeframes to reduce nitrogen discharges, but Plan Change 1 does not include a set amount for that reduction (refer to Evaluation of Option 3). The approach does, however, include the concept of proportionality, where the degree of reduction in all contaminants must be proportionate to the amount of current discharge and the scale of water quality improvement required in that sub-catchment.

Whilst not setting a numerical standard for all contaminants, these Farm Environment Plans can still achieve change by requiring a set of actions to be undertaken on each property by a certain date (WRC 2016, Document# 3673247).

For practical reasons, the requirement for a Farm Environment Plan would need to be phased in, based on a prioritisation process. The proposed dates for landowners to develop Farm Environment Plans have been staggered; three priorities are proposed based on the relative scale of the water quality issues in the particular sub-catchment. Each of these three priorities have different dates to complete Farm Environment Plans, with all to be done by 2026. Refer to E.8 'Prioritisation and sub-catchment planning' for more information.

Requiring all landowners in the Waikato and Waipa River catchments to develop and implement a Farm Environment Plan under a consented regime will be resource intensive. Initial estimates suggest that approximately 5000⁽¹⁶⁾ farms in the Waikato and Waipa Catchments would be required to obtain a Farm Environment Plan under this option. It is likely that most landowners would need technical assistance to develop and implement a Farm Environment Plan, and an important consideration of this method is how this assistance could be efficiently and effectively provided to landowners. Some primary sectors have been building capacity and expertise in managing environmental issues, and this sector expertise provides an opportunity to speed up the roll-out of Farm Environment Plans using existing farmer support systems.

The requirement to have a Farm Environment Plan could be implemented either through a permitted activity rule (as a condition to the rule) or by requiring a resource consent. In the development of the rules, consideration was given to the threshold at which a Farm Environment Plan would be required and what the most appropriate rule activity status would be.

The Farm Environment Plan approach was considered in both a permitted and consented activity status context. Permitted activity rules need to be clear and unambiguous to the plan user and the community. For instance, conditions that give discretion to third parties to 'approve' matters, or conditions that reference an external document that may change are not appropriate. There was also consideration about section 70 of the Resource Management Act 1991, which considers whether the effects likely to arise from the activity meet the requirements for a permitted activity rule.

It was judged that Farm Environment Plans could either be attached to a consented or a permitted regime. Effectively, a permitted activity rule with conditions creates a similar legal obligation on a landowner to that of a resource consent. Options available under the RMA for the purpose of achieving compliance are the same for either option (WRC 2015, Document# 3625488 and WRC 2015, Document# 3608886). The issue is more that there is typically more scrutiny of consents relative to permitted activities. This simply reflects their relative risk in an RMA sense. The rules in Plan Change 1 have been designed to include the industry scheme component, which provides that scrutiny for Farm Environment Plans at a similar level as those as part of a resource consents. Both are ultimately subject to the same enforcement options.

Certified Industry Schemes and Farm Environment Plans

Including the requirement for a property plan within an industry assurance scheme is an alternative way to meet the outcomes sought.

Farm Environment Plans would still need to be approved by a certified person to confirm that a robust risk assessment has been done, and that the proposed mitigation actions are appropriate given the result of the risk assessment. An independent audit process could check that certified persons and industry schemes are developing Farm Environment Plans in a manner that is consistent with the objectives of Plan Change 1. Those assisting in the development of Farm Environment Plans and auditing actions would need to have appropriate training and experience, and be approved by the council as competent to deliver the services.

Consideration was also given to how best to address the points of difference between a permitted activity and a consented activity. Matters considered included: consent requirements, meeting the needs and cost of implementation, explicit consideration of an individual property's circumstances, and the possibly higher transaction costs with a controlled activity status (WRC 2015, Document# 3625488 and WRC 2015, Document# 3608886).

Other key factors considered in designing a programme that provides community and council confidence in a tailored Farm Environment Plan policy option are as follows (WRC 2015, Document# 3563987):

¹⁶ report provides an evaluation of the number of landowners that would be affected by this rule

- Need for clarity in Plan Change 1 requirements for what should be contained in the Farm Environment Plan and thresholds in the rules/ conditions to assess against.
- The Farm Environment Plans and the supporting information to be registered with council so that tracking and monitoring can be undertaken.
- Training and competency of the independent Farm Environment Plan providers and industry scheme auditors.
- Farm Environment Plan to record the landowner's existing management practices and technologies so that progress can be determined in relation to reducing discharges, especially if landowners are found to be non-compliant.
- Security and accountability that Farm Environment Plan actions are implemented.
- Industry schemes to be supported by an appropriate level of compliance action.
- Compliance processes:
 - A process that holds landowners accountable for actions.
 - A single policy framework that applies across sectors, so everyone is held to the same requirement.
 - Clarity around industry roles, council roles and capacity for implementation.

With regard to **Commercial Vegetable Production** there are several factors that require consideration of a different approach to pastoral farms (dairy, drystock and mixed farms, which also have a significant amount of land in crops):

1. Vegetable crops are frequently rotated where crops may differ from year to year and also a number of crops grown on the same land in one year. This creates technical difficulties in modelling nutrient losses using *Overseer*.
2. Land used for vegetable crops also changes, where the extent and location of land leased by growers may change from year to year.

For these reasons, separate policy provisions relating to Commercial Vegetable Production land use and discharges are appropriate, although all will require a Farm Environment Plan. As with the policy provisions for pastoral and mixed farms, the Farm Environment Plan is the mechanism that existing landowners would use to demonstrate compliance and to form part of the basis for consent (that is, actions and timeframes become part of resource consent conditions). There is no permitted activity pathway suggested for commercial vegetable producers due to the complexity of these operations and the potential for high per-hectare discharges of sediment and nutrients.

Furthermore, to allow for the differences in this sector, controls on any land use changes, and/ or expansion of land used for commercial vegetable production are based on area. New landowners wishing to use land for commercial vegetable production would apply for resource consent under the non-complying land use rule. See E.4 'Restricting land use changes' for more information. Commercial vegetable production would also have a longer period on which to base their nitrogen reference point (refer to Part 6 of this Option).

In summary, the permitted activity status that requires the preparation of a Farm Environment Plan has been proposed for farming activities on properties that are registered to a certified industry scheme (excluding commercial vegetable production). This is an appropriate approach for farming activities in an industry scheme; the level of record keeping and oversight of the scheme is similar to that of a consented process, as is the requirement for appropriate technical expertise in Farm Environment Plan development, auditing and monitoring and the level interaction with landowners offered by an industry scheme.

Part 5: Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

This part requires some landowners to make reductions in nitrogen down to the 75th percentile nitrogen leaching value. This option seeks reductions from the "highest" discharging properties or enterprises (WRC 2016, Document# 3673247).

Without fully developing the detail of the future allocation approach, the judgement has been made that, since these property owners are at the higher end of the scale of leaching, they could be expected to be subject to reductions under any future allocation regime in an 'over-allocated' catchment, and therefore should begin reductions now.

(Refer also to 'General information on managing nitrogen and the use of *Overseer*' under Option 3: Modelled property limit and reductions for nitrogen discharge loss, which contains relevant information on managing nitrogen.)

Part 6: Nitrogen Reference Point information and no increase in discharges

This part of the option requires landowners to determine and provide to council a numeric value representing the level of nitrogen discharged from their land. This number is determined using *Overseer* or another approved model.

Within this part, there are two variations:

Variation A - Determine Nitrogen Reference Point. The option is simply a way of recording information about nitrogen leaching as of 2016, when Plan Change 1 is notified.

Variation B - The reference point for nitrogen leaching is used as a property-specific limit for Plan Change 1. Each landowner would be required to operate at or below that set level (Nitrogen Reference Point).

In this part, landowners compare their leaching against their own reference point in time, but are not assigned a numeric limit for reduction and there is no allocation of a capped catchment load.

Pastoral choice of reference years

The approach is to determine the property-level leaching (determining current nitrogen outputs), based on a number of set years immediately prior to Plan Change 1 being notified in 2016. This retrospective reference point goes back two years before public notification of the rules for pastoral landowners. The two financial years (2014/15 and 2015/16) were chosen for the following reasons;

1. Plan Change 1 sets a new regime for managing water quality, and action is desired in the first ten years of the new regime; therefore the years have to be retrospective. A retrospective reference period also prevents changes in management practices post-notification in order to 'inflate' a property's nitrogen discharge.
2. The last two years allow for some seasonal variation and changes made on farms to be accounted for.
3. If a longer period was chosen, landowners may have more difficulty producing records for use in *Overseer*, and there would be more farms that were in the process of changing from one land use to another.

Commercial vegetable production reference years

The retrospective reference point goes back ten years before public notification of the rules for commercial vegetable production landowners (to 2006). This longer time period was chosen for the following reasons;

1. Recognition that vegetable crop rotations on the same piece of land can change markedly over a long rotation period.
2. Recognition that nitrogen leaching of vegetable crops is highly variable.
3. Choosing a 2 year period may overly disadvantage some if they were in a period where crops grown were in the low to moderate nitrogen leaching types, when their "normal" rotation included higher leaching crops.

The variability in vegetable and cereal crops grown is described in a study of Pukekohe vegetable farms (Agribusiness Group, 2014 Document# 8727329).

Assessment of variations A) and B) within Part 6

Variation A) of this part (Part 6 Variation A) is simply to collect information about nitrogen leaching from each property, without requiring landowners to make any changes. On its own, collecting information about nitrogen leaching does not contribute to the short term objectives or avoid increases in contamination of the water. However, to provide future benefit for implementing any future policy, collecting information of appropriate detail and quality is essential (refer to E.2 'Staging the transition to the 80 year goal' for more information). This collection of information means that if property allocation is set based on land suitability, as signalled in Plan Change 1, it would be based on appropriate information around existing catchment loads. This information is also important for catchment accounting systems.

Variation B) takes nitrogen leaching information and uses it to hold landowners' discharges at that value through the life of Plan Change 1. The reason for taking this approach is to ensure diffuse discharges of nitrogen do not increase. The mechanism to do so is to model nitrogen leaching at a property level.

The requirement to prepare a Farm Environment Plan and undertake mitigation actions will result in some reduction in nutrient losses. The ongoing degradation of water quality would be reduced, with the widespread preparation and implementation of Farm Environment Plans. It was not considered appropriate to set a reduction target for all landowners (refer to Option 3, Variation A for more information). The preparation of Farm Environment Plans is appropriate as a first stage, before further reductions are set in subsequent management regimes (that is, allocation based on land suitability as signalled in Plan Change 1). In other words, under this approach, the ongoing degradation of water quality would be reduced, consistent with NPS-FM Objective A2c) and Plan Change 1 short term objectives.

For Plan Change 1, *Overseer* is recognised as an appropriate tool to undertake the process of establishing the Nitrogen Reference Point, whilst recognising that for some types of primary production industries there has been less development and validation of this model to date. Processes will be developed in the implementation of Plan Change 1 to fill some of these gaps. The nitrogen management approach allows for the use of:

1. The use of the current version of *Overseer*, or another approved model to be used in policy provisions for measuring nitrogen leaching loss (refer to E.3.10 'Appendix 1' for a discussion on the decision to specify which model(s) may be used)
2. The option to specify other suitable mitigations that are known to impact on nutrient losses, but are not captured in the models such as *Overseer* that account for property discharge loss, and
3. A five year rolling average to assess against the nitrogen reference point, so there is some allowance for annual variation.

To manage any uncertainty around approval of alternative models, a process of approval by the Chief Executive Officer of Waikato Regional Council for each alternative model has been inserted into the following schedule:

Schedule B - Nitrogen Reference Point/Te Āpitianga B – Te tohu ā-hauota

This is invoked under the following rules:

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ētehi atu mahi i runga pāmu

Rule 3.11.5.3: Permitted Activity Rule - Farming activities with a Farm Environment Plan under a Certified Industry Scheme/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.4: Controlled Activity Rule - Farming activities with a Farm Environment Plan not under a Certified Industry Scheme/Te Ture mō ngā Mahi ka āta Whakahaerehia – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu kāore i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.5: Controlled Activity Rule - Existing commercial vegetable production/Te Ture mō ngā Mahi ka āta Whakahaerehia – Te whakatupu hua whenua ā-arumoni o te wā nei

There are costs in the use of the Nitrogen Reference Point; most of these costs only come into play if the policy includes a process to restrict discharges. It is then that the associated costs (implementing action and reductions, and opportunity costs of development foregone) come into force.

The benefits of the option of a numerical property-level limit on nitrogen to which landowners are held are:

- Flexibility for landowners to choose the approach or actions taken to operate within their property limit. Even if trading or transfers between landowners is not facilitated in the policy approach, the existence of an output limit for each landowner gives them flexibility to search for and use lower cost options to meet requirements (Greenhalgh *et al.*, 2014, Document #3811284).
- More confidence for the community that the desired reduction in discharges to meet community catchment limits and targets will be achieved (de Serres *et al.*, 2010).

Summary of Option 6

In summary this option consists of 6 parts:

Part 1 - Existing Waikato Regional Plan policies, rules and methods

Part 2 - Identifying small and low intensity farming activities

Part 3 - Catchment wide rules for stock exclusion, forestry harvest and property registration

Part 4 - Controls that require a Farm Environment Plan

Part 5 - Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Part 6 - Nitrogen Reference Point and no increase in nitrogen discharges.

This option is considered the most appropriate way to achieve the objectives.

Having regard to this information, it is the Council's view that policies, methods and rules to implement Option 6 (Mandatory Farm Environment Plans, mandatory mitigations, property cap and reduction in nitrogen for some, no increase in nitrogen discharges) is the most appropriate way to achieve the objectives of Plan Change 1.

Summary of the selected options to be assessed for effectiveness and efficiency

| Policy option | Selected Yes/No |
|---|-----------------|
| Option 1. Existing Regional Plan polices, rules and methods | No |
| Option 2. Set property limits or standards for phosphorus, sediment or microbial pathogen discharges Variation A - Sediment or microbial pathogens property-level limit Variation B - Phosphorus property limit using <i>Overseer</i> Variation C - Phosphorus property limit using Olsen P | No |
| Option 3. Modelled property limit and reductions for nitrogen discharge loss Variation A - modelled property level limit that requires all/most properties to make set numeric reductions in nitrogen Variation B- A modelled property-level limit requiring landowners to make reductions in nitrogen discharges, applied to some properties only. This approach could be used to provide flexibility for properties or enterprises considered to have "low" nitrogen leaching loss, in order to make provision for some increase. Variation C - A modelled property level limit that applies to all/most properties with trading or transfer | No |
| Option 4. Tax on inputs such as a fertiliser tax | No |
| Option 5. Catchment-wide rules | No |
| Option 6. Mandatory Farm Environment Plans, mandatory mitigations, cap and reduction in nitrogen for some, no increase in discharges Six parts for controlling discharges and the use of land across the catchment are discussed under this option: Part 1 - Existing Waikato Regional Plan policies, rules and methods Part 2 - Identifying small, low intensity and low risk farming activities Part 3 - Catchment-wide rules for stock exclusion, forestry harvest and property registration Part 4 - Controls that require a Farm Environment Plan Part 5 - Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit Part 6 - Nitrogen Reference Point and no increase in discharges | Yes |

Summary of the policy options selected

E.3.5 Effectiveness of Option 6: FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges

Effectiveness is evaluated as the success of the proposed provisions in achieving long term and short term numerical and narrative objectives, or the extent to which progress will be made even if the objectives are not to be met.

Refer to [Explanation of the effectiveness criteria for evaluation in this Section 32](#) for criteria used in the effectiveness evaluation.

E.3.5.1 Relevance

Part 2: Identifying small, low intensity and low risk farming activities

The principle applied under this cluster of policies, rules and methods is to use the best knowledge available about which biophysical, contextual and management practices are most likely to result in low risk of nitrogen, phosphorous, sediment and microbial pathogens entering water. The analysis also took into account how implementable these factors would be, including compliance and enforcement considerations.

The thresholds to identify small and low intensity farming include property size and stocking rate (less than or equal to 4.1ha, or if more than 4.1ha less than 6 stock units per hectare) as well as activity indicators (not commercial vegetable or arable cropping). For low risk farming activities, additional thresholds were identified. These include farming activities less than or equal to 20 ha maintaining current stocking rate or discharges, or, if larger than 20 hectares, not grazing or cultivating slopes over 15 degrees, not grazing winter forage crops *in situ*, not discharging more than 15kgN/ha/yr as assessed by *Overseer*, and maintaining a cultivation setback of 5m with new fences set back 3m from the water. These properties all need to also comply with the stock exclusion and property registration schedule, while properties over 20ha also need to comply with the Nitrogen Reference Point schedule.

These mitigations represent low risk across nitrogen, phosphorus, sediment and microbial pathogens. Enabling land uses that fit the criteria for low risk and low intensity activities recognises the low level of contaminants being discharged from these land uses (in the catchment-wide context).

The proposed rules and associated schedule (Schedule A) requiring registration will provide a key basis of information for council, when implementing Plan Change 1.

Part 3: Catchment-wide rules for stock exclusion, forestry harvest and property registration

Stock exclusion

The principle applied here is to use the best knowledge available to identify mitigation practices that can be described clearly in a rule that will assist in achieving a reduction of contaminants entering the water (WRC 2015, Document# 3258508). There must be confidence that regulating the activity will target potential adverse effects.

Therefore there should be a clear cause-and-effect relationship between the activity occurring and adverse effects on water quality, across a range of conditions. If a permitted activity is being considered, additional clarity is needed that the conditions of the permitted activity will adequately manage the potential adverse effect, regardless of what time of year, or where in the catchment the activity occurs. When stock have unrestricted access to the beds and banks of rivers, streams and lakes, adverse effects on water quality are highly likely. The magnitude of these adverse effects varies depending upon a number of biophysical and management factors such as soil type, rainfall, slope, type and numbers of stock and length of time they are confined to an area. However, excluding animals from streams would prevent direct deposition of faeces and urine from stock in and close to the stream, prevent disturbance of the stream bed and banks, and help stabilise the stream banks. Excluding animals would therefore be expected to have benefits for water quality across a range of locations, particularly in reducing the direct discharge of nitrogen, phosphorus, sediment and microbial pathogens into the waterway (see review of literature in Doole 2015, Document# 3606268).

The aim of this approach is to manage the direct water quality effects of stock entering waterways while enabling the use of adjacent land for stock grazing provided that stock do not have access to waterways. This may be achieved through installing fencing and stock crossing structures or by relying on geographical features that form natural barriers.

The proposed approach focuses on excluding stock from waterway types that are defined in the following schedule:

Schedule C - Stock exclusion/Te Āpitihanga C – Te aukatinga o ngā kararehe

This is invoked by the following rules:

Rule 3.11.5.1: Permitted Activity Rule - Small and low intensity farming activities/Te Ture mō ngā Mahi e Whakaetia ana – Ngā mahi iti, ngā mahi pāiti hoki i runga pāmu

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaetia ana – Ētehi atu mahi i runga pāmu

Rule 3.11.5.3: Permitted Activity Rule - Farming activities with a Farm Environment Plan under a Certified Industry Scheme/Te Ture mō ngā Mahi e Whakaetia ana – Ngā mahi i runga pāmu kua whāi Mahere Taiao ā-Pāmu i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.4: Controlled Activity Rule - Farming activities with a Farm Environment Plan not under a Certified Industry Scheme/Te Ture mō ngā Mahi ka āta Whakahaerehia – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu kāore i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.5: Controlled Activity Rule - Existing commercial vegetable production/Te Ture mō ngā Mahi ka āta Whakahaerehia – Te whakatupu hua whenua ā-arumoni o te wā nei

Sheep and goats are not included because it is generally accepted that they do not have the same affinity for entering water or wallowing or standing in wet areas that other stock types have (such as cattle, horses, deer or pigs), and therefore pose less risk of adverse effects on water bodies.

Schedule C and the associated rules are complementary to the existing rules in the Waikato Regional Plan (Rules 4.3.5.4 - 4.3.5.6). These existing rules focus on disturbance to the beds and banks of water bodies and the associated adverse effects of sediment in waterways and erosion of banks. Together, these rules provide a clear bottom line for restricting stock access to waterways.

A prohibited activity was considered, because it very clearly signals to the community and landowners that allowing stock to enter streams, lakes and wetland is unacceptable in any situation. This was set aside. In focusing on land use, it was considered appropriate to have a permitted activity rule that would allow the use of land for farming subject to conditions, and flexibility to plan stock exclusion by linking it to the Farm Environment Plan process.

Forestry harvest

The catchment-wide rule that adjusts the forestry permitted activity conditions under Regional Plan 5.1.5 will make council aware of any harvesting operations that may result in a change in sediment discharges. As harvesting occurs on a cyclical basis, it is important that this can be monitored in a timely fashion, and correlated with any water quality information being collected in the vicinity.

Property registration

The registration process will give baseline information, and will provide much more accurate data about land use in the catchment for future policy development.

Requiring properties operating under the rules in Plan Change 1 to register with Council improves the implementation effectiveness and enforceability of the rules.

Part 4: Controls that require a Farm Environment Plan to be produced

The focus of the Farm Environment Plan approach is to contribute to the long term and short term numerical and narrative objectives by managing diffuse discharges through a tailored property risk assessment. This approach identifies actions and mitigations along with timeframes for managing the effects of activities and land uses and the associated contaminant discharges. Such plans would cover nitrogen, phosphorus, sediment and microbial pathogens.

A key element of the approach to Farm Environment Plans is that these provisions will be widely applied across the catchments, thereby creating a cumulative positive effect for water quality. This comprehensive coverage, as modelled, provides significant benefits across a range of target attributes (Doole *et al.*, 2016, Document #6551310).

The use of Farm Environment Plans in a regulatory regime requires a rule structure and policy guidance that stipulate suitable standards to manage the effects of diffuse discharges. With this type of approach that is tailored to a particular property, there is a choice of appropriate mitigations. The actions specified are based on best available knowledge about their effectiveness in reducing adverse effects of contaminants on water.

There is a strong reliance on the expertise of the people working with landowners to develop property-level plans, who provide both guidance to the landowner and assurance in the regulatory process. Appropriate expertise will cover farm systems, risk of contaminant discharges within the farm context, appropriate actions and mitigations, and feasible timeframes. In total, this should create a raised awareness and a shift in practices, and consequently reductions in contaminants and adverse effects on water.

According to Doole *et al.*, (2016, Document #6551310 p13), the property-level Farm Environment Plans are:

"pragmatic policy that allows for a property-by-property risk assessment, and application of the most appropriate set of mitigations for that situation above the specified minimum standards. Indeed, it explicitly recognises and deals with the heterogeneity present between producers across the catchment, particularly in terms of land-use type, land-use mix, management ability, production intensity, soil type, and slope (Doole and Kingwell, 2015)."

Farm Environment Plans combine a range of mitigations that were part of the catchment scenario modelling. In order to assess the magnitude of the changes needed to restore and protect the Waikato and Waipa Rivers, Doole (2016, Document #6551310 p4) states that:

"a catchment-level model was initially developed as an optimisation model – that is, it determined the least-cost combination of mitigation measures (land management, land-use changes, and point-source treatments) required to meet the water-quality attribute limits set for each scenario (Doole *et al.*, 2016 a, b)."

Within this approach, an iterative process was used to identify how different mitigations could be implemented to minimise the cost associated with achieving a set of given limits (Doole, 2015, Document #3606268). The term "optimisation" conveys how the iterative process seeks to minimise the cost of a change, and contrasts a simulation approach in which a model user evaluates different scenarios involving pre-defined management activities across the landscape of interest."

The policy option of a tailored, property-specific set of mitigations actions to hold and reduce the four contaminants, means that each landowner will make choices for their property based on a different set of assumptions. Rather than choosing least-cost for the catchment as a whole, a tailored property plan approach will see a set of mitigations chosen for each farm that are best suited to the individual property and its farming operations. Clearly, these cannot be specified, by farm, *a priori* and so simulation of the effects of such a policy option requires assumptions to be made. As noted by Doole (2016, Document #6551310 p13):

"This approach is challenging to simulate and by necessity, assumptions need to be made in the simulation modelling. Some input to these assumptions was provided by industry representatives, members of the CSG, and Waikato Regional Council; however, this stopped short of prescriptions of what activities would be generally applicable within the proposed Farm Environment Plans. Indeed, the baseline assumptions were updated iteratively with the CSG in response to an examination of the impacts of various assumptions on economic and water-quality outcomes."

In assessing the water quality improvements that would accrue from the staged actions implemented in the next decade, and the cost (specified in changes in annual profit earned per land use sector), key assumptions made include (Doole, 2016, Document #6551310):

- a broad roll-out of a well-resourced farm planning programme
- practices that are selected are consistent in that they involve changes to the farming operation, but do not involve large up-front capital costs and are more focused on the refinement of an existing system. Overall, they share a concerted focus on tuning the existing farming system, based on their particular management system and biophysical resources, to promote nutrient-use efficiency (page 16)
- Farm Environment Plans will be rolled out across the 74 sub-catchments in three priority areas over the decade of the Plan, with this staged approach being taken primarily due to farm planning resource constraints. The sub-catchments within each priority area have been selected on the basis of the gap between current and desired water quality across the four contaminants. The 'best estimate' assumption provided by the CSG and used in the simulation modelling is that actions within Farm Environment Plans will be implemented to 25, 50 and 100 per cent level in Priority areas 3, 2, and 1 sub-catchments, respectively, over the next decade (page 17) (meaning that not all actions in Farm Environment Plan across the whole catchment may be implemented by 2026, due to the staged implementation of preparing Farm Environment Plans across the priority areas). Sensitivity analysis was undertaken on this assumption to determine the robustness of the water quality outcomes predicted.

The costs and benefits of the proposed new rule are set out under E.3.6 'Efficiency of Option 6: FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges'. The implementation of Farm Environment Plans will contribute significantly to improving water quality. The collective effect across properties of mitigation actions to reduce diffuse discharges of phosphorus, sediment and microbial pathogens will start to be reflected in receiving water quality within the next decade and beyond. The situation with nitrogen is more complex, with the water quality response times to land management changes being particularly slow within sub-catchments in the Upper Waikato Freshwater Management Unit. While Farm Environment Plans will reduce nitrogen leaching at root zone level (Doole, 2016, Document #6551310), within these sub-catchments there is a load of nitrogen that is already in transit from current and past land use and practices that is yet to be expressed in surface water quality. This disequilibrium, or legacy effect, will likely lead to increasing nitrogen concentrations being observed in some of the surface waters of the Upper Waikato Freshwater Management Unit over the next decade (and beyond), despite the implementation of the policy package including Farm Environment Plans.

Certified Industry Schemes to produce Farm Environment Plans

Farm Environment Plans do not have to be managed entirely by Waikato Regional Council. If the one-to-one process between an agency and a landowner can ensure mitigation actions, and timeframes for achieving them can be specified and monitored, this process can be effective in addressing adverse effects from land use.

The option allows for a formal agreement between council and industry bodies, in the form of Waikato Regional Council certifying industry assurance schemes. Once this is done, landowners (excluding vegetable growers) can sign up to an industry scheme and stay within a permitted activity, where the industry bodies ensure the same level of rigour is applied as it is to those operating under a consented regime. Schedule 2 in Plan Change 1 sets out what is required in order to become a certified industry scheme, which provides oversight and consistency across the various sector schemes.

Some of the industry bodies already have some capacity to set up and run a tailored farm plan approach through an industry scheme. The scheme would have to meet the standards required and approved by council. Sectors and industry bodies have been engaged in the development of Plan Change 1, providing their expertise and experience with industry-producer schemes.

Examples of the information provided include that from New Zealand Good Agricultural Practice (NZGAP). Dolan (2016, Document #8726653 p1) states that:

"New Zealand GAP (NZGAP) is an assurance programme that certifies a range of fruit and vegetable crops in New Zealand. The NZGAP standard describes the Good Agricultural Practices that apply to New Zealand horticulture production systems. The governance, codes of practice, standards, record keeping, certification, standard risk assessment, research, training and technology provided by schemes develops continuously."

Plan Change 1 sets out standards (Schedule 2) against which each scheme will be assessed in order to be certified for the purpose of the rules. There will be requirements for the scheme to develop, monitor and report the environmental outcomes of a Farm Environment Plan for each farm enterprise that is registered with the scheme. In order to be certified, the scheme must ensure its registered members achieve the mandatory mitigation actions within specified time periods. If these are not achieved, the scheme must have a process for internal response and then involvement of Waikato Regional Council compliance processes.

In summary, each industry scheme must have processes for ensuring its registered members are holding and reducing contaminant discharges. From a water quality outcome point of view, there must be no difference between what is achieved by landowners who are part of an industry scheme, and those who apply under a council-managed process.

Auditing Farm Environment Plans, Certified Farm Environment Planners, and Industry schemes

Implementation planning and scheme set-up agreements with council will refine the detail for components such as auditing. Auditing and monitoring could include, for example:

- a process of ensuring that landowners are completing the individual mitigations set out in their Farm Environment Plan
- ensuring that certified Farm Environment Planners are competently undertaking their risk assessment and action planning roles when assisting landowners to develop Farm Environment Plans
- audit of the industry scheme itself, to ensure the scheme is implementing the scheme according to the industry scheme proposal approved by the council.

Seeking robust and rigorous processes and taking account of role appropriateness, there could be inspection from an industry scheme, inspection from an approved third party auditor, and/or inspection from council monitoring staff.

Auditors would have a different role than Waikato Regional Council monitoring staff. Auditors would not have enforcement powers under the RMA, so would not be able to issue abatement or infringement notices; nor would they be able to exercise powers of entry under section 332 of the Act.

In order for the regional community to be confident that the Farm Environment Planning process can achieve environmental outcomes, auditors need to:

- Have enough knowledge of the potential water quality effects of the farm system they are assessing, for instance vegetable crop production or dairy farming.
- Understand the requirements of Plan Change 1.
- Be qualified and skilled in following a structured audit process.

As well as supporting the above points, Dolan (2016 Document #8726653 p 4) noted that:

"New Zealand GAP is audited by 2 independent third party agencies, known as Certification Bodies: AsureQuality Ltd. and SGS (NZ) Ltd. The New Zealand GAP audit process includes a combination of site audits, self-assessments, random audits and targeted audits."

For industry schemes, it is intended that Waikato Regional Council will also employ further audit checks on top of the industry auditing.

Reasons for additional scrutiny of Farm Environment Plans for commercial vegetable production

The proposed rule framework that applies to commercial vegetable production, is premised on the complexity of that farm system, where:

- Crops change rapidly, and in any ten year period, one piece of land may be used to grow many different crops, based on market signals.
- Crop ownership is the key determinant of a vegetable business entity, rather than land ownership. Crops are owned but in many cases land is leased through contractual arrangements, which can change from year to year.

Resource consents are required for all growers, which allows greater flexibility to tailor consent conditions imposed through Farm Environment Plans that recognise the complexity of commercial vegetable production.

Commercial vegetable growers who are not part of an Industry scheme

Council has retained discretion as to whether it will grant resource consent for those growers who are not part of a certified industry scheme. The main consideration for imposing a rule framework where resource consents can be declined, is the expectation that growers in an industry scheme will be subject to an independent quality assurance programme and associated processes. Both regimes would rely on a certified farm planner to develop the Farm Environment Plan. However, those outside an industry scheme will not have the same level of additional checks imposed by a scheme such as NZGAP. An example of this is the NZGAP requirement that growers have sufficient knowledge and skills to manage sediment and nutrient losses from vegetable growing.

As noted by the business manager for NZGAP (Dolan, 2016, Document #8726653 p3):

"The New Zealand GAP standard is reviewed every 4 years, or when a significant change is required. The most recent review (Version 5.0, November 2009) introduced requirements and guidance for environmental management in the areas of:

- a. Production site management (including soil conservation);
- b. Nutrient management, and
- c. Water management".

Industry has indicated that it is intended that future versions of New Zealand GAP will align with the requirements of Regional Plans, and may be strengthened in key areas to enable this. Dolan (2016) noted "the New Zealand GAP standard develops over time, the skills and capability of growers and auditors also develops. Training is a key component of the New Zealand GAP programme and the standard requires evidence that growers and auditors participate in industry training programmes and certification schemes".

Dolan (2016, Document #8726653 p4) goes on to note that the NZGAP system has a system where growers themselves have to have a base level of training or experience. Dolan notes:

"the Certified growers are required to provide a significant amount of evidence of their practices during the audit process. This includes records, certificates, documentation and observations. The discipline required to achieve and maintain this evidence over time has resulted in many growers adopting an integrated quality systems approach within their businesses. Growers comment that this has been of benefit to the running of their businesses, as new requirements can fit into this framework."

Part 5: Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

This option will reduce discharges of nitrogen from activities on the land, and contribute to achieving both short and long term objectives. The highest nitrogen leaching pastoral properties (those that exceed the 75th percentile nitrogen leaching value) will have to reduce by 2026.

In order to achieve nitrogen reductions on pastoral farms that are high leaching, a Nitrogen Reference Point is required to be calculated and submitted to council (Schedule B). It is this reference point that can be compared against the 75th percentile threshold to determine whether this requirement applies.

Reasons for setting an upper limit of nitrogen leaching (nitrogen leaching 75th percentile value of NRP values for dairy farming properties and enterprises in each Freshwater Management Unit)

An assumption made in the development of Plan Change 1, is that as part of a future allocation regime (that has been signalled to be based on land use suitability), nitrogen leaching from sub-catchments will still have to progressively reduce to meet the 80 year nitrogen attribute limits set for surface waters. It was therefore considered appropriate to require the highest nitrogen leaching farms to start their reductions in the life of Plan Change 1.

The highest nitrogen leaching pastoral farms were judged to be those farms at and above a 75th percentile cut-off point of current nitrogen leaching. A spatial element was included, in that a 75th percentile is to be calculated for each of the Freshwater Management Units, based on the Nitrogen Reference Points from dairy farms registered by a certain date. The judgement was made using experience from non-statutory projects where nitrogen leaching data gathering had been completed by the dairy sector. The reason for choosing the 75th percentile cut-off point and not another cut-off point, was based on sector expert judgement from experience about the range of nitrogen leaching amongst dairy farmers in the Waikato. The group of farms leaching more than the 75th percentile nitrogen leaching value was acknowledged to include: dairy farms with high nitrogen-related inputs (feed and fertiliser), who may not be utilising the inputs efficiently and are therefore leaching high levels of nitrogen, as well as a group of dairy farms whose management decisions, combined with biophysical characteristics of the farms such as soil type and high rainfall, mean that the farm is leaching high levels of nitrogen.

Whilst for expediency of data collection, the Nitrogen Reference Points of dairy farms will be used to determine the 75th percentile nitrogen leaching value per Freshwater Management Unit, it was also decided that if there were any non-dairy pastoral operations operating above that line, this cap would also apply to them. The Nitrogen Reference Point exercise will gather data from dairy properties and enterprises following protocols to be agreed with council, and this data would be used to identify the value. For commercial vegetable production, whilst having the potential to contribute high rates of loss, it was considered an appropriate solution for commercial vegetable production to require a 10 per cent reduction in aggregate across the sector for nitrogen. This is because applying the concept of the 75th percentile to commercial vegetable production across the sector would effectively eliminate the growing of certain high-leaching crop types, whilst applying the 75th percentile within each crop type would be complicated to administer, as there is such a wide range of crops produced, within widely varying rotations over time. Due to the complexity of vegetable production operations and the variability of nitrogen leaching across crops, a reduction target for nitrogen across the sector was preferred. Economic information from the sector indicated that a 10% reduction in nitrogen would have a significant income effect on the sector, so this was considered to be the limit for how much reduction could be made in the sector during this first stage of change (Agribusiness Group, 2014).

How and when the 75th percentile nitrogen leaching value is calculated and comes into force

The 75th percentile cut-off value is not known at the time Plan Change 1 is notified. It is defined in the glossary, including a process to calculate the number. A key reason for not writing a numeric nitrogen leaching number in the policy provisions was to allow landowners to establish their current nitrogen discharges using accurate and careful processes, with guidance from experts that will also follow the agreed protocols for data input. From a practicability point of view, Plan Change 1 gives a reasonable period before the Nitrogen Reference Point data must be provided to council. A 75th percentile nitrogen leaching value can be calculated by council after that date.

During the development of the rules, consideration was given to the range of nitrogen leaching within the dairy farming population, and that some farms will be considerably above the upper limit. Plan Change 1 contains a default rule to capture situations where landowners are not able to comply with Farm Environment Plan rules (including the 75th percentile nitrogen leaching value). This is:

Rule 3.11.5.6: Restricted Discretionary Activity Rule - The use of land for farming activities/Te Ture mō ngā kōwhiringa mahi e herea ana – te whakamahinga o te whenua mō ngā mahinga pāmu

Part 6: Nitrogen Reference Point and no increase in discharges

One contribution of the Nitrogen Reference Point option to long term objectives is that it will provide data and information that will assist in developing a long term accounting and monitoring framework as required by the NPS-FM. This will, in turn, inform future plan changes, as described in E.2 'Staging the transition to the 80 year goal'. Some information can be gathered through Waikato Regional Council state of the environment monitoring and other processes at a regional or national level. Other information can only be gathered through Plan Change 1 rules, such as the requirements upon most landowners to register some basic details about their property and land use, and properties over 20ha to obtain a Nitrogen Reference Point.

The Nitrogen Reference Point requirement is important because it provides a means for Waikato Regional Council to obtain data from landowners about the level of nitrogen leaching on their farms. This information will be used to gain a greater understanding of the effects of land use on water quality.

In addition, data from rules that require Nitrogen Reference Point data can be used by Council to determine whether landowners fall into the 75th percentile group, or, alternatively, whether they meet the threshold for low risk nitrogen leaching in the following rule:

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ētehi atu mahi i runga pāmu

The requirement to hold nitrogen discharges at the Nitrogen Reference Point value ensures there is no increase in discharges.

Consistency between models and allowing for mitigations not recognised in models

Overseer is one model that can be used to calculate the Nitrogen Reference Point. Other models or methods that are approved by the council's Chief Executive Officer can also be used. Consistency between different models can therefore be assessed at this time, as noted in the Nitrogen Reference Point policy option discussion in Option 6 of E.3.4 'Evaluation of options and reason for preferred option'.

The policy provisions rely primarily on *Overseer* to calculate the Nitrogen Reference Point; it is also used in determining appropriate actions where the nitrogen leaching is currently above the 75th percentile. This is somewhat problematic because some nitrogen loss reduction mitigations are not currently in *Overseer* (as discussed in Option 3 of E.3.4 'Evaluation of options and reason for preferred option').

In order to address this, policy guidance and then rule drafting must allow for situations where a landowner is reducing the amount of nitrogen leaving the property, but the current version of *Overseer* does not recognise the mitigation being undertaken. For this situation, provision was made for alternative mitigations to be proposed and approved by a certified farm planner via the Farm Environment Plan process. Alternatively, the landowner could apply under the 'catch-all' default rule restricted discretionary activity.

To increase public confidence that nitrogen reductions are being achieved, mitigations put in place on a farm will rely on best available technical evidence and research to show that the mitigation will reduce nitrogen leaving the property, regardless of whether the current version of *Overseer* is able to take the mitigation into account when calculating root zone nitrate leaching outputs.

E.3.5.2 Feasibility

Part 2: Identifying small, low intensity and low risk farming activities

This part of the provisions is consistent with s30 functions, in particular the:

- integrated management of resources in the region, and
- control of the use of land for the purpose of the maintenance and enhancement of the quality of water in water bodies.

This part of the provisions has been chosen to improve the ability to implement the entire proposed approach by removing costs of obtaining resource consents and Farm Environment Plans, that would otherwise fall on landowners whose land use contributes a relatively low proportion of diffuse contaminants to water bodies.

The feasibility of applying the same regulatory requirements to all landowners was assessed in light of the cost of implementing the whole policy provision package (that is, Option 6). Plan Change 1 implementation will require resources that include skilled, experienced advisors who can assist in developing tailored plans to reduce discharges of nutrients, sediment and microbial pathogens, for both pastoral and vegetable growing properties. These resources are limited.

In order to ensure that resources are targeted toward land uses and properties who currently contribute relatively more diffuse contaminants to water bodies, a 20ha threshold was established, below which resource consents and farm environment plans were not required and a nitrogen reference point need not be calculated. In addition, properties above 20ha could continue farming activities without a resource consent if certain environmental factors related to risk of contaminants entering water bodies were met. These are established as conditions of the following rule:

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ētehi atu mahi i runga pāmu

The threshold of 20ha was set taking account of the relative area of the catchment occupied by different properties. Approximately 20 per cent of the area of rural land in catchment is contained in 300 forested properties, while the remaining 80 per cent is contained in 13,700 other rural properties (Dragten, 2016 Document #8405574). Approximately 5700 of these rural properties are less than 4.1ha, while another 3000 properties are less than 20ha in size. Collectively, these 8700 smaller properties constitute 63 per cent of the number of properties in the catchment, but only occupy 3.5 per cent of the catchment land area. In contrast, the remaining 5000 larger properties occupy the remaining 76 per cent of the catchment area. By managing the properties of less than 20ha without requiring Farm Environment Plans (and any over 20ha that comply with the conditions), the total number

of Farm Environment Plans that need to be prepared is reduced by more than 60 per cent, while ensuring that 95 per cent of the rural land in the catchment is managed under a Farm Environment Plan. This approach significantly increases the feasibility of implementing this policy.

Implementation resources are still needed for Option 6. However, the implementation resource will be more focused on ensuring catchment-wide rules are met, and that compliance activities identify those properties posing the highest risk of non-compliance with the permitted activity rules. The approach will rely on landowners being informed of the new rules relating to low intensity and low risk land uses, so that all landowners can ensure they are meeting the conditions required.

Some landowners may not be able to easily determine whether they can comply with conditions of the permitted activity rules. For example, some landowners will need to get an *Overseer* assessment of their property to determine whether they can comply with a nitrogen leaching threshold or if they require a Farm Environment Plan.

Part 3: Catchment wide rules for stock exclusion, forestry harvest and property registration

Stock exclusion

Under s13(2) RMA no person may do any activity described in subsection 2A in a manner that contravenes a National Environment Standard or a regional rule unless the activity is allowed by a resource consent or is an activity allowed by s20A. The activities covered by s13(2) include entering onto or passing across the bed of a river or lake.

Excluding cattle, horses, deer and pigs from intermittent waterways was considered during development of Plan Change 1. This was set aside because of the practicability of monitoring compliance. Having a stock exclusion requirement that applies to continually but not intermittently flowing water poses some risk to being able to efficiently and effectively enforce this rule, but this was considered to pose less difficulty than defining and enforcing stock exclusion from intermittent waterways (WRC 2016, Document# 3651049). Instead, it was considered appropriate to include the consideration of stock exclusion from intermittent waterways through the Farm Environment Plan process.

Additional resources for monitoring and enforcing this rule will be required, over and above those currently allocated for rules in the existing Regional Plan.

Forestry harvest

In terms of forestry, s15 RMA controls the discharge of contaminants to water, and a discharge must not contravene a National Environment Standard or a regional rule unless the activity is allowed by a resource consent or is an activity allowed by s20A.

The policy package for stock in waterways and for forestry is consistent with s30 functions in particular the:

- integrated management of resources in the region,
- control of the use of land for the purpose of the maintenance and enhancement of the quality of water in water bodies.

Monitoring compliance with the forestry harvesting plan and notification requirement would be incorporated into current work areas and impose little additional administrative cost to council. The cost of preparing the forest harvest plan would be borne by forest owners.

Property registration

Receiving, storing and then retrieving and using large amounts of information requires systems and processes to manage data. The council will need to make investment in online data management, to ensure that this process is user friendly for landowners and achieves the intended purpose, which is to support the implementation of rules in Plan Change 1 and work towards future allocation based on land suitability.

Part 4: Controls that require a Farm Environment Plan

The Farm Environment Plan approach for farming activities and commercial vegetable production is implemented through rules and schedules in Plan Change 1, which are a combination of Section 9 (relating to the use of the land) and Section 15 (relating to discharges) RMA restrictions on activities. Under section 9 of the RMA no person may use any land in a manner that contravenes the rules in a regional plan (or proposed regional plan) unless the activity is allowed by a resource consent. Under Section 15 of the RMA no person may discharge any contaminant or water into water unless allowed by a regional plan, resource consent or regulations. There are no permitted discharges specified under the RMA; the default would be a discretionary activity for all discharges.

The Farm Environment Plan approach is consistent with s30 functions, in particular the:

- integrated management of resources in the region,
- control of the use of land for the purpose of the maintenance and enhancement of the quality of water in water bodies.

Council resources

Implementing the requirement for Farm Environment Plans across the Waikato and Waipa River catchments will require significant Council resources. It will have to be resourced with new processes and procedures to track and report information, as well as additional resourcing to process resource consents. To process consents that require Farm Environment Plans, staff will need to have some understanding of mitigations that will reduce diffuse contaminants and how these fit into a farm system. The knowledge base needed to process consents for pastoral farms is different from that required for commercial vegetable systems (WRC 2015, Document# 3258508). These skills are usually associated with soil conservators or farm consultants.

The need for implementers to have an understanding of farm systems and nutrient management was identified as a key learning from the implementation of the Lake Taupō chapter 3.10 of the Regional Plan (WRC 2015, Document# 3034258). As part of implementing diffuse nitrogen regulation in Lake Taupō catchment, new staff were needed who had nutrient management training. These people also required training and experience in RMA processes.

There is also the potential risk that not enough providers are available to support priority timelines for Farm Environment Plans to be completed.

The magnitude of consent numbers and ongoing requirements will be significant for implementation agencies and/or service providers and/or industry staff/consultants preparing and monitoring farm plans (WRC 2015, Document# 3258508).

While council and the community want to see change as fast as possible, systems and processes will need to be in place to collate data and work with farmers and industry on systems that can support the Farm Environment Plan process.

Industry resources and providers

Given the number of landowners involved, industry input and involvement is essential to enable implementation of Farm Environment Plans within a ten-year period. This is relevant to both the council-managed Farm Environment Plan process, and an industry-managed Farm Environment Plan. For the latter, feasibility requires that schemes are of an adequate standard for a regulatory agency to accept, and for the public to have confidence that water quality objectives will be achieved.

Feasibility also depends on alignment with industry programmes and the availability of staff within private companies (such as fertiliser companies and farm advisory consultancies) to assist with implementation (WRC 2015, Document# 3258508). The availability of external support resources could be impacted on by the preparedness (or not) of providers to offer this service within their current businesses, along with the level of comfort, knowledge or experience to undertake this role. For instance, there is a significant shift in role for a farm advisor who has traditionally assisted a landowner increase profitability and production, versus the same individual working with a landowner in the future who is seeking the same farm goals, but must also demonstrate compliance with the Plan Change 1 regulatory regime.

Overall the option of Farm Environment Plans requires a significant increase in the number of people in Waikato Region with specialised skills and additional resources for preparing plans and monitoring implementation.

Industry Scheme oversight

Farm Environment Plans that are developed within a council-certified industry scheme will also require landowners to undertake mitigations to reduce diffuse discharges. The scale and nature of these mitigations at a property-scale are outside the direct control of Waikato Regional Council. In the certified industry scheme, council would be reliant on agreements outside the legislative framework, to ensure defined actions are included and undertaken within appropriate time frames.

Monitoring and auditing challenges

Because there would be a range of activities covered in the Farm Environment Plan, some will be customised and observable, some would be generic and observable, and some cannot be observed. Therefore, there are questions relating to ensuring accountability for undertaking the full range of actions.

Landowner readiness

Past policy implementation suggests landowners usually need time to work with council on what is required before submitting consent applications.

The success of this policy package relies on processes that would hold landowners accountable for actions and associated reductions in discharges, including complex and expensive mitigations and consistently undertaking re-occurring actions (such as fertiliser application) to secure permanent nutrient efficiency gains. This must also be enduring if the land changes ownership, or if and when the Farm Environment Plan is reviewed. If actions are not implemented after changes in ownership or changes in enterprise occur, then catchment water quality outcomes are at risk.

Part 5: Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Within the population of pastoral farmers, there is a range of nitrogen leaching. The pastoral farms that currently leach the most nitrogen, as modelled by *Overseer*, are likely to be dairy farms and some drystock farms such as bull beef and weight-gain dairy heifer grazing operations. Through the rule development, targetting the high to very high leaching farms for reductions was seen as appropriate. These were described as those above the 75th percentile nitrogen leaching value for dairy farms, per Freshwater Management Unit.

The rules and policies do not set a numeric upper limit on nitrogen leached that represents “high dischargers” in Plan Change 1. Because that data is not available until the Nitrogen Reference Point process is completed, a numeric upper limit is not part of the notified Plan Change 1. Not having an upper limit of nitrogen leaching in rules or policies presents the risk that until this is determined, landowners will not begin to make reductions. However, some guidance is given by defining how the high dischargers will be identified.

Nitrogen reductions are required within ten years from the highest nitrogen leaching pastoral farms, down to an upper limit for each Freshwater Management Unit of nitrogen leaching, in the following schedule:

Schedule 1 - Requirements for Farm Environment Plans/Te Āpitihanga 1: Ngā Herenga i ngā Mahere Taiao ā-Pāmu

This is invoked by the following rules:

Rule 3.11.5.3: Permitted Activity Rule - Farming activities with a Farm Environment Plan under a Certified Industry Scheme/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.4: Controlled Activity Rule - Farming activities with a Farm Environment Plan not under a Certified Industry Scheme/Te Ture mō ngā Mahi ka āta Whakahaerehia – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu kāore i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

The concept of bringing down the highest nitrogen leaching pastoral farms to an upper acceptable limit of nitrogen leaching is part of Schedule 1. The key reasons are:

- there are some dairy farms with high nitrogen-related inputs (feed and fertiliser), who are not utilising the inputs efficiently and are leaching high to very high amounts of nitrogen
- there are other dairy farms that are on light soils with high rainfall (both risk factors for nitrogen being leached more rapidly past the root zone of plants), who also have high inputs, and therefore are leaching high to very high amounts of nitrogen
- the dairy sector is willing to show leadership in addressing nitrogen from these two groups of high leaching dairy farms, in order to meet the expectation in the wider community of a precautionary approach to managing nitrogen in Plan Change 1.

Through the Farm Environment Plan process, these landowners are expected to make the biggest nitrogen reductions because they are currently leaching the highest amount of nitrogen. Guidance is in the policy below;

Policy 2: Tailored approach to reducing diffuse discharges from farming activities/Te Kaupapa Here 2: He huarahi ka āta whakahāngaihia hei whakaiti i ngā rukenga roha i ngā mahinga pāmu

In addition:

- the controlled activity Farm Environment Plan rule sets out, as a matter over which control is reserved, 'the actions, timeframes and other measures to ensure ... nitrogen is reduced so that it does not exceed the 75th percentile nitrogen leaching value by 1 July 2026.'
- the glossary defines the process to be used to define '75th percentile nitrogen leaching value'.

Part 6: Nitrogen Reference Point and no increase in discharges

This option is within council's powers and responsibilities. However, further investment in in-house expertise, relationships with industry, improved co-ordination and targeted use of regulatory and non-regulatory methods will be required to ensure that the outcomes can be achieved.

The implementation resource would be significant including, for Waikato Regional Council: gathering and storage of data, training of staff and industry, development of standards and protocols, development of an approach to manage implementation and dealing with general inquiries. To manage changing versions of *Overseer*, Council and farmers will need to keep records of the data that was used to ascertain the Nitrogen Reference Point via *Overseer*. Implementation resource from a landowner and industry point of view includes obtaining expert advice for producing the Nitrogen Reference Point, and ongoing record-keeping. For landowners who have to reduce nitrogen, additional advice will be needed about the most cost-effective way of making nitrogen reductions within the timeframe specified, and management options to help maintain ongoing business viability under the new nitrogen leaching cap for the farm.

Nitrogen leaching outputs using *Overseer* for some pastoral farms in the catchment have already been gathered for other non-statutory processes. However, the Nitrogen Reference Point rule in Plan Change 1 is the appropriate place to set out the protocols and process for obtaining nitrogen leaching data from all farms, to ensure the data gathered is consistent and will allow comparisons across sectors and areas. Standardised procedures for the pastoral farming Nitrogen Reference Point process will give confidence that Waikato Regional Council can identify the highest nitrogen leaching farms.

E.3.5.3 Acceptability

Part 2: Identifying small, low intensity and low risk farming activities

There may be a small number of situations where activities are not controlled through a resource consent, or a permitted activity supported by an industry scheme, and where the risk of discharges to water might be more than low. This has been weighed against the overall effect on water quality and the overall benefit in reducing the costs to council and therefore ratepayers and landowners, by choosing this approach. These properties are controlled by permitted activity rules and their conditions, which have the same compliance and enforcement options available as consented activities.

This approach also recognises that some of the practices undertaken already by landowners (for example, setbacks) will have contributed to reducing the risk of contamination of waterways.

In addition, it is signalled that properties exempted from the requirement for a Farm Environment Plan under Plan Change 1 may still be required to do more in future plan changes.

Part 3: Catchment wide rules for stock exclusion, forestry harvest and property registration

Stock exclusion

Under this approach to stock exclusion from waterways, landowners may undertake different levels of actions. Some can be undertaken relatively cheaply, others would be more costly to comply with the proposed Schedule C (WRC 2015, Document# 3258508).

It is possible that the proposed stock exclusion rule will be more acceptable to dairy farmers than drystock farmers due to actions already taken to fence cows out of stream over the last decade within the dairy sector and other signatories of the non-statutory Dairying and Clean Streams Accord. Dairy farms in the Waikato Region have a relatively high proportion of streams already fenced and the remainder are likely to be cheaper to fence than drystock farm streams on a per metre basis, because of the generally flatter topography, the existence of power for electric fences and the prevalence of reticulated water on dairy farms. In contrast, drystock farms may not have mains power electric fences or water reticulation in place, and may have a greater range of topography with more rolling to steep land, and/or graze deer, which require more resources for fencing.

The wider community may have a favourable response to the proposed stock exclusion rule, due to attention in the media that photographs of stock in water tend to receive. Stock exclusion is a practice that is easy to observe from public roads or along riparian areas.

Forestry harvest

The forestry harvest plan rule is primarily an additional administrative requirement that will make it more efficient to monitor and enforce existing regulatory provisions. This is likely to have a high degree of acceptability.

Property registration

Some property owners may not respond positively to an additional administrative requirement of providing information to the Council. This requirement is aimed to be streamlined, by developing an online portal to make it easy for landowners to supply information to the council, and link with other online systems where the information may already be held but can be shared with Council.

For some landowners this will be the only requirement of them under Plan Change 1, in which case their response is likely to be more favourable.

Part 4: Controls that require a Farm Environment Plan be produced

The approach of developing Farm Environment Plans provides landowners with time to stage the changes, but at the end of ten years, comprehensive coverage of the catchment is expected. This will increase acceptability as there will be a sense of the same requirement applying to all, and everybody contributing to progress towards achieving the water quality targets. Although the tailored nature of the Farm Environment Plans means that mitigations will differ from farm to farm, the policy direction in Plan Change 1 is that landowners feel that equivalent levels of effort are being undertaken for equivalent risk of adverse effects on receiving water bodies.

It will be important to monitor that mitigation actions on an individual property have been undertaken by the landowner, as well as collating and modelling the effect of the mitigations. This will provide public confidence that water quality outcomes are being achieved and that there is a level of consistency across plans.

Comprehensive implementation of the Farm Environment Plan approach in policies, rules and non-regulatory methods in Plan Change 1 (including the roll out of an implementation plan that involves Waikato Regional Council and other agencies), encompasses:

- guidance to landowners, and
- guidance to Farm Environment Plan providers to ensure appropriate independence and expertise, and
- clearly articulated actions and appropriate timeframes, and
- appropriate detail provided to council for recording, monitoring and enforcement purposes; and
- data to assist in reviewing the plan; and
- ways to hold landowners accountable for actions if ownership changes or when the Plan is reviewed.

This will result in increased community and council confidence that water outcomes will be achieved.

The scale of the changes required by activities undertaken on the land in order to achieve the 80 year water quality outcomes makes implementation effort very important. Despite the extensive consultation, there are likely to be many landowners who are not aware of the changes in the management regime of farming activities required by the rules in Plan Change 1, and given the costs associated with implementing mitigations to reduce diffuse contaminants across their whole property, may have a negative response. Farm Environment Plans will cover more activities on the farm, and involve more landowners (particularly those who have not previously required consents) than previous approaches.

Part 5: Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

There could be tensions with this approach where some landowners have to make reductions in nitrogen leaching under Plan Change 1, while some would not be required to do so until some stage in the future.

Further tensions could arise from low-leaching landowners being required to hold to their current level of diffuse discharge without flexibility to increase.

There is some flexibility for landowners to choose the approach or actions to operate within their Nitrogen Reference Point, or, for the higher leaching farms, to find ways to make the required reductions. The approach allows a degree of flexibility to search for and use the lowest cost option to meet their requirements. Seasonal fluctuation is also allowed for through the use of a five-year rolling average measure to determine whether the reference point is exceeded.

The proposed option provides a degree of confidence to the community that there would be reductions in nitrogen discharges across sub-catchments. The amount of reduction from the top quartile of nitrogen leaching pastoral farms has been modelled (Doole, 2016, Document #8726653). The range of nitrogen leaching associated with the top quartile was estimated, but the cost to individuals is not possible to determine, as the cost to each landowner will vary.

This policy package may not be acceptable to those in the community who were expecting Plan Change 1 to require all landowners to be subject to a property-level nitrogen limit where the amount of measured or modelled nitrogen leaving a property is set at a reduced level in the rules. This approach has been taken in recent regional planning processes in Lake Taupō, Rotorua Lakes, Hawkes Bay and Canterbury. Because Plan Change 1 has signalled that any future allocation of discharges should be based on the principle of land suitability as a starting point, it was considered that a longer timeframe would be required to establish this framework in a defensible and robust way.

The highest nitrogen leaching farms are targeted for reductions. The 75th percentile approach, along with accompanying policy guidance, represents a 'proportional' principle whereby those contributing most to an issue also contribute more to the solution. This principle will be seen as equitable by many, but may be seen as unfair by some. With inputs held constant, nitrogen leaching is higher in areas of light soils and high rainfall. Research contracted by the council suggests that biophysical factors influence the choice of landowners in the management practices and technologies they use on their properties (Davies and Topperwien, 2011; Davies, 2012; Versus Research Limited and Davies, 2012; Kaine, 2014).

Part 6: Nitrogen Reference Point and no increase in discharges

Not allowing nitrogen increases will be acceptable to those seeking firm and secure measures to manage contaminants to the rivers as part of achieving the Vision and Strategy/Te Ture Whaimana. This policy approach will be acceptable to those with an expectation that Plan Change 1 will set property-level limits, as has been done in other regional water quality plans.

This approach will not be acceptable to those seeking flexibility for low leaching farms to increase their discharges, and may be seen as inequitable and unfairly penalising those who have been proactive in putting good practice in place. It could also be viewed as creating an unintended consequence of holding up action on other contaminants by requiring farmers to concentrate on not increasing their nitrogen discharge.

The approach to holding all landowners to the Nitrogen Reference Point without allowing flexibility to increase may be seen as running counter to a principle of 'proportionality' whereby those who contribute to a problem are the ones targeted to contribute to the solution. However, this principle of proportionality is evident in the policy requiring reductions to be commensurate to the current degree of discharges (that is, those discharging more must make greater reductions). It is also clearly the basis for requiring those in the highest leaching quartile to come down to that point, as discussed above.

Options considered during development of Plan Change 1

In assessing how to achieve reductions in nutrients and best use of the *Overseer* model, the option of using *Overseer* to set a property-level nitrogen limit and make reductions across the board was initially set aside. Key reasons were that contaminant mitigations such as constructed wetlands are outside *Overseer*, and the model does not work equally well for all sectors.

An alternative option was to manage nitrogen in a similar way to phosphorus, sediment and microbial pathogens; by assessing the risk and identifying actions and timeframes to reduce discharges, on a property scale, through a Farm Environment Plan. If a Farm Environment Plan is relied on, and no numerical nitrogen limits are specified in the rules, the proposed approach includes:

- Rules to prevent land use change and require stock exclusion.
- Farm Environment Plan rules to require reductions through specifying mitigations for the four contaminants. To assist with this the *Overseer* model would be used to inform farm plans, and specify mitigations that will reduce nutrient.
- A future allocation regime in the next plan change with property-level limits that applied to all or some contaminants. Landowners get 'fair warning' nitrogen limits are coming, that upwards creep is not acceptable and that the highest nitrogen leaching farms must make reductions now. This is done in policy and guidance documents that inform Farm Environment Plans.

This option was not pursued because it was not judged to give sufficient certainty that nitrogen targets would be met. It was not seen to be aligned with direction in the NPS-FM to set limits in the water and then define policies to enable these limits to be met.

Nitrogen limits, including reductions, were seen as an appropriate approach to protect water quality. Modelling a degree of flexibility for the development of tangata whenua ancestral lands showed that Plan Change 1 water quality objectives can be met with some increases in discharges of nitrogen from land use being allowed to occur as part of the policy package (Doole, 2016, Document #8726653). However, it was not considered that flexibility could be extended to allow all those with current low discharges of nitrogen to increase without jeopardising the achievement of water quality targets for nitrogen set in the objectives.

As the catchment is considered to be 'over-allocated' for nitrogen, it is expected that widespread reductions will be needed in future plan changes to meet the long term objectives. In light of this, allowing for more increases in nitrogen leaching in this first stage was considered unacceptable in view of the longer term extent of change needed.

Preferred option

The preferred option stops short of requiring specified numeric reductions from all properties. However, landowners will be held to a nitrogen limit in Plan Change 1 rules, and property-level nitrogen reductions will be required from the top quartile of nitrogen leaching pastoral farms. If mitigations are to be used that are not recognised in *Overseer*, provision is made for this to be approved by a suitably qualified person through a certified Farm Environment Plan.

This approach is seen as being more acceptable to the wider community because of greater confidence of achieving water quality objectives associated with property-level numerical nitrogen limits, while still recognising and allowing for the limitations in the current modelling tools available.

E.3.5.4 CSG's Policy Selection Criteria

Some relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

Part 2: Identifying small, low intensity and low risk farming activities

Provided landowners can meet the requirements of the rule conditions, they have the flexibility to continue their operation without a consent. This recognises that if landowners have already taken positive actions, they will not be required to seek consent to continue their activity.

Part 3: Catchment wide rules for stock exclusion, forestry harvest and property registration

Stock exclusion

The stock in waterways rule would be implemented progressively over three priority areas, which are aligned with the timeframes for requiring Farm Environment Plans.

This approach allows landowners some flexibility to determine more appropriate options for their particular farm; for example, how to progressively implement their stock exclusion.

Forestry harvest

The rule adjustment relating to forestry harvesting allows forest owners some flexibility in determining the content and timing for their forest harvest plan, while still providing council with notification of the intent to harvest.

Property registration

This option requires landowners to register information about their property or enterprise, to provide information council on which rule they are operating under. This provision of information does not in and of itself impact on flexibility, but supports the rules and methods in Plan Change 1.

Part 4: Controls that require a Farm Environment Plan be produced

Controls that require landowners to produce a Farm Environment Plan and operate in accordance with the plan provide for tailoring of approaches to each farm property or enterprise, which is a key element of flexibility. The farm planning approach takes account of complexity and differences between farming systems, while review of farm plans allows for change and review as new information and issues arise. Farm planning can also encourage the consideration of intergenerational opportunities and aspirations.

Part 5 and 6: Nitrogen Reference Point and no increase in discharges and Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

The approach to nitrogen reductions allows for a degree of flexibility in that the landowner can define practices to hold and reduce nitrogen that suit their property while still meeting the regulatory requirements. A five-year rolling average is the proposed measure and this allows for some seasonal variability. The policy package does not provide alternative approaches to

meet rule requirements in the form of trading, as this was judged to require a robust allocation and accounting system to be in place. Neither is there flexibility for landowners to increase above their Nitrogen Reference Point, because this was seen to place the meeting of nitrogen targets at risk.

It was considered that a different approach to flexibility around Nitrogen Reference Point year/s is required for vegetable production. This reflects the diverse and extended rotation decisions used in these production systems (for example, leasing, swapping and mixing the growing ground, and fallow land that is not used for production every year). However, all enterprises will still be held to their reference point and an expectation is set around a specified cross-sector reduction in nitrogen, with tailored actions in addition to minimum practices to be included in the Farm Environment Plan for these enterprises.

E.3.5.5 Summary of effectiveness

In light of the above discussion on policy options to contribute to making reductions in contaminant discharges, it is considered that the following key areas should be included in Plan Change 1, in order to contribute to achieving the objectives.

Part 1: Existing Waikato Regional Plan policies, rules and methods: When considering how best to manage water quality in the Waikato and Waipa Rivers, one of the starting points was to acknowledge that the Regional Plan has a range of policies and methods that would continue to be relevant and therefore Plan Change 1 should not replicate existing provisions. However it was also noted that the existing plan does not address diffuse source discharges in any particular detail and does not contain objectives consistent with the Vision and Strategy/Te Ture Whaimana, and that therefore further land use rules would be required.

Part 2: Identifying small, low intensity and low risk farming activities: This approach contributes to prioritising implementation effort across the catchments. By defining land uses that can fit into the low risk/ low intensity framework, these activities to be enabled while effort to bring about change is focused on where it will be most cost-effective.

Part 3: Catchment-wide rules for stock exclusion, forestry harvest and property registration: Catchment-wide rules considered in the context of Plan Change 1 include forestry requirement to prepare a harvest plan and provide harvesting notification, stock entry into waterways and registration of properties. This cluster of rules applicable to the Waikato and Waipa River catchments are complementary to the Waikato Regional Plan rules, but provide a stronger focus on key activities that could contribute to degrading the water quality and support the implementation of other rules.

However it is also acknowledged that these rules on their own may not provide a clear message to landowners on what actions are required to meet the objectives for improved water quality. In this respect the work involved in Farm Environment Plans will be essential for making the required difference in water quality, over time, to meet the 80 year timeframe.

Part 4: Controls that require a Farm Environment Plan: It is expected that implementation of Farm Environment Plans will make a positive difference to water quality, providing a mechanism to instigate actions to address nitrogen, phosphorus, sediment and microbial pathogen discharges. The quantum of that difference is reliant on effective actions, mitigations and changes in farming activities to reduce discharges. Where measurement or quantitative modeling is possible, then the relationship between actions undertaken and reduction is clearer. For contaminants where no suitable property-scale measurement or modelling options are available, then actions are being used as an indicator of changes in property discharge levels.

A key component of this policy option is that Farm Environment Plans are prepared by certified Farm Environment Planners working with landowners to conduct a risk assessment, and identify appropriate actions and timeframes. Measuring the contribution that this approach makes to reductions in diffuse discharges would need to occur at an aggregate level, that is, measuring the actions undertaken by all landowners. While guidance and direction would be provided in Plan Change 1, the actions chosen will not be known until landowners have completed and are implementing their Farm Environment Plans.

Farm Environment Plans have considerable monitoring and enforcement requirements. For example, there are practical and technical considerations associated with measuring management actions set out in Farm Environment Plans. The level of detail of actions recorded in the Farm Environment Plan could assist with this aspect. There is also a need for accurate records to be kept on the landowner's current operations, so that this can be used as a starting point for developing Farm Environment Plans, and for future evaluation of the effectiveness of actions taken.

Farm Environment Plans rely on effective mitigations and actions being undertaken by landowners in a reasonable timeframe and at a level that would meet the catchment-wide reduction targets. This option provides flexibility to landowners to use mitigation measures to reduce diffuse discharges that are suited to their property and to identify the most appropriate way to address risk factors for a range of contaminants.

The approach to monitoring specified in the Methods of Plan Change 1 indicate starting with more frequency then moving to a risk-based approach.

This approach may not necessarily bring about the level of change required, as not all landowners are specifically regulated to a property-level reduction target. Because there are no suitable tools for setting such limits for some of the contaminants, a risk-based approach with tailored actions was considered most effective. This approach will require significant and across-the-board monitoring and compliance responses so that there is confidence water quality targets will be met, and those regulated feel that everyone is contributing to improving the water quality in the catchment.

Farm Environment Plans and certified industry schemes would require joint implementation by council and industry agencies. This would ensure that there was clarity in scope and a level of consistency across Farm Environment Plans and industry schemes. Policy guidance is included to be clear that a similar level of rigour should exist between those within, and outside of, industry schemes. Methods have been included about the inclusion of formal agreements between industry and council that support the Certified Industry Schemes.

Part 5: Nitrogen reduction to the 75th percentile nitrogen leaching values per FMU, and Part 6: Nitrogen Reference Point and no increase in nitrogen discharges: Setting a Nitrogen Reference Point at a property-specific level is considered to be an essential first step in effectively managing long term reductions in nitrogen discharges. In this first stage, it is considered effective to use the reference point approach to manage nitrogen across farming properties, and to bring about required reductions from high leaching activities.

The judgement has been made that more information on current levels of nitrogen being discharged from a property is needed before setting more stringent nitrogen reduction limits that extend beyond the highest nitrogen leaching properties. This information will also inform the development of the allocation framework based on land suitability for future plan changes.

Together the above approaches are considered to be effective in achieving the short term freshwater objectives of Plan Change 1 and working towards achieving the long term goals, as they contribute to making reductions for nitrogen, phosphorus, sediment and microbial pathogens. The combined policy package has a wide range of complementary provisions, which together provide guidance on the steps required in the next 10 years to start making reductions to the level of contaminants in the water.

Catchment-wide reductions are supported by rules controlling land use activities as well as data collection and monitoring frameworks. Comprehensive application of the Farm Environment Plan approach also provides for catchment-wide progress to be made on all of the contaminants in question. The importance of recognising existing risk factors for all these contaminants, and tailoring changes in practices to property conditions, contribute to making this policy package relevant to achieving the objectives of Plan Change 1.

These options together also provide some phasing in of actions over time, which reduces social and economic impacts.

The intent of this combined group of options is for landowners to manage discharges through management practices and additional mitigations set out in Farm Environment Plans, which are tailored to the risks of that particular property.

Under this regime landowners that are not defined as "high dischargers" by the nitrogen leached limit will need to stay within their Nitrogen Reference Point and make reductions. The degree of reductions in all contaminants, will be proportionate to the amount of current discharge and the scale of water quality improvement required. The highest nitrogen dischargers will be subject to a numeric limit that will be set once comprehensive data collection has occurred.

E.3.6 Efficiency of Option 6: FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges

E.3.6.1 Environmental

Identifying small, low intensity and low risk farming activities

Provides for use of land in a way or at a rate that does not pose significant risk to water quality.

Catchment-wide rules for stock exclusion, forestry harvest and property registration

Realises the water quality benefits of preventing stock entry into water bodies:

- Prevention of direct deposition of urine and faeces.
- Reduction in sediment loss from stock disturbing bed and banks of waterway.
- Reduction in damage to bank and stream habitat.

A 1 metre buffer strip is required for new fences, creating an additional small increase in water quality benefits.

Contaminants are not removed from a setback area unless vegetation that traps sediment and phosphorus is harvested (Doole, 2016, Document #8726653 p 13).

Some delay to benefits due to various timeframes for stock exclusion.

The requirement to prepare a harvest plan for forestry will allow for risk assessment, and for more effective monitoring and enforcement. This builds on current "best practice" for earthworks, vegetation clearance and sediment controls.

Controls that require a Farm Environment Plan to be produced

Allows the specification of farm-level actions to manage diffuse discharges. The benefit will depend on the level of the actions specified in each instance.

Landowners undertaking activities on farm and mitigations to reduce discharges will lead to improved management and cumulative benefits across the catchment.

In conjunction with other options (land use controls, nitrogen leaching controls and stock exclusion), there are significant improvements expected (Doole, 2016 Document #8726653 p 49). Median Total N and P achieve 33% and 31% of the improvement required to reach Scenario goal 1 and the 95th percentile *E. coli* improves 69%.

A consent applicant must demonstrate that the application will result in positive benefits contributing to water quality, proportionate to the current discharges and degree of water quality improvement required.

The water quality outcomes are not fully achieved until all Farm Environment Plans are implemented. Varying timeframes for implementing actions would mean improvements would not occur everywhere in the catchment at the same rate.

Achieving environmental benefits is dependent on the rigour of the implementation of this approach.

Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit and Nitrogen Reference Point information and no increase in discharges

In conjunction with other options (land use controls, Farm Environment Plans and stock exclusion) there are significant improvements expected (Doole, 2016, Document #8726653 p49). Median Total N achieves 33% of the improvement required to reach Scenario goal 1.

Deteriorating trends currently seen in nitrogen attributes through land use change and intensification will be addressed over time, and further deterioration will be minimised in the period taken to develop the framework for future allocation based on land suitability.

The contribution to water quality outcomes and limits and targets will not be realised until landowners have undertaken actions and discharges from land have had time to move through groundwater.

Due to high load to come and groundwater lags in some areas, achievement of the short term targets for all nitrogen attributes is not assured within ten years.

E.3.6.2 Economic

Identifying small, low intensity and low risk farming activities

Significant fixed or ongoing costs are not placed on farming activities that are not on a scale that can meet these costs within a farming system - provides benefit of additional time.

Catchment wide rules for stock exclusion, forestry harvest and property registration

Provides time for landowners to prevent entry of dairy cattle, beef cattle, deer and pigs from waterways. Allows some flexibility in the means by which stock exclusion is done.

Reduces the negative economic impacts of sediment on other water users.

Landowners undertake different levels of actions to prevent entry of stock, some relatively cheaply, others are more costly.

Requirement to be met across landowners irrespective of different cost.

Controls that require a Farm Environment Plan to be produced

Efficient because it recognises the heterogeneity between producers and provides flexibility in choice of mitigations.

Tailored approach is risk-responsive and more cost-effective than requiring everyone to carry out the same actions, regardless of relevance or effectiveness.

Provides certainty to landowner investors about Regional Plan requirements for the Farm Environment Plan and thresholds in the rules/conditions to assess plans against.

The factors that affect implementation costs include staged timing through prioritisation of sub-catchments, how many properties will require a Farm Environment Plan, and the role that industry might play in implementation.

Plan Change 1 model results suggest dairy sector profit will fall from \$618m to \$604m (-2.2%) and horticulture from \$28.2m to \$25.9m as a result of actions to reduce discharges (Doole *et al.*, 2016, Document #6551310)

Flow-on effects of *all actions* to the Waikato economy are estimated (McDonald and Doole 2016) to be around:

- 0.3 - 0.6 per cent decrease in GRP
- 0.0 - 0.4 per cent decrease in employment.

Costs to landowners for collecting information and developing (or amending) and auditing the Farm Environment Plan.

Costs to the council and ratepayers for monitoring and compliance. Will require more one-on-one interaction with landowners and new expertise.

Cost to industry to implement the process. Farm Environment Plans may build on existing industry programmes but there will be added costs. The Sustainable Milk Programme (a voluntary industry-led programme) worked one-on-one with landowners to develop farm plans. This cost \$2.2 million for 650 dairy farms between July 2012 to June 2015.

Costs for adjustments where there are requirements for consistency in standards across the various assurance schemes, or where they differ from current industry programmes or templates.

Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit and Nitrogen Reference Point information and no increase in discharges

Some of the costs in determining Nitrogen Reference Points can be spread between industry and council.

Costs to make reductions in nitrogen are centred on the 75th percentile group, with the assumption that there are some inefficiencies in these operations that will allow for reduction to be made at lower cost by targeting these properties.

For high dischargers, costs to bring down their leaching may be significant.

For commercial vegetable growers, impacts on profitability from reductions in nitrogen use.

For all properties, restriction on development potential of the land.

Plan Change 1 model results suggest dairy sector profit will fall from \$618m to \$604m (-2.2%) and horticulture from \$28.2m to \$25.9m as a result of actions to reduce discharges (Doole *et al.*, 2016, Document #6551310).

Flow-on effects of *all actions* to the Waikato economy are estimated (McDonald and Doole 2016) to be around:

- 0.3 - 0.6 per cent decrease in GRP
- 0.0 - 0.4 per cent decrease in employment.

Monitoring costs will either fall to ratepayers or landowners.

Roll out will be a significant task especially if Council will be required to keep records of the data that was used to ascertain the nitrogen leaching via *Overseer*.

E.3.6.3 Social

Identifying small, low intensity and low risk farming activities

Minimising the demands on the community for ongoing investment and compliance in combination with avoiding the disproportionate economic effects identified above

Catchment wide rules for stock exclusion, forestry harvest and property registration

Improvement in recreation and non-use values relating to water quality.

Where stock exclusion is via fencing this may restrict access to the River for sporting, recreational, and cultural activities.

Controls on the use of land and discharges from land via a tailored plan for each property

Improvement to freshwater recreation value, which is currently in the order of \$28-91 million per year (Phillips, 2014, TR2014/17). Industry and community involvement, taking a proactive role in creating positive water quality improvements; makes use of existing 'social capital' in industry networks.

Flow-on social issues from economic effects listed above.

Nitrogen Reference Point information and cap and Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Improvement to recreational and social values affected by nitrogen-related attributes.

Flow-on social effects from the economic impacts noted above.

E.3.6.4 Cultural

Identifying small, low intensity and low risk farming activities

Enabling current cultural values and practices to continue where intervention or change would be disproportionate to any benefit

Catchment wide rules for stock exclusion, forestry harvest and property registration

Improvement in cultural values dependent on water quality.

Controls on the use of land and discharges from land via a tailored plan for each property

Significant improvement in water quality will give positive cultural impact; prioritisation will see most efficient approach taken to achieving gains in degraded sites, including lakes.

Nitrogen Reference Point information and cap and Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Improvement to cultural values affected by nitrogen-related attributes

Potential for additional nitrogen restrictions in the form of a nitrogen cap, on pastoral land that has been unable to develop (but see E.7 'Flexibility of the use of Te Ture Whenua and settlement land').

E.3.6.5 CSG's Policy Selection Criteria

Identifying small, low intensity and low risk farming activities

Placing minimal requirements on these activities is about prioritising efforts and being administratively efficient. There is an element of proportionality, and aiming for cost-effective solutions.

Catchment wide rules for stock exclusion, forestry harvest and property registration

Rules address issues known to be most cost-effective means to bring about water quality gains in the first instance.

Controls on the use of land and discharges from land via a tailored plan for each property

Optimises outcomes because landowners can undertake a risk assessment of specific features of their property and activities and address areas of greatest risk. Property-level optimisation of outcomes occurs through flexibility to select most cost-effective and appropriate actions for that property and business. When these are aggregated, they represent a form of optimisation across the catchments.

Some landowners will require a range of steps or activities to ultimately achieve the desired change. It is difficult to extrapolate from existing voluntary farm programs to predict the likelihood of change in situations where farmers have to undertake costly actions. Therefore for the community and other stakeholders, design and auditing is very important for providing more confidence in achieving water quality outcomes.

Nitrogen Reference Point information and cap and Nitrogen reduction to the 75th percentile nitrogen leaching values per Freshwater Management Unit

Policy strikes a balance between assurance that nitrogen objectives will be met, and flexibility around how to stay within Nitrogen Reference Point or how to bring about the required reductions (including use of *Overseer* and/ or approved set of suitable mitigations).

Targetting of highest leaching properties to come down most seeks to find the most cost-effective gains across the catchment.

Support resources availability could be a limiting factor to the reference point process roll out.

Constraint on flexibility for nitrogen imposed by this policy may not allow for full optimisation of actions to reduce all four contaminants.

Remaining uncertainty for future investment past ten years or confidence that investment in mitigation now will be recognised and accounted for in future policy.

E.3.6.6 Summary table of benefits and costs of Option 6

| Option 6: Mandatory Farm Environment Plans, mandatory mitigations, property cap and reduction in nitrogen for some, no increase in nitrogen discharges | | |
|--|---|---|
| | Benefits | Costs |
| Environmental | Reduction in contaminants entering water | Timeframes allowed to implement controls, and lag in time for controls to reach full effect will mean some delay in benefits to water quality |
| Economic (Including opportunities for economic growth and employment) | Flexibility is provided for how to implement controls, which allows for innovation, while certainty allows for investment decisions to be most efficient Reduced impact of contaminants on other users | Collection of information and development of controls Costs incurred to make reductions Reduced GRP for the region, estimated to be a 0.3 - 0.6% for all actions in the policy mix Regional employment reduced by up to 0.4% |
| Social | Improved recreation and other non-use values | |
| Cultural | Improved cultural values dependent on good water quality. | |
| CSG Policy Selection Criteria Optimising environmental, social and economic outcomes | Optimises outcomes by addressing most cost-effective interventions first and allowing for tailored risk-based approach | |

Efficiency of FEPs, mitigations, property cap, reduction in nitrogen, no increase in nitrogen discharges

E.3.6.7 Summary of efficiency

This policy package includes a combination of catchment-wide rules, Farm Environment Plans and Nitrogen Reference Points to be used to meet the short term and build towards the long term objectives.

Catchment-wide rules are recommended for stock in waterways and minor modification of the existing forestry rules. According to the LAWF Fourth Report (Land and Water Forum 2015) excluding stock from waterways is one of a number of practices that can be implemented on-farm to help manage water quality, the benefits of which are less context-dependent than other practices, and therefore suited to being regulated nationally.

The proposed Priority areas for progressive implementation would allow time for landowners to prepare to meet the stock entry rule. This option provides a degree of flexibility to landowners regulated to achieve exclusion and find lower cost methods of compliance.

The proposed new rules in Plan Change 1 build on Waikato Regional Plan catchment-wide rules relating to earthworks, vegetation clearance and erosion control (which apply to all sectors) and it is anticipated that this will contribute to reducing sediment from entering water.

It is anticipated that **Farm Environment Plans** being comprehensively applied will involve considerable implementation costs. Depending on the actions required in the Farm Environment Plan, the compliance costs for landowners could vary from relatively small to large. Implementation costs would be incurred by some landowners as a result of increased requirements for the range of on-farm activities and land uses required in order to make reductions in discharges. There would also be costs associated with resource consents required to give effect to this policy.

The benefits of using Farm Environment Plans are that the landowners have a list of actions that align well with their property's topography, rainfall, soil type, crops grown and/or stock carried. Some of the challenges of a tailored approach using Farm Environment Plans in a regulatory setting are that writing the plan and then monitoring actions in it, has to be specific to a property and is therefore more resource-intensive. In addition, a tailored approach to Farm Environment Plan rules requires careful monitoring and audit to provide the wider community with the level of confidence that everyone is 'doing their bit' to reduce discharges, including those under industry schemes.

In order for the community to be confident that progress is being made toward environmental limits and targets, rules need to be clear and enforceable. One aspect of this is how easily the actions undertaken by landowners can be observed, particularly if monitoring has to be spread among many properties.

Efficiency of the **Nitrogen Reference Point** approach depends on holding nitrogen leaching so that increases do not occur, whereby reductions made could be negatively offset by increases in discharges from others in the catchment. Much of the increase in contaminant levels in waterways is driven by gradual intensification (Hudson et al 2015 Document #3700008), which has 'overwhelmed' the voluntary 'good work' to date.

As part of taking a precautionary approach to addressing both nitrogen and phosphorus attributes, Plan Change 1 contains provisions to manage nitrogen discharges, and to require the highest nitrogen leaching landowners to reduce leaching in the life of Plan Change 1.

E.3.7 Assessment of risk: certainty and sufficiency of information

There is sufficient information on which to base the proposed policies and methods. In particular, the technical work has been undertaken to do a comprehensive assessment of the monitoring data and information available on the rivers, lakes and wetlands in the catchment. This included additional field investigations to inform groundwater lag time considerations and faecal sources and providing forums to gather mātauranga Māori specifically to inform Plan Change 1.

There is significant information from the research and reports commissioned and/ or considered by the TLG on the understanding of biophysical, social and cultural considerations (see Part C 'Technical Information').

In summary, there is sufficient information to understand the water quality problem and define the desired future state and understand the types of actions required to address the problem. Technical information on the timeframe or rate of uptake of mitigations under the proposed package is less well understood.

The interpretation and use of this information in a regulatory regime and a number of "real world" considerations was used to inform the design of the policy package. There is considerable information on the actions needed. The approach taken for Plan Change 1 is based on catchment-scale understanding of actions required (that is, modelled mitigations) and cannot be down-scaled to prescribe individual property requirements. However, an understanding of the quantum of change required to meet the long term objective has come from the modelling of future scenarios described in C.2.2.11 'Scenario modelling outputs'.

There is a need to have a range of mitigations in place to meet the desired future state for water quality. The full extent of projected effects may be uncertain, and some caution is needed in light of gaps in understanding.

The management approach chosen relies on a policy package of catchment-wide rules, Farm Environment Plans and Nitrogen Reference Point. Should any of these not be implemented, the overall impact will be lessened.

Not acting because of this uncertainty would increase the risk of not achieving the water quality objectives, including degradation of the river, or prolonging time taken to achieve the desired water quality objectives. There is a clear risk that if no action is taken in this plan then there will be further degradation of water quality in the catchment and, therefore, that the objectives of the Vision and Strategy and NPS-FM will not be met.

E.3.8 Overall Assessment of appropriateness and reasons for deciding on provisions

To achieve the long term and short term freshwater objectives, a extensive number of policy provisions were assessed and the most useful elements of each were combined. As a first step landowners are generally prevented from increasing their property or enterprise diffuse discharges, and required to make reductions in discharges by undertaking mitigation actions. This requires significant change and response. Therefore in Plan Change 1 the policy package reflects the start of a staged reduction in contaminants entering water, and future plan changes will be needed to require further reductions from all discharge sources.

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E.3.10 Appendix 1

Choice of approach to model used to measure leaching loss

Options for models used - Either restrict to one model (such as *Overseer*) or allow any approved model to be used in policy provisions for measuring nitrogen leaching loss

Models are referred to in three processes in Plan Change 1:

1. To calculate reference points of the amount of nitrogen leaching for land within the Waikato and Waipa River catchments.
2. To support approaches that hold or cap levels of nitrogen leaching.
3. To support approaches to bring about reductions in nitrogen leaching.

Use of a stipulated model - One option is for the policy provisions to rely solely on the *Overseer* model when setting property-level nitrogen reference points. This has the advantage of:

- Consistency in how nitrogen-related inputs and outputs are considered.
- Over time, focusing effort on development of one model to be used in limit setting processes such as Plan Change 1.
- Ability for outputs from different properties to be directly compared, if all landowners either use the same version for establishing nitrogen reference points, or there is a mechanism that enables comparison of outputs between different versions of *Overseer*.

Allow any approved model - The alternative is to allow landowners to choose the nitrogen output model they use. This has the advantage of:

- Recognising that for some sectors, particularly the commercial vegetable production sector, research is underway to improve the accuracy of the nitrogen leaching loss figures produced by the *Overseer* model, and to investigate and compare other biophysical and farm management models such as APSIM (Agricultural Production Systems sIMulator), which is currently being trialed in New Zealand (Ford 2015).

It is considered that the confidence in *Overseer* is lower for vegetable production, because there are a wide range of crops that are rotated on the same block of land, and research is still underway to improve the level of confidence in the modelling outputs for the various crops.

However, a key disadvantage of allowing multiple models to be used is that outputs cannot be aggregated or compared. This is not a concern if the purpose of the model is to assist the landowner to track their own progress and choose mitigations relevant to their property. If this option is chosen there must be careful consideration of how different model outputs would relate to each other, and whether it was possible to aggregate the outputs at a sub-catchment or FMU level as part of an accounting framework, and to facilitate ongoing monitoring toward achieving the objectives.

E.4 Restricting land use changes

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to restricting land use changes.

E.4.1 Plan Change 1 Provisions

The policy being evaluated is:

Policy 6: Restricting land use change/Te Kaupapa Here 6: Te here i te panonitanga ā-whakamahinga whenua

The rule being evaluated is:

Rule 3.11.5.7: Non-complying Activity Rule - Land Use Change/Te Ture mō ngā mahi kāore e whai i ngā ture – Te Panonitanga ā-Whakamahinga Whenua

The relevant objectives are:

Objective 1: Long-term restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 1: Te whakaoranga tauroa me te tiakanga tauroa o te kounga wai ki ia riu kōawaawa me te Wae Whakahaere i te Wai Māori

By 2096, discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water result in achievement of the restoration and protection of the 80 year water quality attribute targets in Table 11-1.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

E.4.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long-term and short-term freshwater objectives.

Note: This section should also be read in conjunction with the analysis undertaken for provisions relating to making reductions, as found in section E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point', as well as the analysis undertaken for provisions relating to staging the transition to the 80 year goal, as found in E.2 'Staging the transition to the 80 year goal'.

| | Reasonably practicable options | Description |
|---|--|---|
| 1 | Existing Waikato Regional Plan policies, rules and methods | Maintain the status quo |
| 2 | Controls on changes in land use | Restrict and manage specified, major changes in land use that are likely to result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens |

Reasonably practicable options for restricting land use changes

E.4.3 Explanation of options

Option 1: Existing Regional Plan policies, rules and methods

This option retains the policies, rules and methods in the Waikato Regional Plan. There are provisions that provide some specified land use management controls related to nitrogen, phosphorus, sediment and microbial pathogens, but changing land use is not explicitly controlled in the Waikato Regional Plan.

Option 2: Controls on changes in land use

This option would restrict and manage major changes in land use that would be expected to result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens. This option restricts specified changes in land use.

These controls are linked to the existing vegetable production rule that caps the commercial vegetable growing land area. Refer to E.3.4 'Evaluation of options and reason for preferred option' under the E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point' section of this evaluation.

E.4.4 Evaluation of options and reason for preferred option

General comments

Controls on land use change are designed to be interim, with the intent that they be removed from the Regional Plan in future plan changes. Refer also to the discussion in E.2 'Staging the transition to the 80 year goal'.

Putting controls on changing land uses impacts future opportunities. It was identified that certain types of Māori freehold land under Te Ture Whenua Māori Act 1993 and Treaty settlement land have historical and contemporary legal impediments that have affected the use of the land. Provisions controlling land use change have the potential to negatively impact upon the relationship of Māori with their ancestral land. Therefore, an additional set of provisions were investigated to deal with the consequences of the land use change provisions (refer to E.7 'Flexibility of the use of Te Ture Whenua and settlement land').

Option 1: Existing Regional Plan polices, rules and methods

This option on its own is not considered to achieve the objectives, given the trends in decreasing water quality in some attributes in parts of the rivers and lakes. The current management regime in the Waikato Regional Plan does not specifically impose restrictions on land use change or intensification within a land use. Therefore this option on its own is not sufficient to manage the effects arising from changes in land use that result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens.

This option is not considered to be the most appropriate way to achieve the objectives.

Option 2: Controls on changes in land use

This option (Policy 6, Rule 3.11.5.7) is an interim measure to control specified land use changes in the catchment that, should they occur, are expected to result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens. The rule focuses on land use changing from woody vegetation to farming activities, any livestock grazing to dairy farming, arable cropping to dairy farming or any land use to commercial vegetable production (unless provided for in Rule 3.11.5.5 Existing commercial vegetable production). The existing Waikato Regional Plan provisions do provide some specified land use management controls related to nitrogen, phosphorus, sediment and microbial pathogens, that apply across the entire Waikato Region. Keeping these provisions will provide a level of consistency across the region in the short term, and build on management that already occurs.

The changes in land use specified under Rule 3.11.5.7 would become a non-complying activity. These particular changes in land use have been selected as they represent the highest risk of increases in discharges (see Monaghan *et al.*, 2010).

The non-complying activity rule based on specified changes in land use provides additional clarity than a rule based on any general trend in intensification, and addresses all four contaminants of nitrogen, phosphorus, sediment and microbial pathogens.

Section 86B of the RMA governs when rules in proposed plans have legal effect. It states that a rule in a proposed plan has immediate effect if the rule "protects or relates to water, air, or soil..." (s86B (3)). As the intent of Plan Change 1 is to protect water quality in the Waikato and Waipa Rivers, the rules have legal effect upon notification. The land use change rule was considered to be appropriate to have legal effect from notification, as it is able to be implemented immediately, and it is an important part of the approach to achieve improvements in water quality (that is, by restricting large scale land use change and therefore the associated increases in discharges). The intent was for this protection from further degradation to be made from notification, whilst still allowing public consultation and input on the rule through the Schedule 1 RMA process of submissions and hearings.

Other rules in Plan Change 1 also have immediate effect on notification, but include express provisions that delay the date by which compliance is required. The decision to delay the start for some rules are to take account of time needed while landowners and council staff set up processes to do initial data gathering steps, where it is unrealistic for landowners to comply with rules immediately or to allow landowners time to complete actions.

These rules all require landowners to take actions on their property, and there are time and financial costs associated with these actions. This is a different approach to the land use change rule, which restricts landowners from taking actions, and therefore would only apply if and when a landowners chooses to change land use, and the costs are borne out as forgone opportunities. The impact of proposed land use change controls on landowners will not be distributed across all landowners within the catchment. Those affected will be landowners who are seeking to change the use of their land to those land uses specified under the rule. Despite this, the provisions do not prohibit land use change. Rather, they are seeking to require such activities seek resource consent (through a non-complying activity rule) to ensure that sediment, nutrients and microbial pathogens are managed effectively. It is not intended to remove the ability of landowners to operate existing activities on their land.

If the land use change rule was delayed to come into legal effect post-notification, this could allow more land use change, and associated increases in discharges, to occur, and could result in a higher number of landowners being part way through a conversion when the rule takes legal effect. This has the potential to create a 'gold rush' of applications, and goes against the objectives of Plan Change 1. In addition, other rules that control increases of discharges would need to be implemented by landowners earlier, and as discussed in the paragraphs above this is not practicable.

Controls on land use can be in place from the time of plan notification, and do not require benchmarking (through *Overseer* or another model used as a measure of discharges). The land use change rule focus is to restrict and/or manage specified major land use change in the interim, while the other policy approaches to making reductions are being rolled out (refer to E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'.)

A non-complying activity status means that an application must either be consistent with the objectives and policies, or have effects that are no more than minor. If one of these tests can be met, the consent authority can then consider the application and grant consent with or without conditions, or decline consent. Requiring a resource consent for any of the specified land use changes would enable a high degree of scrutiny of the effects of these changes in use.

This level of scrutiny, and the ability to impose conditions and ongoing management requirements, or indeed to refuse consent, provides a process to consider the adverse effects of the activity and that the change is not contrary to the objectives and policies.

The policies provide some direction to guide when it would be appropriate for a consent for land use change to be granted.

Reductions in nitrogen, phosphorus, sediment and microbial pathogens from existing farming uses will be managed through requiring implementation of mitigation actions in Farm Environment Plans (refer to E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'). If there were no controls on land use change, then the reductions required from current high-discharging activities may be negated by changes in land use from lower to more intensive activities, resulting in higher levels of diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens. This has been observed in the catchment to date, where reductions from voluntary actions carried out by landowners have been overwhelmed by a combination of intensification and land use change. There are large differences in per-hectare contaminant losses between the land uses found in the catchment, and historic large-scale land use changes have led to significant impacts on water quality (see Hudson *et al.*, 2015, Vant, 2014). In order to achieve the objectives, current land use and changes to land uses that result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens need to be managed.

While this option has economic implications for landowners, the additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens that result from the continuation of major land use change are not tenable for meeting the objectives of Plan Change 1.

This option is considered to be the most appropriate way to achieve the objectives.

Having regard to this information, it is the Council's view that the policy and rule to implement Option 2 (Controls on changes in land use) is the most appropriate way to achieve the objectives of Plan Change 1, when combined with options specified under E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'.

E.4.5 Effectiveness of Option 2: Controls on changes in land use

Effectiveness is evaluated as the success of the proposed provisions in achieving the long term and short term numerical and narrative objectives, or the extent to which progress will be made even if the objectives are not to be met.

Refer to [Explanation of the effectiveness criteria for evaluation in this Section 32](#) for criteria used in the effectiveness evaluation.

E.4.5.1 Relevance

The focus of **Option 2** (controls on changes in land use) is to manage the effects of diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens arising from specified major changes in land use. This option seeks to restrict changes in land use that are considered most likely to result in additional diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens, and to provide guidance on managing those changes if they are allowed to occur. The controls on land use change through the non-complying activity rule are particularly relevant in the short term, in the period while other mechanisms through Plan Change 1 (and future plan changes) are being established to improve water quality. The use of a non-complying activity rule is suggested for specified land use changes to provide clear guidance for decision makers around the type of change that is not appropriate, and therefore would need to be carefully considered on a case-by-case basis. This option contributes to the short term objectives by halting the degradation that could potentially occur as a result of changes from lower to higher discharging land uses.

The non-complying activity rule is focused on specified changes in land use that represent the highest risk of increases in discharges. The changes in use that are controlled are (refer to the Rule for full details):

- woody vegetation to farming activities; or
- any livestock grazing other than dairy farming to dairy farming; or
- arable cropping to dairy farming; or
- any land use to commercial vegetable production (except as provided for under Rule 3.11.5.5).

In general, land uses have the following hierarchy of per-hectare contaminant discharges, from highest to lowest: commercial vegetable production, dairy, arable cropping, drystock, with forestry and indigenous vegetation having the lowest discharge levels (see Monaghan *et al* 2010).

This approach seeks to restrict land use conversion from lower to higher discharging uses. For commercial vegetable production, this land use change rule is cross-linked to the existing commercial vegetable production rule. Otherwise, much of their general rotational operation would trigger this rule (refer to the evaluation of Option 6 in E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point').

An analysis of Agribase found that commercial vegetable production covers less than 1 per cent of the land area of the catchment (Dragten, 2016) and is therefore likely to make only a small contribution to overall catchment-scale water quality degradation. However, it is a very intensive land use, can lose significant quantities of sediment and phosphorus, and can have a high nitrogen leaching rate per hectare. Commercial vegetable production has a unique management system that involves rotation of crops on different parcels of land. Due to these factors, it was seen as most appropriate to manage the whole rotation of crops and therefore restrict the total area under vegetable growing, rather than try to regulate it on individual parcels of land. The policy approach for commercial vegetable production is that the total area would be capped, meaning that land could only be introduced into commercial vegetable growing if an equivalent area is taken out of production (refer to the evaluation of this option under E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point').

E.4.5.2 Feasibility

Under the RMA, the functions of regional councils are set out in section 30, and s30(1)(c) sets out controls on the use of land for the purposes of soil conservation and water quality (among other matters). Section 9 restricts the use of land where there is a regional rule, and section 15 restricts discharges of contaminants into water or onto land. Managing land use change as a part of Plan Change 1 is therefore within the Council's mandate.

The land use change provisions will contribute to the achievement of the objectives by controlling large scale changes in land use from lower discharging uses to higher discharging uses. There is also a high risk associated with taking no action, as it has been predicted that on-going land use changes will continue to increase sediment and nutrient loads in the waterways (Hughes, 2015).

A relatively small increase in council resources is likely to be required to implement this part of Plan Change 1 to provide landowners with information on the rule and utilise existing systems to process resource consents, monitor compliance and undertake enforcement action. Implementation will also require close liaison with other local stakeholders, and the co-operation of industry representatives from the dairy, horticulture and forestry sectors to identify locations where land use change may be occurring. Industry/ landowner resources required would be on a case-by-case basis, when any land use change is contemplated. The key requirement would be for any consent application to demonstrate the proposal is not contrary to the policies and objectives of Plan Change 1, or ensure that any adverse effects would be no more than minor (as the test for a non-complying activity rule). The onus is on the applicant to propose mitigation methods to ensure land use effects are managed.

To assist with managing compliance with this rule, there needs to be an understanding of the land use at the time of notification. This links to the registration provisions of Plan Change 1 (refer to E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'.) Also, a property owner would need to have completed a change to a new use before compliance action could be taken. This emphasises the need for communication on the provisions, and adequate and timely enforcement to prevent non-compliance with the provisions.

E.4.5.3 Acceptability

The impact of proposed land use change controls on landowners will not be distributed across all landowners within the catchment. Those affected will be landowners who are seeking to change the use of their land to those land uses specified under the rule. Despite this, the provisions do not prohibit land use change. Rather, they are seeking to require such activities seek resource consent (through a non-complying activity rule) to ensure that sediment, nutrients and microbial pathogens are managed effectively. It is not intended to remove the ability of landowners to operate existing activities on their land.

Landowner acceptability will depend on economic and other drivers for their decisions to change their land use.

The importance of water quality as expressed through the NPS-FM and the Government's working group on water are indicative of the political and community support for improving water quality in the Waipa and Waikato River catchments (NPS-FM 2014 and Land and Water Forum 2010).

A key factor in the acceptability of this policy and rule is its interim nature, which foresees that these provisions will be replaced by future plan changes. It was judged to be unacceptable to lock in current land uses indefinitely without this specified timeframe. Therefore an important part of the non-complying activity rule for land use change is the end date of 2026.

If the land use rule no longer has effect from the date specified in the rule, then the change of land use will no longer require resource consent. Specifying an 'end date' means that the adverse effects of any land use change after that date are only covered by the remaining rules. The intention is to commit the Waikato Regional Council to establishing new rule(s).

Consultation with the community included a question on this challenge, asking: "Should there be an interim catchment-wide rule to limit any increased contaminant losses as a result of intensification while the plan change is being implemented?" This question was asked during the intensive engagement period October - November 2015 at the large stakeholder workshop, community workshop and an online survey. Of the responses, 74 per cent of respondents answered 'yes' and 26 per cent answered 'no' (WRC 2015, Document# 3603167). The most common comment was a question about what the detail of the rule would be, and what was meant by intensification.

E.4.5.4 CSG's Policy Selection Criteria

Some relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

As above, the land use provisions would be realistic to implement, monitor and enforce and would be acceptable to the wider community. The main risk to preventing further degradation of quality under this approach would be unauthorised land use changes continuing to happen. Active compliance and enforcement efforts would be needed to support this policy approach.

These provisions restrict flexibility in the short term, but there may be some intergenerational flexibility (depending on choice of future policies) in the longer term. Controlling the increase in discharges from land use change in the short term may, in fact, preserve some flexibility for increases in discharges from some properties to occur under a future allocation regime. The restrictions on land use changes allow for a period of time to enable other land use controls (such as Farm Environment Plans) to be implemented in a way that the effects from these actions will be able to be measured without the additional inputs from significant land use changes. Within-sector changes can still occur, provided the other provisions around contaminant discharges are met (such as no increase above a Nitrogen Reference Point, and reduction in nitrogen leaching from a property or enterprise exceeding the 75th percentile nitrogen leaching value).

The land use opportunities in the the future may be different (including different kinds of farming or other alternative uses). In addition, as water quality improves this may open up opportunities to other users of the water resource.

E.4.5.5 Summary of effectiveness

This policy option makes a strong contribution to achieving short term objectives by managing the rate of water quality degradation that might otherwise occur if controls on land use were not in place. This option also supports other policies in the plan that manage and reduce discharges from existing land uses.

Implementation of the land use change provisions would make a difference to future contaminant discharges from land in the Waikato and Waipa River catchments. However, the quantum of that difference is difficult to estimate, as it is highly dependent on commodity prices and other economic drivers to change land use over the 10-year life of the Plan (factors that determine how much land use change would have occurred without these restrictions in place).

The effectiveness of the policy provisions will also be reliant on well-informed landowners, cooperation from landowners and the community, effective mitigation measures where any land use changes occur, and effective enforcement for any unauthorised activities.

This policy approach targets only some of the potential sources of increases in discharges, and therefore is complemented by the other provisions in Plan Change 1 to achieve the objectives. These include Farm Environment Plans and the requirements around the 75th percentile nitrogen leaching value and the Nitrogen Reference Point (refer to E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'.)

E.4.6 Efficiency of Option 2: Controls on changes in land use

| Policy Option 2: Controls on changes in land uses | | |
|--|--|--|
| | Benefits | Costs |
| Environmental | <p>A small to medium environmental benefit is anticipated. The benefit would be achieved through fewer landowners undertaking land use changes and through stronger mitigation requirements for such changes, to manage the effects of diffuse source discharges to waterways. The magnitude of this benefit is small to medium, due to the scale of land use change that has already occurred.</p> <p>In-stream values and community uses would also benefit.</p> | |
| Economic (including opportunities for economic growth or reduction and employment to be provided or reduced) | <p>Long term benefits could accrue to the community for other direct and indirect uses by reducing the rate of degradation.</p> | <p>There would be short term opportunity costs impacting on landowners, by restraining land use changes and requiring a higher level of mitigation measures to be introduced if land use is allowed to occur.</p> <p>The policy provisions could constrain economic growth, contributing to an overall expected reduction in GRP of 0.3 - 0.6%. The expected decrease in employment of up to 0.4% could also be partly contributed to by this policy.</p> <p>Costs are focused on, and impact on, those wanting to undertake land use change. Some sectors would not be as affected.</p> <p>Potential impacts could occur on land values for some industries (land values could go down due to reduced opportunities.)</p> <p>Currently land values are driven by highest value use, not actual use. Other market influences (such as milk prices) can also impact on land values. Other market influences may have greater influence on land values than this policy.</p> |

| | | |
|--|---|--|
| | | The costs of implementation to the council, and therefore to ratepayers, is minimal as these provisions do not require additional skill sets or resources to administer the consenting regime. |
| Social | Resource (water) uses enhanced from reduced rate of degradation of water quality. Greater certainty from a clear policy around land use change. | Opportunity costs are reduced due to the interim nature of these provisions. Applying these provisions to all land types does not recognise the connection iwi have with their ancestral lands. This may affect the social wellbeing, and connection and relationship between people derived from connection with their lands (Coffin, 2016). |
| Cultural | The policy provisions would contribute to achieving the Vision and Strategy. Reducing the degradation of water quality would enhance the contribution that this makes to kaitiakitanga and the mauri of the water. | In isolation, these provisions do not give consideration to the cultural values and connections with iwi land. These provisions are likely to result in Māori-owned land remaining underdeveloped in the short term. This does not promote cultural and historical values, or the ability for future generations to utilise sites for cultural activities. The importance and recognition of co-management agreements and the understanding of cultural values are not reflected in these provisions (Coffin, 2016). However, see E.7 'Flexibility of the use of Te Ture Whenua and settlement land' for further discussion on policy to address these issues. |
| CSG's Policy Selection Criteria Optimising environmental, social and economic outcomes | It is considered that the environmental, social and economic benefits of the policy provisions are optimised by reducing in the short term any major increases in nitrogen, phosphorus, sediment and microbial pathogens discharges into waterways from significant land use change. Reductions being made on existing farms will not be negated by further land use change. | It is recognised that the costs to landowners in constraining their land uses has flow-on effects to their economic and social aspirations. |

Efficiency of controls on land use change

E.4.6.1 Summary of efficiency

The environmental, social and cultural benefits would contribute to achieving the objectives of Plan Change 1. Community confidence in the contribution the policy provisions make to the overall objectives needs to be ensured through limiting land use change to those situations where controls proposed can be clearly shown to manage contaminant discharge. This would limit the likelihood of a series of small cumulative effects of individual applications for land use change that could undermine the objectives. Proactive management of changes in land use will require the “buy-in” of landowners and key industry groups. Economic costs, including impacts on land values, would accrue to a small-medium number of landowners over the next 10 year period, through provisions restricting changes in certain land uses.

Potential significant unfavourable consequences and costs, and tensions with other catchment objectives, have been identified as a result of these provisions, and dealt with in E.7 'Flexibility of the use of Te Ture Whenua and settlement land'.

E.4.7 Assessment of risk: certainty and sufficiency of information

In line with the Vision and Strategy/Te Ture Whaimana, the water quality objectives for protection and restoration require no decline, and a general improvement in water quality. A policy restricting increases in contaminant discharges is required, in order for the monitoring sites within the main stem or tributaries of the Waikato and Waipa River catchments to show that there is no decline in water quality. The choice is a policy restricting land use changes to higher discharging activity.

Hudson *et al* (2015) reported on patterns of land use change in the catchment over the period 1972-2012. Unsurprisingly, these changes appear to be largely a consequence of changing economic drivers and do not necessarily follow any linear direction or trend over the 40 years. For example, the estimated area in forestry rose from 145,000ha in 1972 to 208,000ha in 2002 before declining to 170,000 in 2012 (the last year when catchment-wide data are available). The total area in pastoral land use has slightly declined over the 40 year analysis period (709,000ha in 1972 versus 680,000ha in 2012), but the intensive land uses of dairy and intensive sheep and beef have increased in area in more recent years, primarily at the expense of forestry and low intensity sheep and beef.

While these patterns make it difficult to predict the direction and pace of future land use change, they nevertheless do show the extent to which changes to more intensive land use could occur within the 10-year time frame of Plan Change 1 if no restrictions were in place. In the 4-year period from 2008 to 2012, there was an estimated increase in intensive land uses of 66,000ha, and further, similar, land use changes have continued since that time (Hudson *et al*, 2015 Document #3623054). These trends, if extrapolated to 10 years in the future represent 165,000ha, or 15 per cent of the catchment area (1.1M hectares), or 20 per cent of the land in productive uses, including forestry (840,000ha). This policy approach is therefore an important component of the policy mix, as it removes the risks of large scale land use changes occurring during Plan Change 1 and overwhelming the effects of other policies designed to reduce contaminant discharges to achieve the water quality targets (refer to E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point').

There is a clear risk that if no action is taken in Plan Change 1 there will be further degradation of water quality in the catchment. The flow on impacts could be on other sectors (such as tourism) from degraded water quality, and/ or increased cost to improve water quality in the future.

E.4.8 Overall assessment of appropriateness and reasons for deciding on provisions

To achieve the long term and short term freshwater objectives and avoid increases in discharges, significant land use changes need to be carefully managed.

Overall these provisions manage changes from land uses with lower discharges to land uses with higher discharges. This approach is relevant to achieving the objectives and is feasible to enforce.

The effectiveness and efficiency of these provisions depends on other provisions of Plan Change 1 to manage increases in discharges from within land uses.

The acceptability of these provisions is higher because they are an interim measure until the Regional Plan is changed again in future.

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E.5 Managing point source discharges

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to managing point source discharges.

E.5.1 Plan Change 1 Provisions

The policies being evaluated are:

Policy 10: Provide for point sources discharges of regional significance/Te Kaupapa Here 10: Te whakatau i ngā rukenga i ngā pū tuwha e noho tāpua ana ki te rohe

Policy 11: Application of Best Practicable Option and mitigation or offset of effects to point source discharges/Te Kaupapa Here 11: Te whakahāngai i te Kōwhiringa ka Tino Taea me ngā mahi whakangāwari pānga; te karo rānei i ngā pānga ki ngā rukenga i ngā pū tuwha

Policy 12: Additional considerations for point source discharges in relation to water quality targets/Te Kaupapa Here 12: He take anō hei whakaaro ake mō ngā rukenga i ngā pū tuwha e pā ana ki ngā whāinga ā-kounga wai

Policy 13: Point sources consent duration/Te Kaupapa Here 13: Te roa o te tukanga tono whakaaetanga mō te pū tuwha

Policy 17: Considering the wider context of the Vision and Strategy/Te Kaupapa Here 17: Te whakaaro ake ki te horopaki whānui o Te Ture Whaimana

The relevant objectives are:

Objective 1: Long-term restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 1: Te whakaoranga tauroa me te tiakanga tauroa o te kounga wai ki ia riu kōawaawa me te Wae Whakahaere i te Wai Māori

By 2096, discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water result in achievement of the restoration and protection of the 80 year water quality attribute targets in Table 11-1.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

E.5.2 Reasonably practicable options

The following reasonably practicable options were identified for managing point source discharge contributions of nitrogen, phosphorus, sediment and microbial pathogens to achieve the long term and short term numerical and narrative freshwater objectives.

| | Reasonably Practicable options | Description |
|---|--|--|
| 1 | Existing Regional Plan policies, rules and methods for point source discharges | Maintain the status quo |
| 2 | Existing Regional Plan policies, rules and methods, and new controls on point sources and consent application considerations | Keep existing Waikato Regional Plan provisions, add additional controls on point sources, policies to direct point sources and additional guidance on consent applications |
| 3 | Point source discharge level limit and catchment cap | Requirement to meet hard limits or standards at a "property" level |

Reasonably practicable options for managing point sources

E.5.3 Explanation of options

Option 1. Existing policies, rules and methods to control point source discharges

This status quo option means that there would be no change to the existing Regional Plan and no new provisions relating to point source discharges in the Waikato and Waipa River catchments. All large point source discharges would be managed through the current Regional Plan policies and rules, and operate under consents with conditions. There are three policies relevant to large point source discharges, which are: 3.5.3 Policies 2, 3 and 4. These policies are implemented by a number of rules.

The rule that most large point source discharge consents are issued under is 3.5.4.5 Discretionary Activity Rule – Discharges – General Rule. This rule is discretionary, which means that Council must consider any and all relevant effects of the activity when making a decision to grant or decline the consent, and when applying conditions. The Council must also 'have regard to' any relevant provisions of the Regional Plan and 'have particular regard to' the Vision and Strategy when making decisions on resource consents (s17 Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010).

Option 2: Existing policies, rules and methods and additional controls on point source discharges and consent application considerations

Under this option Plan Change 1 would include additional policies (Policy 10, 11, 12 and 13) that would provide guidance when assessing point source consent applications.

The new policies would be introduced to implement the new objectives in Plan Change 1. This approach would incorporate the requirement of Best Practicable Option (BPO) to avoid and mitigate adverse effects on the surrounding environment due to contaminants entering water bodies, with the opportunity for offsets that reduces adverse effects where BPO does not result in the required reductions. The proposed policy guidance would be clearer than the status quo option, by providing additional decision-making guidance for consent applications.

The proposed new policies would be implemented by existing rules in the Regional Plan, including 3.5.4.5 Discretionary Activity Rule – Discharges – General Rule.

Option 3: Point source discharge level limit and catchment cap

This option would be based around the inclusion of an overall "property" level limit and catchment target that is to be met by point sources. This option would (in aggregate) set a level for the nitrogen, phosphorus, sediment and microbial pathogens from point source discharges, then set some form of allocation of responsibility to meet this cap. This option to remain overall under the cap would also need to manage (if allowed) new entrants, or any type of expansion of existing industries/municipal systems.

E.5.4 Evaluation of options and reason for preferred option

Option 1. Existing policies, rules and methods for control of point source discharges

The existing rules manage point sources discharges via a consenting regime and have been effective in achieving investment in infrastructure upgrades and other mitigation to improve the quality of water discharged from point sources.

Under the Regional Plan the general discharge rule provides a lot of flexibility for Council staff implementing this rule. In particular there is limited strong policy guidance in the Regional Plan for decision making. With the current level of policy guidance when processing consents, there is a degree of reliance on precedent, in line with the most recent court decisions. This focuses the process on the facts of the case and the effects on the environment within the regional context, with little guidance on giving effect to the Vision and Strategy and NPS-FM.

This option is not considered the most appropriate ways to achieve the objectives.

Option 2: Existing policies, rules and methods and additional controls on point source discharges and consent application considerations

This option aims to provide clearer guidance in the policy (Policy 10, 11, 12 and 13) relating to giving effect to the Vision and Strategy and NPS-FM for managing nitrogen, phosphorus, sediment and microbial pathogens. The policies include additional direction for assessing consent applications by highlighting those matters that need to be considered when undertaking assessment of applications. This option is based on the current management approach for point source discharges, and the understanding that this approach has led to reductions in contaminants in discharges. Therefore by building on

the existing approach there would be on-going improvements in the quality of point source discharges, while noting that there are existing industries in the region that are still expanding and some new industries and associated discharges can be expected to emerge.

Point sources discharges are directly and individually regulated under resource consent conditions to achieve demonstrable reductions in the impact of the discharges. These reductions are subject to assessment at the time of resource consent renewal (or if a significant reason triggers an earlier review). The key principle behind this policy option is that the continuation of this approach will contribute to ongoing improvements in discharge levels.

This option was developed to reflect that for Plan Change 1:

- The consent process is the proper channel through which the nature and scale of any appropriate improvement should be identified.
- Seeking the Best Practicable Option needs to be consistent with the need for betterment of the Waikato and Waipa Rivers.
- Improvement should be expected in point source discharges over time, especially considering there have been significant improvements in this sector under past consenting processes.
- There have been significant reduction in point source discharges and the focus needs to be on everyone (including diffuse discharges) contributing to reductions in future.

In setting consent conditions for discharges into the Waikato and Waipa Rivers:

- The use of offsetting has been proposed once the use of Best Practicable Option and mitigations have been applied. This approach recognises that offsets should not provide an easier option than upgrading infrastructure and recognises that it may not be appropriate to offset in a situation where the residual discharges may cause serious ecological harm.
- The consent authority will take account of current loads and future proposed reductions, and these considerations will need to be viewed in light of the context of the obligation imposed by the Vision and Strategy and the relevant objectives.

This option is considered the most appropriate ways to achieve the objectives.

Option 3. Point source discharge level limit and catchment cap

Refer to section E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point' for an evaluation of an approach that sets a catchment cap in aggregate on discharges, that 'dischargers' are required to meet and/or reduce from.

Considering sector feedback (that is industry, energy, local government and water supply sectors) it was concluded that:

- the existing approach in the Regional Plan, that is, consent with improvements during review of consents, has contributed to reduced levels of contaminant discharges, and
- to be consistent with the diffuse discharges approach not to set a property level limit with a catchment cap (option 3 in the Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point section), then a similar approach should be taken for point sources.

This option is not considered the most appropriate way to achieve the objectives.

Having regard this information, it is the Council's view that policies, rules and other methods to implement Option 2 (Existing Policies, Rules and Methods for control of point source discharges and additional controls on point source discharges and consent application considerations) is the most appropriate way to achieve the objectives of Plan Change 1.

E.5.5 Effectiveness of Option 2: Existing provisions, additional controls on point source discharges and consent application considerations

Effectiveness is evaluated as the success of the proposed provisions in achieving long term and short term numerical and narrative objectives or the extent to which progress will be made even if the objectives are not to be met. Refer to [Explanation of the effectiveness criteria for evaluation in this Section 32](#) for criteria used in the effectiveness evaluation.

E.5.5.1 Relevance

The significant requirements in the Vision and Strategy now require point source discharges to the Waikato and Waipa River catchments to achieve a greater reduction in contaminants than was expected at the time the existing Regional Plan rules were developed.

Point source discharges are currently controlled by rules in the Regional Plan and are managed to meet the conditions of their resource consents. Along with the review clauses specified in each consent, s128(1)(b) of the RMA provides the 'as of right' ability for a council to review conditions in light of new standards or limits in a plan, but how much those conditions can be changed is limited.

All consents eventually expire and new consents need to be applied for. There is an expectation from council that point source dischargers aim for continual improvement, defined at the time of consent.

The existing rules are appropriate for application in the Waikato and Waipa River catchment, however there is a need for additional policy guidance to address the effects of nitrogen, phosphorus, sediment and microbial pathogens in point source discharges. This option is based on the continued implementation of the existing rules, that over time have made incremental improvement in point source discharge quality. New policies are proposed, with reference to the targets set out in Plan Change 1. This policy approach aims to provide additional direction for the assessment of consent applications, by providing guidance for decision making that complements the existing policy provisions in the Regional Plan. This option adopts a case by case approach to the management of point source discharges and provides a stronger link to policies for guiding resource consent decision making.

By using the concept of Best Practicable Option, there is significant room for interpretation and this may differ between Council, community expectations and the consent applicant. However, there is a body of knowledge through case law and consenting processes around the application of the Best Practicable Option.

Note: A Regional Plan policy effectiveness review highlighted that the existing rules are strong, but would benefit from improvements in the conditions imposed through the consenting process (GHD Limited, 2011). These rule improvements would be addressed in the upcoming Regional Plan review.

E.5.5.2 Feasibility

For the purposes of Plan Change 1, an offset for a specific contaminant/s is an action that reduces residual effects of that contaminant on water quality.

Many large point sources discharges have invested in the past in upgrade treatment systems, but all are at different treatment levels and stages of upgrade. For some, upgrades may be cost prohibitive and improvements achieved in water quality may not be to the same degree as past upgrades. Offsets may provide a more cost-effective option, while achieving the required improvements in discharges.

Offsetting of adverse water quality effects has its place in the consent process, while noting that offsetting is not appropriate in all circumstances. However, in the context of the Vision and Strategy, which requires protection and restoration of the Rivers (that is, betterment), offsetting alone may not be sufficient.

Point source discharges are managed at source, that is, before the discharge reaches the water. Therefore there is a focus on improving the quality of the discharge by reducing contaminants before any discharge is made to water bodies. Point source discharges also have a direct link to infrastructure (such as pipes). Any infrastructure upgrade would continue to mitigate the effects of an industry's point source discharge and provide benefit beyond the initial consent duration (for example, for the life of that infrastructure). Therefore any offset should remain in place as long as it is required to provide benefit in terms of reduction in contaminant discharges and water quality improvement. Improvement in the future needs to be on top of what has already been committed to, including any offset.

A consent process could require that offsetting actions address the same types of contaminant, however, if the consent process required that the level of the discharges were reduced commensurately, there could be measurement difficulties.

Best Practical Options seeks the "best" method for preventing or minimising the adverse effects on the environment while considering the receiving environment, the financial implications, the effects compared to other options and the available technology at the time and if the option can be successfully applied.

Focusing on BPO provides the opportunity to identify and utilise best technology, and targeted treatment solutions from the available knowledge. BPO provides for identifying a more effective approach, and cost effectiveness.

BPO requires careful consideration because the concept relies on an assessment of several subjective criteria. This provides the appropriate discretion but may lead to subsequent challenge in the consent process as to what actually constitutes BPO in any particular case. It is appropriate to consider what is practicably achievable for a particular discharge, however this needs to occur in conjunction with other factors such as what water quality effects are likely to occur and/or what outcome in the water is being sought.

E.5.5.3 Acceptability

This approach allows for consideration in the consenting process of infrastructure and industry that is important to communities in the Waikato and Waipa River catchments, recognising the positive contribution made by point source activities to communities.

This option also recognises that there have been significant reductions in point source discharges in the past and that the focus for Plan Change 1 should be on how everyone can play a role in addressing nitrogen, phosphorus, sediment and microbial pathogens.

Providing for consideration of longer consent terms for point source discharge consents recognises that investment in alternate technologies requires significant lead times and careful business planning. Longer consent durations may provide more investment certainty thereby supporting commitment to the investment in upgrading point source discharge treatment technologies.

An offsetting approach has the potential to improve the cost-effectiveness of meeting water quality objectives for point sources. Point source dischargers applications will include actions (that is, offsets) that are expected to provide the required amount of discharge mitigations. Point source operators would only do this where the costs were lower than upgrading their own plants, but the effect would likely be the same: same outcome for lower costs.

Whilst there is appropriate reference in the policy to the proposed water quality targets, there may be concern about the extent and if enough guidance and tightening of the policies (that is, desired consent timeframes, significant industry and infrastructure, proportionality, past investment, diminishing returns) in terms of alignment with the RPS, the Vision and Strategy and the influence over decision making. However this approach overall provides more clarity for assessment of consent applications and reference to the short term water quality targets.

Where it is not practicable to avoid or mitigate adverse effects then offsetting actions may be proposed in consent applications. An offsetting approach as proposed has the potential to improve the cost-effectiveness for point sources contribution to short term objectives.

There could be some concern in the community around the use of offsets. Strong controls will be required in the setting of consent conditions, including the location within the catchment where the benefits of the offsets occur, and the ongoing maintenance by industry under council monitoring to ensure that the offset continues to provide the desired benefits (that is, mitigate the point sources adverse effects). The offset need to remain in place (as an infrastructure upgrade would remain in place) for as long as it provides the water quality benefit, (perhaps beyond a one or more consent period).

The objectives are set at a sub-catchment scale, and so care needs to be taken when allowing offsets (acknowledging that this is only after Best Practicable Option has been exhausted). River iwi have shared that no part of the river should be allowed to decline in order to achieve an improvement elsewhere.

E.5.5.4 Policy Selection Criteria

Some of the relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

The existing rules have been used effectively to progressively improve the quality of point source discharges, by requiring improvements in the quality of discharges when consents are being considered. This is an appropriate approach, in conjunction with the additional proposed policies to guide decision making on resource consent applications.

Taking into account the Best Practicable Option and the provision for offsetting allows some consideration of flexibility of available solutions. However, the need for betterment as required in the Vision and Strategy means that there are competing considerations in the decision-making process on which mitigation actions need to be taken by dischargers, even in light of increased costs for possible smaller returns on that cost, in order to achieve improved discharge quality.

E.5.5.5 Summary of effectiveness

The combination of using existing regional plan rules and developing new policies to guide decision making is consistent with Council's current resources and approach to managing point source discharges. A focus on improvement in water quality during the review of consents has contributed to reduced levels of contaminants discharged from point sources. The proposed option follows a similar approach, but with more policy guidance for decision-makers and applicants, and it is anticipated that the review of consent conditions should continue to provide improvements into the future. This needs to be supported by monitoring and compliance efforts.

This approach does not restrict new point source discharges but seeks to provide for operation of regionally significant infrastructure and industry. It provides guidance on expectations around information required for discharge applications and discharge quality.

The consent application/renewal process presents the opportunity for point source applicants to challenge their proposed investment or controls, as weighed against the proposed objectives and policies, and this could impact on the gains in improved water quality.

In its task of granting or declining consent applications, Council will need to consider Plan Change 1 limits and targets set for discharges, along with any guidance in the objectives and policies, and assess the effects of activities against these. Any lack of clear direction for decision making on the likely effect of proposed activities on fresh water, and the lack of sufficient information, is likely to reduce the effectiveness of any actions taken to improve fresh water bodies.

The limits and targets sought means that there can be no decline in water quality attributes at any of the monitoring points in the catchment. The rule conditions /consent conditions specify that the offsetting of actions should preferably be in the same sub-catchment, and if this is not practicable, then the same FMU or upstream FMU. The benefits of an offset are highest when it is in close proximity to the discharge being mitigated. Offsets are also not intended to allow an 'unders and overs' approach, where improvement in water quality in one part of the catchment allows for degradation in another part (even where the water quality target is still met).

E.5.6 Efficiency of Option 2: Existing provisions, additional controls on point source discharges and consent application considerations

| Policy Option 2 Existing policies, rules and methods and additional controls on point source discharges and consent application considerations | | |
|--|---|--|
| | Benefits | Costs |
| Environmental | A consent applicant must avoid or mitigate all adverse effects, or if not practicable, lessen any residual effects | Providing for the continued operation of regionally significant infrastructure and industry may have permanent ongoing adverse effects. Offsetting does not have to avoid or mitigate all residual adverse effects. |
| Economic (including opportunities for economic growth or reduction and employment to be provided or reduced) | Some support for the continuing operation of regionally significant infrastructure and industry. Consideration of the relative proportion of point source contribution to contaminants. Longer consent timeframes may provide more business security. | The opportunity to use offsets provides some opportunity to select a more cost effective mitigation options, however the stipulation that this is only available when all other options are exhausted reduces the opportunity to select offsetting of lower cost but similar values in water quality improvements. Consent compliance and monitoring costs. |
| Social | Consideration in policy around contribution and maintenance of community wastewater systems. | Community values relating to water quality not fully provided for. |
| Cultural | Could provide better protection of the cultural values by considering what is practicably achievable for a particular discharge, what water quality effects are likely to occur and/or what outcomes in the water are sought to be achieved upon consent renewal. Once all options are exhausted then offsets could be considered for the continuing betterment of water quality. | Allows for ongoing discharge of contaminants from sources that are culturally unacceptable into water bodies |

| | | |
|---|--|--|
| <p>CSG’s Policy Selection Criteria</p> <p>Optimising environmental, social and economic outcomes</p> | <p>That policy and associated guidance will inform 'dischargers' of expectations about managing water quality, including the need to consider best practice and offsets as mitigation options.</p> | <p>Many large point source discharges have invested in the past to upgrade treatment systems, but all are at different treatment levels and stages of upgrading. For some, further upgrades may be very costly and result in minimal gains in overall water quality in the rivers.</p> |
|---|--|--|

Efficiency of policy option for controls on point sources

E.5.6.1 Summary of efficiency

The economic costs to point sources of increasing levels of improvements from infrastructure investment is significant.

The estimated cost to remove an additional tonne of each type of contaminant is in the order of 5 to 26 times higher than current unit costs for municipal and industrial wastewater (Roback, 2015). The author highlighted that when considering any initiatives aimed at reducing contaminant loads in the catchment, there should be a comparison made between the loads from wastewater and stormwater sites to loads from other sources, to ensure the most cost effective alternative is pursued. Ultimately while under such a comparison the cost of a similar level of reduction may be less than other discharge sources, the catchment is over-allocated for nitrogen, phosphorus, sediment and microbial pathogens and those who benefit from water use need to contribute to addressing the water quality problem.

Therefore while costs are high, for the overall efficiency of the provisions in Plan Change 1 for point source discharges, the environmental, cultural and community benefits of improved water quality outweigh the economic costs.

E.5.7 Assessment of risk: certainty and sufficiency of information

There is sufficient information on which to base the proposed policies. To achieve the outcome values, long term and short term freshwater objectives, and manage and make reductions, all point source dischargers will be required over time to continue to make reductions through the adoption of mitigation options and/or (as proposed in Plan Change 1), undertake offsetting measures.

Regarding maintaining water quality overall, there is neither uncertain or insufficient information. The best available information has been used to understand the contribution of point source contaminants. However, according to a study of municipal and industry sources (Roback, 2015) the information available for municipal wastewater sites was reasonably comprehensive; while the information on municipal stormwater and industrial wastewater was less so (see also Keenan, 2015). This limited uncertainty has been weighed against the risk that if no action is taken to improve the quality of existing (and manage any new) point source discharges, that there will be further degradation of the water quality in the Waikato and Waipa River catchments, as these catchments are already over-allocated. If no action is taken in Plan Change 1 then there will be further degradation of water quality in the catchment and the objectives of the Vision and Strategy and NPS-FM will not be met.

E.5.8 Overall Assessment of appropriateness and reasons for deciding on provisions

The efficiency and effectiveness of the new policies depends on appropriate levels of guidance being provided to consent applicant and to decision-makers. Those who are responsible for point source discharges will need to consider practicable improvements to the quality of their discharges, and/or offsetting options to contribute to overall improvement of water quality. While it is anticipated that there are still gains to be made through improvements to existing discharges, there is also recognition of the risk of additional contaminant loadings from new discharges.

Continuing reductions of contaminants from point sources and any resultant improvements is consistent with the sustainable management purpose of the RMA, and the achievement of the Vision and Strategy. To achieve the long term and short term freshwater objectives, improving the quality of current and potential new discharges will be important steps. This requires the use of Best Practicable Options to reduce contaminant levels, as well as consideration of offsetting mitigations.

In addition, the implications of the Vision and Strategy for consent processes suggests that the “bar has been raised” in relation to what is now expected for discharges to the Waikato and Waipa River catchment. For any particular discharge consent the improvement (that is, the contribution to restoration) that can be expected must be proportionate. In other words, those who contribute more to the problem, should do more than those who make little contribution and/or who have already implemented the treatment system improvements that are reasonably or practicably available to them.

The focus in Plan Change 1 is on managing the contribution of diffuse and point sources discharges, whilst recognising the contribution and investment some have already made to reductions. Point sources have made significant investment to date in reducing discharges, Plan Change 1 seeks to respond more fully to diffuse sources in addressing the problem.

E.5.9 Bibliography for Part E.5

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E.6 Managing Whangamarino Wetland

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to managing Whangamarino Wetland.

E.6.1 Plan Change 1 Provisions

The policies being evaluated are:

Policy 15: Whangamarino Wetland/Te Kaupapa Here 15: Ngā Repo o Whangamarino

Policy 17: Considering the wider context of the Vision and Strategy/Te Kaupapa Here 17: Te whakaaro ake ki te horopaki whānui o Te Ture Whaimana

The methods being evaluated are:

Method 3.11.4.4: Lakes and Whangamarino Wetland/Ngā Roto me ngā Repo o Whangamarino

Method 3.11.4.5: Sub-catchment scale planning/Te whakamāherehere mō te whānuitanga o ngā riu kōawaawa

Method 3.11.4.6: Funding and implementation/Te pūtea me te whakatinanatanga

The relevant objective is:

Objective 6: Whangamarino Wetland/Te Whāinga 6: Ngā Repo o Whangamarino

- a. Nitrogen, phosphorus, sediment and microbial pathogen loads in the catchment of Whangamarino Wetland are reduced in the short term, to make progress towards the long term restoration of Whangamarino Wetland; and
- b. The management of contaminant loads entering Whangamarino Wetland is consistent with the achievement of the water quality attribute targets in Tables 11-1.

E.6.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long term and short term numerical and narrative freshwater objectives.

| | Reasonably Practicable Options | Description |
|---|---|--|
| 1 | Existing policies, rules and methods in the Regional Plan | Maintain the status quo. |
| 2 | Existing policies, rules and methods, and new provisions relating to Whangamarino Wetland | Existing policies, rules and methods with new policy focused on the effects of contaminant discharges on Whangamarino Wetland. |
| 3 | Additional methods, including requirements for landowners in areas surrounding all wetlands | Landowners adjacent to wetlands required to undertake additional mitigation actions in their Farm Environment Plan. |

Reasonably Practicable options for managing Whangamarino Wetland

E.6.3 Explanation of options

Option 1: Existing policies, rules and methods in the Regional Plan

This option would mean no change to the existing policies, rules or methods applying to the Waikato and Waipa River catchments.

The current approach in the Regional Plan includes rules for protecting or modifying a wetland, and controls on activities for example drainage, earthworks or clearance actions that may impact on wetlands. The creation and enhancement of wetlands is encouraged by policies in the plan, and risk is managed by setting catchment area thresholds for when a consent is needed for works associated with wetlands.

- Chapter Wetlands - Objectives 3.1.2, policies 3.7.3, implementation methods including 3.7.4.6 creation of new drains, 3.7.4.7 discretionary activity rule drainage of wetlands. Table of wetlands 3.7.7.
- Chapter Daming and diverting - Implementation methods including rule 3.6.4.16 creation and enhancement of wetlands.
- Chapter River and lake bed disturbances - Implementation methods 4.3.9.3 clearance of vegetation in natural state water bodies and wetlands.

Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland

The aim of this option is to incorporate provisions in Plan Change 1 relating specifically to Whangamarino Wetland. This would be in addition to the other proposed policy provisions in Plan Change 1 (for example stock exclusions, mitigations in Farm Environment Plans, setting priorities in sub-catchments etc. would all apply). It would involve identifying Whangamarino Wetland as a priority catchment, and focussing management actions on prevention and mitigation of nitrogen, phosphorus, sediment and microbial pathogens entering waterways. Suitable actions, mitigations and other interventions outside the scope of Plan Change 1 would be identified through a catchment plan that is currently being prepared by Waikato Regional Council for Lake Waikare and Whangamarino Wetland catchment.

The intent is to:

- make progress towards long term restoration of Whangamarino Wetland;
- minimise the further degradation of the remaining areas of high value bog ecosystems within Whangamarino Wetland; and
- provide a source of traditional mahinga kai for the people within the rohe.

Option 3: Additional management requirements for landowners in areas surrounding wetlands

The aim of this option is to recognise the sensitivity of these important areas in the catchment and the existing pressures on these areas. This option involves developing additional and separate requirements for managing wetlands. It would involve additional requirements on discharge sources (that is, land management activities) that impact on wetlands in each Freshwater Management Unit or each sub-catchment.

E.6.4 Evaluation of options and reason for preferred option

Option 1: Existing policies, rules and methods in the Regional Plan

This option recognises the significance of wetlands within the whole region and recognises that they are complex environments. The existing rules and methods would remain in place for all wetlands within the Waikato and Waipa River catchments, including for Whangamarino Wetland.

For the Whangamarino Wetland, which is the largest wetland in the Waikato River catchment, the current regime is not considered to be sufficient in managing the contaminants (especially nutrients and sediment) that enter it.

This option is not considered the most appropriate way to achieve the Objective 6.

Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland

This option recognises that there are separate and different management issues that need to be addressed for Whangamarino Wetland. The Wetland is most likely to respond to contaminant inputs differently from other water bodies in the catchment (WRC 2016, Document# 3699610). Whangamarino Wetland is strongly influenced by water flowing into it, particularly during periods of flood, where the wetland is a part of the Council's Lower Waikato flood management scheme.

Studies conducted to date provide strong evidence that nutrient and sediment inputs are having a harmful effect on the ecosystem health of Whangamarino Wetland but there is nothing quantitative relating to changes in ecosystem health or to changes in nutrient and sediment levels (WRC 2016, Document# 3699610).

The flood management scheme that contributes nutrients and sediment to Whangamarino Wetland is regarded as important infrastructure. The scheme protects urban settlements, rural communities, large areas of agricultural production and significant assets including sections of State Highway 1 and the North Island trunk line. This option seeks to ensure adverse effects on Whangamarino Wetland are managed through targeted provisions, including, in this case, the addition of several methods specific to Whangamarino Wetland in Plan Change 1. Methods that include; building on Shallow Lake Management Plans, a

process for the preparation and implementation of Lake Catchment Plans (priority for development and implementation of Lake Waikare and Whangamarino Wetland Catchment Management Plan) with the community, support and research and testing of restoration tools and support Whangamarino restoration programmes.

This option is considered the most appropriate way to achieve the Objective 6.

Option 3: Additional management requirements for landowners in areas surrounding wetlands

This option recognises that wetlands have different management requirements to other water bodies. Wetlands are a significant but diminishing resource in the Waikato Region. The option would provide management provisions that could be used in the upcoming Regional Plan review process, for all wetlands. A separate FMU for Whangamarino Wetland was considered, but it was thought not to be appropriate at this stage because there had been no community or sector engagement on this and further technical information on water quality limits (along with a monitoring and accounting framework) would be required prior to being able to establish a separate FMU for Whangamarino Wetland (WRC 2016, Document# 3710575 and Document# 3697755). The TLG outlined reasons why setting limits for wetlands based on existing knowledge, monitoring data and research would not be a feasible option at this time (WRC 2016, Document# 3697755). In addition the NPS-FM does not include any attributes for wetlands and the development of any national standards is some way off (WRC 2016, Document# 3697755). This option would be best addressed in future plan changes, once further guidance is provided in the NPS-FM and provisions for all the wetlands in the Waikato Region can be reviewed together.

This option is not considered the most appropriate way to achieve the Objective 6.

Having regard to this information, it is the Council's view that policies, rules and other methods to implement Option 2 (Existing policies, rules and methods with new provisions relating to the Whangamarino Wetland) is the most appropriate way to achieve the objectives of Plan Change 1.

E.6.5 Effectiveness of Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland

Effectiveness is evaluated as the success of the proposed provisions in achieving the long term and short term numerical and narrative objectives or the extent to which progress will be made even if the objectives are not to be met. Refer to 'Explanation of the effectiveness criteria for evaluation in this Section 32' for criteria used in the effectiveness evaluation.

E.6.5.1 Relevance

Section 6 RMA identifies the preservation of the natural character of wetlands and their margins, and protection from inappropriate use and development, as a matter of national importance. Through the policy cascade, wetlands are identified in the NPS-FM objectives and in the RPS policies and implementation methods (WRC 2016, Document# 3697755).

Whangamarino Wetland, was identified as a Ramsar site in 1989, recognising it as a site of international importance.⁽¹⁷⁾ Plan Change 1 acknowledges the significance of the Whangamarino Wetland and has accorded it priority status for addressing contaminants (WRC 2016, Document# 3710575).

Whangamarino Wetland also plays a significant role in the Lower Waikato River flood control scheme. This scheme protects approximately 17,200ha of land from inundation during extreme flood events, with this land area having an economic value of approximately \$326 million per annum (2009). The scheme protects nationally significant infrastructure (such as State Highway, North Island Main Trunk rail, national electricity grid and natural gas lines), downstream urbanised areas and productive land.

However, as a result of flood water diversion, storage and controlled release, the hydrological regime of Whangamarino Wetland is significantly altered and nutrients and sediment are trapped within the Wetland. Without careful management, the full range of wetland types present in the Whangamarino Wetland will continue to degrade with the potential loss of bog ecosystems in particular. In this respect the preparation of the Lake Waikare and Whangamarino Wetland catchment plan for this area is a critical management approach.

E.6.5.2 Feasibility

Managing the adverse effects of contaminants on Whangamarino Wetland is a significant task, and as a minimum there is a need to reduce the current rate of decline of water quality in the Wetland.

¹⁷ New Zealand signed the Ramsar Convention on Wetlands in 1976. The requirements for listing include that a wetland has international importance in terms of its ecology, botany, zoology, limnology or hydrology. The Department of Conservation administers New Zealand's obligations under the Ramsar Convention.

The policy package is consistent with the s30 RMA functions of a regional council, in particular integrated management, managing water quality and flows, controlling land for the maintenance and enhancement of water quality and quantity, for the maintenance and enhancement of ecosystems and for the avoidance or mitigation of natural hazards.

The Council also has responsibilities under the Soil Conservation and River Controls Act 1941, controlling flow of water, preventing overflows of banks, and reducing erosion, the Local Government Act 2002 and the Civil Defence and Emergency Management Act 2002 planning for and responding to emergencies, including river flooding.

Plan Change 1 is consistent with the Council's responsibilities under this legislation, there are however tensions between those responsibilities. The emphasis on the need to undertake a catchment plan for Whangamarino Wetland, reflects the complexity of the wetland system, allows for further consideration of the range of issues and demands on the system, and the opportunities for enhancement.

E.6.5.3 Acceptability

Wetland restoration is a key approach to managing the current degradation of Whangamarino Wetland. The focus on contaminant inputs, in particular nitrogen, phosphorus and sediment are integral to the management approaches to water quality in other parts of Plan Change 1.

The international importance of Whangamarino Wetland is acknowledged by its Ramsar site status and the need to manage this wetland is correspondingly identified as a priority area in the RPS and Plan Change 1 (WRC 2016, Document# 3710575).

E.6.5.4 CSG's Policy Selection Criteria

Some of the relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community') have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

While specific management can be targeted at the Whangamarino Wetland, it is also strongly influenced by the contaminants entering the wetland via the in-flowing water from Lake Waikare, rivers and streams, and as such the other proposed policies and methods in Plan Change 1 for managing contaminants in waterways are equally relevant. This is clearly a matter that is important for integrated management.

There is work being undertaken by Council on a non-statutory catchment plan (and including technical work) for Lake Waikare and Whangamarino Wetland (due to be completed in 2017). Plan Change 1 aims to support this initiative and any interventions or mitigations identified (WRC 2016, Document# 3702341).

E.6.5.5 Summary of effectiveness

This policy package identifies the need for integrated management to ensure that the Whangamarino Wetland (which covers approximately 7,000 ha) is protected as a matter of national importance, taking into account its role as part of the Lower Waikato flood control scheme.

The contribution that Plan Change 1 will make to the quality of the Whangamarino Wetland is critical, for example through the development of a sub-catchment plan. In addition the policy package recognises that there are other management mechanisms (and agencies) that could also be used, such as for biodiversity, which lie outside of the scope of Plan Change 1.

It is also noted that in the absence of data and numeric attributes, a narrative objective would apply but there would also need to be further data collected over time.

Prioritising the sub-catchments (for Farm Environment Plan implementation) that flow into and through Whangamarino Wetland as Priority 1 will be critical to the significant work needed to achieve the outcomes anticipated by the provisions. This will be supported and enhanced by any Whangamarino catchment and surrounding sub-catchment planning (including the methods in Plan Change 1 for Lake Catchment Plans and sub-catchment scale planning).

E.6.6 Efficiency of Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland

| | | |
|---|----------|-------|
| Option 2: Existing policies, rules and methods with new provisions relating to Whangamarino Wetland | | |
| | Benefits | Costs |

| | | |
|---|---|---|
| <p>Environmental</p> | <p>This option will reduce and make progress towards the restoration of Whangamarino Wetland and minimise the further loss of ecosystems. These ecosystems have been considerably degraded (WRC 2016, Document# 3697755 & 3645067) due to increasing sediment and nutrient deposits, and there have been large areas of peat bog ecosystems lost since the advent of the flood scheme in the early 1960's. In addition there has been an estimated 40% decline in wildlife.</p> <p>This option will lead to improved biodiversity values for the future (Campbell D 2016 Document# 3694260, Wildlands 2012, Document# 2117907).</p> | <p>The release of water, sediment and nutrients from Lake Waikare into the Whangamarino Wetland is contributing to its decline. The ongoing degradation from sediment entering the Whangamarino Wetland is expected to continue, while the flood control scheme continues to operate in its current form.</p> |
| <p>Economic (including opportunities for economic growth or reduction and employment to be provided or reduced)</p> | <p>As a Ramsar site of international importance, Whangamarino Wetland has important biodiversity values. The Wetland contributes greatly to recreation, tourism, and science.</p> <p>Its flood management role is critical for productive land as well as the resilience of other infrastructure (such as roads, rail, power, gas) and for settlements downstream. The economic value to Waikato River water quality is significant, in that the Wetland is a large area (over 7,000 ha) that 'absorbs' nutrients and sediment from flood flows.</p> | <p>The cost of reducing sediment loadings entering the wetland is likely to be significant, and this is closely tied to the other policies in Plan Change 1.</p> <p>Any changes to the operation of the flood protection scheme that may come out of any catchment plan (that is, reduced level of service) may result in costs to surrounding land and infrastructure.</p> |
| <p>Social</p> | <p>Retention of significant biodiversity values for people's enjoyment and for the protection of natural heritage values for future generations.</p> | <p>Reducing sediment loads could potentially lead to reductions in current Levels of Service for the Lower Waikato flood scheme, which will have significant social impacts.</p> |
| <p>Cultural</p> | <p>Protection of water quality, mahinga kai and plant species of significance to tangata whenua.</p> | <p>Loss of productive agricultural land and farming heritage.</p> |
| <p>CSG's Policy Selection Criteria Optimising environmental, social and economic outcomes</p> | <p>The importance of the Whangamarino Wetland is recognised, and in addition to any site specific actions, the reduction of</p> | <p>There is a need to find an appropriate balance between protecting and restoring the wetland and using it as a 'sink' for flood waters</p> |

| | | |
|--|--|--|
| | <p>sediment and nutrient inflows will also be reliant on the actions taken through other policy packages such as Farm Environment Plans and sub-catchment planning.</p> <p>Implementation will need to also consider management tools that lie outside of this Plan Change 1 (for example, biodiversity mechanisms, flood control options)</p> | |
|--|--|--|

Efficiency of provisions to manage Whangamarino Wetland

E.6.6.1 Summary of efficiency

The benefits of specific provisions for managing Whangamarino Wetland, relate in particular to biodiversity protection and restoration, recognising that it is a Ramsar site of international importance and that it needs to be carefully managed for future generations.

It is difficult to assess the costs of implementation of actions to protect and restore Whangamarino Wetland. Costs will be borne by landowners in relation to other provisions of Plan Change 1 that focus on reducing contaminant input into the rivers, and these actions will contribute to improving the future state of the Wetland. However direct actions will also be required to intercept the sediment loadings of flood waters. At this stage it is unclear what actions or costs would be practicable or feasible, however this is currently being explored in a non-statutory catchment plan being developed by Waikato Regional Council.

It is also important to acknowledge the key role that the Whangamarino Wetland plays in managing flood waters and thereby protecting productive land, and significant infrastructure.

The health of the Whangamarino Wetland will be one indicator that would give the community confidence that progress is being made toward reducing contaminants in the water.

E.6.7 Assessment of risk: certainty and sufficiency of information

There is sufficient information on which to base the proposed policies and methods. In particular, the international status accorded to this site through the Ramsar Convention, along with the directives of RMA s6 to protect and restore such an area. There is a current lack of information on water quality and this will need to be rectified in the future.

The TLG noted that setting long term water quality limits for Whangamarino Wetland would be problematic because there is a lack of monitoring data for some of the possible attributes and therefore there is an inability to determine the current state for those attributes. There is also insufficient scientific research upon which to develop ecosystem health attribute tables (TLG and WRC 2016, Document# 3697755).

The Whangamarino Wetland studies conducted to date provide evidence that nutrients and sediment inputs have a negative effect on the ecosystem health of the wetland, but there is no quantitative data that relate changes in water quality to ecosystem health from which attribute limits could be established (TLG and WRC 2016, Document# 3697755). TLG considered that the Whangamarino Wetland is most likely to respond to contaminant inputs differently to other water bodies, and that with targeted research and the current initiatives on development of the National Objectives Framework (NPS-FM) to include wetlands, then future consideration could be given to setting robust limits (TLG and WRC 2016, Document# 3697755).

There is a clear risk that if no action is taken in Plan Change 1 that there will be further degradation of the Whangamarino Wetland, as a result of nutrient and sediment loads entering the Wetland, which conflicts directly with the Vision and Strategy and obligations under the Ramsar Convention.

If no action is taken in Plan Change 1 then it is likely that there will be further degradation of water quality in the catchment and the objectives of the Vision and Strategy and NPS-FM will not be met.

E.6.8 Overall Assessment of appropriateness and reasons for deciding on provisions

The efficiency and effectiveness of this option depends on reductions in the level of nutrients and sediment entering the waters of Whangamarino Wetland. These reductions may arise from waters upstream as well as from catchment management mitigations. However it is also recognised that Whangamarino Wetland has a significant role in flood management, and that flood waters

can contain significant levels of sediment and nutrients. Therefore as further data is collated on the water quality of Whangamarino Wetland, there may also need to be further RMA regulations applied in the future. Plan Change 1 is the start of a staged reduction in contaminants entering the Wetland.

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E.7 Flexibility of the use of Te Ture Whenua and settlement land

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to providing for the flexibility of land returned under Te Tiriti O Waitangi settlements processes between the Crown and tangata whenua, and Māori freehold land under the jurisdiction of Te Ture Whenua Māori Act 1993.

E.7.1 Plan Change 1 Provisions

The policy being evaluated is:

Policy

Policy 16: Flexibility for development of land returned under Te Tiriti o Waitangi settlements and multiple owned Māori land/Te Kaupapa Here 16: Te hangore o te tukanga mō te whakawhanaketanga o ngā whenua e whakahokia ai i raro i ngā whakataunga kokoraho o Te Tiriti o Waitangi me ngā whenua Māori kei raro i te mana whakahaere o te takitini

The relevant objective is:

Objective 5: Mana Tangata – protecting and restoring tangata whenua values/Te Whāinga 5: Te Mana Tangata – te tiaki me te whakaora i ngā uara o te tangata whenua

Tangata whenua values are integrated into the co-management of the rivers and other water bodies within the catchment such that:

- a. tangata whenua have the ability to:
 - i. manage their own lands and resources, by exercising mana whakahaere, for the benefit of their people; and
 - ii. actively sustain a relationship with ancestral land and with the rivers and other water bodies in the catchment; and
- b. new impediments to the flexibility of the use of tangata whenua ancestral lands are minimised; and
- c. improvement in the rivers' water quality and the exercise of kaitiakitanga increase the spiritual and physical wellbeing of iwi and their tribal and cultural identity.

E.7.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long term and short term numerical and narrative freshwater objectives.

Note: this section should also be read in conjunction with the evaluation of the E.4 'Restricting land use changes' of this report.

| | Reasonably Practicable Options | Description |
|---|--|---|
| 1 | Rely on provisions for managing land use change | All landowners wanting to change land use would need to apply for a non-complying resource consent. |
| 2 | Develop new policy | Include a policy reference to Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. |
| 3 | Develop new policies and rules | Provide a separate pathway for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. |
| 4 | Exempt Te Ture Whenua and Treaty of Waitangi Settlement Land from land use change rule | Write an exemption for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land from the land use change rule. |
| 5 | Cap and trade | Cap and trade across the entire Waikato and Waipa River catchment. |

| | | |
|---|---|---|
| 6 | Cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement Land | Cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land |
| 7 | Offsets | Like-for-like offsetting of any intensification with a comparable de-intensification occurring elsewhere. |

Reasonably Practicable Options for flexible use of tangata whenua ancestral lands

E.7.3 Explanation of options

Option 1: Rely on provisions for managing land use change - Policy 6 and non-complying activity rule

This option would involve a rule in the Plan requiring landowners to apply for a non-complying resource consent. This rule would be focused on landowners wanting to change land use from woody vegetation to farming activities; or any livestock grazing other than dairy farming to dairy farming; or arable cropping to dairy farming; or any land use to commercial vegetable production (except as provided for under Rule 3.11.5.5).

Option 2: Develop new policy - Policy 16 and non-complying activity rule

This option would include a reference to Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi settlement land as part of the policy. This policy would then be considered as a part of the decision making process, in accordance with the land use change non-complying activity rule.

Option 3: Develop a specific policy and rule for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land - Policy 16 and a discretionary activity rule

This option would include a separate policy pathway for Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi settlement land. The intent of this separate approach would be outlined in the policy and would be supported by a separate rule.

One variation of this option is to include a schedule to be developed that would identify the parcels of land that could utilise any alternative rule framework.

A second variation of this option is to cap the total hectare of land able to change use under any alternative rule framework.

Option 4: Exempt Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement land from proposed non-complying activity rule for land use change

This option would include an exemption in the proposed plan provisions for any land use changes or intensification on Te Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi settlement land. This would mean that Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land could change land uses without a resource consent, but would still be required to comply with the other requirements in Plan Change 1 (that is stock exclusion or preparing a Farm Environment Plan for the new land use).

Option 5: Cap and Trade

This option involves a cap and trade across the entire Waikato and Waipa River catchment. This option could allow Te Ture Whenua and settlement land to develop either by having capacity to discharge under the initial allocation of the property-level limit, or to purchase additional discharges through trading.

Option 6: Cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement Land

This option involves a cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement land, that is similar to Option 5 but applying only to specific parcels of land.

Option 7: Offsets

This option involves like-for-like offsetting of any intensification with a comparable de-intensification occurring elsewhere. Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land may be able to develop, and consequently increase diffuse discharges by identifying and coming to a formal agreement with another landowner, who would undertake actions to reduce discharges by an equivalent amount.

E.7.4 Evaluation of options and reason for preferred option

Option 1: Rely on provision for managing land use change - Policy 6 and non-complying activity rule

All landowners wanting to change the use of their land would need to apply for a non-complying resource consent if they are changing the land use from woody vegetation to drystock farming, dairy farming or arable cropping; drystock farming or arable cropping to dairy farming; or any land use to commercial vegetable production. This policy and rule combination (Policy 6 and non-complying activity rule) does not consider the history or legal status of the land, or the ancestral relationship of Maori with their land in line with s6(e). See analysis on the cultural effects of this option in E.4 'Restricting land use changes'.

This option is not considered the most appropriate way to achieve Objective 5.

Option 2: Develop new policy - Policy 16 and non-complying activity rule

A new policy would include a reference to Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land that would be considered during assessment of the non-complying activity rule. A non-complying resource consent will be assessed against Objective 5 and Policy 16 where land that is held under Maori freehold land under Te Ture Whenua Maori Act 1993 or settlement land is a factor in the decision making.

This policy would be implemented by the non-complying activity rule, which has an additional layer of rigour to other lesser activity classes; being the 'gateway test'. This test is that the effects of the activity on the environment will be minor or the activity is not contrary to the objectives and policies. This policy is aiming to provide guidance for one of these gateways by including how to manage Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land applications under this rule.

The application of this policy does not override compliance with the non-complying activity rule as all land use change must meet the water quality outcomes anticipated in Plan Change 1 (WRC 2016, Document# 3724784).

This option is considered the most appropriate way to achieve Objective 5.

Option 3: Develop a specific policy and rule for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land - Policy 16 and a discretionary activity rule

This option provides a separate pathway for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. This option includes a policy that outlines the intent of the approach, and a discretionary activity rule to require resource consent if land use is proposed to change from woody vegetation to drystock farming, dairy farming or arable cropping; drystock farming or arable cropping to dairy farming; or any land use to commercial vegetable production on Maori freehold land under Te Ture Whenua Maori Act 1993 or settlement land.

This option would include an activity status that is an appropriate level of assessment for the land use change, and cover the factors to be managed in the new land use. The discretionary activity class would not be as rigorous as an application under a non-complying activity class due to the requirements for assessment under that class of activity.

This option could define and restrict the type of land that could be considered under a rule, for example certain slopes, soil types or Land Use Capability classes. It could also specify requirements for management of the new land use, should the consent be granted, for example to be managed to best practice.

The relevant key themes when considering this option are the effect that the policy and rule would have on water quality in the Waikato and Waipa Rivers, whether the policy and rule apply to a type of activity or to a type of applicant, and if there are different/greater benefits produced by having flexibility for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land over any other type of land ownership structure (WRC 2016, Document# 3771967).

The RMA outlines the functions of a council, which includes the ability to control the use of land for the purposes of maintaining and enhancing freshwater quality, a regional council must have regard to the actual and potential effects of the activities on the environment, and generally objectives, policies and rules should have an effects basis. Policies and rules to provide for the flexibility of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land need to clearly show the effects of

the activities are different from activities on other land. This is particularly relevant if there is a different activity class for a rule for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land to change use than for other land types (WRC, 2016, Document# 3724784) .

A variation on this option would involve developing a schedule that establishes criteria, or list or maps land that could utilise any alternative rule framework.

A second variation of this option is to cap the total hectare of land able to change use under any alternative rule framework (WRC 2015, Document# 3724784)

This option is not considered the most appropriate way to achieve Objective 5.

Option 4: Exempt Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement Land from proposed non-complying activity rule for land use change

This option excludes Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land from the non-complying rule for land use change, which restricts changes in use from woody vegetation to drystock farming, dairy farming or arable cropping; drystock farming or arable cropping to dairy farming; or any land use to commercial vegetable production. This would mean that Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land could make those specified land uses changes, without a resource consent or any control over the way intensive land use effects are managed.

Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land would still be required to comply with the other rules in Plan Change 1 (that is stock exclusion and preparing a Farm Environment Plan for the new land use) (WRC 2016, Document# 3724784) .

This option is not considered the most appropriate way to achieve Objective 5.

Option 5: Cap and trade

This option is a cap and trade (new policies and rules) across the entire Waikato and Waipa River catchment.

Through the initial allocation process Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land could be allocated a nitrogen discharge allowance higher than their current discharges (and need to remain under this allowance) and that amount and any other reduction target is then made from the rest of the discharges available to other land.

This outcome may be achieved by allocating based on Land Suitability, but there are information gaps on what that allocation regime would be, so this is unknown at this stage. See E.2 'Staging the transition to the 80 year goal' for more information.

Setting property level limits, and therefore the ability to set up a cap and trade system, has been considered but was not a preferred approach, see section E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point' (WRC 2016, Document# 3724784).

This option is not considered the most appropriate way to achieve Objective 5.

Option 6: Cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and Treaty of Waitangi Settlement Land

This option involves setting a property-level limit, cap and trade system only within Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land.

A cap and trade within Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land poses the same challenges as a cap and trade for the whole catchment, as mentioned above in **Option 5**, with these additions:

- This option requires all Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land to be allocated a discharge right, and to manage their land within that allocation, or purchase allowances from another Te Ture Whenua or settlement land owner. Flexibility for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land is intended to be available if a landowner chooses to utilise it. This option will result in all Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land landowners applying for a resource consent, even though some may not want to develop their land or sell their rights in the next 10 years.
- The size of the cap and trade market is greatly reduced, as it is restricted only to Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land landowners, which is a subset of the total number of landowners in the catchment. This means that the number of potential people to trade with is reduced. This affects the efficiency of this policy as an option.

- As the cap and trade market is limited to Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land that means some landowners will need to choose not to develop so that others can (if the initial allocation allowance is less than what is needed for the intended future land use).
- How this relates to property-level allocation in 10 years is unclear, either Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land will remain under the allocation they receive now, or they will be re-allocated in 10 years under a regime that allocates the same across all land ownership types. See E.2 'Staging the transition to the 80 year goal' for more information about transition to allocation in the future (WRC 2016, Document# 3724784).

This option is not considered the most appropriate way to achieve Objective 5.

Option 7: Offsets

This option involved like for like offsetting of any land use change of woody vegetation to drystock farming, dairy farming or arable cropping; drystock farming or arable cropping to dairy farming; or any land use to commercial vegetable production with a comparable change to a less intensive use occurring elsewhere.

A holder of Maori freehold land under Te Ture Whenua Maori Act 1993 or settlement land wanting to change land use (and increase discharges) would need identifying and come to a formal agreement with another landowner, who would undertake actions to reduce discharges by an equivalent amount. Payment would be needed for that to occur and there needs to be the technical information that the offset achieved (and continues to achieve) the desired result.

The requirement to meet water quality targets at a sub-catchment scale may restrict the spatial scale at which the offset could occur. There is no motivation for another party to undertake actions to produce an offset and this would reduce the likelihood of an offsetting system occurring (WRC 2016, Document# 3724784).

This option is not considered the most appropriate way to achieve Objective 5.

Options 1, 4, 5, 6 and 7 are not feasible or do not achieve the objectives of Plan Change 1 and so have not been progressed.

Options 2, and 3 offer components that are feasible and so were investigated further. Legal advice, technical information and River iwi input were used when determining which components of the options should be combined to form the desired policy approach.

Having regard to this information, it is the Council's view that policies, rules and other methods to implement Option 2 (Develop new policy) is the most appropriate way to achieve the objectives of Plan Change 1.

E.7.5 Effectiveness of Option 2 develop new policy

Effectiveness is evaluated as the success of the proposed provisions in achieving long term and short term numerical and narrative objectives, or the extent to which progress will be made even if the objectives are not to be met. Refer to [Explanation of the effectiveness criteria for evaluation in this Section 32](#) for criteria used in the effectiveness evaluation.

E.7.5.1 Relevance

The policy selected provides guidance on how to achieve the water quality objectives as well as Objective 5: Mana Tangata.

The policy, applied in conjunction with the non-complying activity rule, recognises the unique relationship between tangata whenua and their land, the ability to make decisions about the use of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land, and the historical and contemporary restrictions that have been placed on that land. The policy also acknowledges that a change of land use will likely result in increases in contaminant discharges, and therefore any new land use needs to take into account best management practice for the new land use, the short term water quality targets in Objective 3, and look to the future and consider the suitability of the land for that type of development.

The use of a non-complying rule supported by the policy aims to provide guidance for decision makers that land use change from lower discharging to higher discharging land uses is not contemplated by Plan Change 1, except in certain circumstances, and one such circumstance is where the change in use occurs on Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land, and this change needs to be managed through a resource consent process.

E.7.5.2 Feasibility

It is within the council's functions to control the use of land for the purposes of maintaining and enhancing freshwater quality.

The policy relates to the use and development of a particular type of land, being Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. Management of this land links to the council's role to recognise and provide for the relationship of Maori and their culture and traditions with their ancestral lands s6(e), to have particular regard to kaitiakitanga s7(a) and take into account the principles of the Treaty of Waitangi s8.

The policy focuses on managing the effects of land use, particularly of the nitrogen, phosphorus, sediment and microbial pathogens, on water quality through the conditions imposed through a resource consent.

E.7.5.3 Acceptability

When developing Plan Change 1 it was identified that the impacts that the land use change rule could have on certain parts of the Waikato community. This prompted investigation into the options to minimise any unintended consequences for land returned under settlement or Maori freehold land under Te Ture Whenua Maori Act 1993. River iwi also provided support for investigating possible options to address these impacts (River iwi 2016, Document# 3709793).

River iwi partners expressed early on in the project the need to avoid creating inequitable outcomes through any allocation process, and balance the rights and interests of iwi with rights of existing users, and avoid creating further inequality. River iwi noted that Māori freehold land under Te Ture Whenua Māori Act 1993 and land returned under Treaty Settlement may need a different approach to assisting in restoring the relationship of iwi with the awa (River iwi 2015, Document# 3483800).

When developing the provisions of Plan Change 1 the consequences of managing land use change to achieve water quality outcomes on different parts of the community were considered. Restrictions on land use change, as outlined in the E.4 'Restricting land use changes' section would adversely affect the flexibility of land that has had historically and contemporary legal restrictions placed upon it.

The key factor in considering a policy approach for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land is the barriers to development that have been placed upon it, which has reduced or removed the decision making control of the owners over how that land was used (Coffin 2016). These barriers include both the historic alienation of land through colonisation and assimilation in the nineteenth and twentieth century, and contemporary marginalisation through legal and governance constraints. Examples of these include:

- Land confiscation
- Public Works taking of Māori land
- Rating law
- Ownership status, ability to leverage land to produce capital for investment, governance structures and multiple owners
- Encumbrances upon land that is returned through settlement processes, such as Crown forestry licences and Emissions Trading Scheme requirements.

Given these factors it would be unacceptable to not provide for the flexibility of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement lands during the 10 year transition period towards allocation.

The policy recognises the unique circumstances of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. In combination with the non-complying activity rule for managing land use change, the policy is considered to be the most appropriate way to achieve Objective 5.

E.7.5.4 CSG's Policy Selection Criteria

Some of the relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

The provisions give effect to the Vision and Strategy by managing the effects of land use through resource consent conditions in order to restore and protect the health and wellbeing of the rivers, and by providing for the relationship of River iwi according to their tikanga and kawa.

The provisions provide for the aspiration of River iwi by allowing flexibility of the use of tangata whenua ancestral land and provides for the relationship with land and water.

The provisions allow for flexibility, specifically future land use of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land by providing policy direction on resource consent decision making around future use of the land.

E.7.5.5 Summary of effectiveness

The provisions provide policy guidance for decision making on resource consents for a change in land use of tangata whenua ancestral lands. The provisions recognise:

- the historical and contemporary legal impediments that have been placed on certain types of land,
- the impact that the provisions of Plan Change 1 that control changes in land use will affect that type of land, and
- that there is an unacceptable effect on the relationship of tangata whenua with ancestral lands, the ability to exercise mana whakahaere and kaitiakitanga without recognition and of these circumstances and relationships.

E.7.6 Efficiency of Option 2: develop new policy

Environmental

The ability for tangata whenua to utilise Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land will result in increased awareness and understanding of sites and the ability to invest in sites that were previously under-utilised. By ensuring flexibility exists, traditional practices will remain part of the decision making process and the land and waterways will benefit from a holistic approach to protecting and managing the environment (Coffin 2016, Document# 8723821). However, the development of land from uses with lower discharges of diffuse nitrogen, phosphorus, sediment and microbial pathogens to higher discharging uses will result in additional contaminants entering the rivers.

The provisions contained in Plan Change 1 were simulated in a computer model as a package, with three levels of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land changing use to higher discharging land uses (Doole, Quinn and Wilcock 2016 Document# 6551310).

The results showed that overwhelmingly, sites that met the short-term targets without this land use change continued to meet these targets under all three levels of land use change.

| Attribute | Current | WRPC1 (no) | WRPC1 (low) | WRPC1 (med) | WRPC1 (high) | Total sites |
|--------------------------------|---------|------------|-------------|-------------|--------------|-------------|
| Median chlorophyll-a | 3 | 5 | 5 | 5 | 5 | 9 |
| Maximum chlorophyll-a | 4 | 7 | 7 | 7 | 7 | 9 |
| Total Nitrogen | 1 | 1 | 1 | 1 | 1 | 9 |
| Total Phosphorus | 2 | 2 | 2 | 2 | 2 | 9 |
| Median nitrate | 46 | 49 | 49 | 49 | 49 | 61 |
| 95th percentile nitrate | 38 | 42 | 42 | 42 | 42 | 61 |
| Median <i>E. coli</i> | 57 | 59 | 59 | 59 | 59 | 61 |
| 95th percentile <i>E. coli</i> | 12 | 25 | 25 | 25 | 25 | 61 |
| Clarity | 3 | 44 | 44 | 44 | 44 | 58 |

Number of sites that meet Scenario 1 target under different development of iwi land⁽¹⁸⁾

The breaches of nitrogen-related attribute targets evident without land use change in three Upper Waikato River sites were somewhat more pronounced under the three levels of land use change modelled. These breaches were for total nitrogen at three sites (Ohakuri, Waipapa and Whakamaru) and for median and 95th percentile nitrate target at one site (Waipapa). All other sites achieved the target improvements.

There was one additional breach of the water quality target at the site at Waikato River at Ohaki for total phosphorus, which occurred under the medium and high levels of land use change. However, the breach is minuscule in absolute terms and does not lead to a predicted increase in chlorophyll-a at this site or others downstream.

¹⁸ Multiple Maori ownership land and land covered by the Central North Island settlement

The table below shows the concentration data for sites ⁽¹⁹⁾ that do not achieve 10 per cent improvements under the proposed policy mix across cases of no, low, medium, and high iwi land development. Numbers followed by an asterisk denote instances where reported concentrations fail to meet the 10 per cent steps towards Scenario 1 that are the goal of the policy mix.

| Attribute | Site | Current | Current + load-to-come | Sc. 1 | 10% step to Sc. 1 | WRPC1 (no) | WRPC1 (low) | WRPC1 (med.) | WRPC1 (high) |
|----------------|-------------|---------|------------------------|-------|-------------------|------------|-------------|--------------|--------------|
| TN | EW-1131-107 | 0.215 | 0.281 | 0.16 | 0.210 | 0.237* | 0.241* | 0.245* | 0.248* |
| | EW-1131-143 | 0.336 | 0.422 | 0.16 | 0.318 | 0.344* | 0.348* | 0.352* | 0.355* |
| | EW-1131-147 | 0.271 | 0.354 | 0.16 | 0.26 | 0.291* | 0.295* | 0.298* | 0.301* |
| TP | EW-1131-105 | 0.011 | 0.011 | 0.01 | 0.011 | 0.0105 | 0.0108 | 0.0111* | 0.0111* |
| Median nitrate | EW-1202-007 | 1.210 | 1.77 | 1 | 1.189 | 1.280* | 1.280* | 1.280* | 1.272* |
| 95% nitrate | EW-1202-007 | 1.555 | 2.27 | 1.5 | 1.55 | 1.644* | 1.644* | 1.644* | 1.635* |

Concentration data for sites that do not achieve 10% improvements

The number of sites that meet the 80 year water quality targets under the provisions did not change with and without Te Ture Whenua and settlement land development. See C.2.2.11 'Scenario modelling outputs' for more information on the scenario modelling.

Economic

This policy will enhance tangata whenua wellbeing through flexibility of decision making and economic opportunities, reducing inequality between parts of the community. There may be investment in sites that were previously under-utilised. Policy simulation results indicate there will be small increases in dairy sector profit (\$618 million to \$626 million) and drystock sector profit (\$210 million to \$218 million) under the highest level of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land use change. However, forestry sector profit is expected to decline from \$59 million to \$55 million. There are also conversion costs imposed by the development of land and simulated total catchment profit is \$3.2 million lower in the "high" Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land use change scenario than in the no land use change scenario.

Social

The ability to convert Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land to more profitable use may reduce inequality in the community. The social benefits enjoyed by River iwi are multi-faceted and at times unable to be translated. Those that can be articulated and will be protected by the inclusion of the provisions include:

- The ability to develop sites and introduce concepts such as maatauranga Māori will allow teaching opportunities, inter-generational knowledge sharing and the retention and protection of Māori culture.
- Recognition of historical and legal circumstances surrounding under-utilisation of Maori land.
- Retained connection with, sense of belonging, historical connection to and historical aspirations for Maori freehold land under Te Ture Whenua Maori Act 1993, and an increase of these aspects for settlement land, as sites are not constrained by legislation and policy implementation.
- Due to the increased flexibility of use and economic effects, there can also be flow on social services as a result of retaining connections with Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. Examples of these include potential to enhance papakainga, social infrastructure and provision of education and health services, particularly in rural areas (Coffin 2016, Document# 8723821).

¹⁹ Sites are as follows: EW-1131-107 is Waikato River at Ohakuri, EW-1131-143 is Waikato River at Waipapa, EW-1131-147 is Waikato River at Whakamaru, EW-1131-105 is Waikato River at Ohaaki, and EW-1202-007 is Waipapa.

Cultural

This policy acknowledges rangatiratanga over Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land and resources by providing flexibility in the use of land and the consequent discharges of nitrogen, phosphorus, sediment and microbial pathogens. The cultural benefits of preserving flexibility for tangata whenua to utilise Māori freehold land under Te Ture Whenua Māori Act 1993 and settlement land is immeasurable. The cultural connections that tangata whenua have with their lands will be enhanced (or at least be maintained) through access and the ability to develop their lands in a manner that is consistent with Māori cultural beliefs. It is expected the implementing the policy (and associated rule 3.11.4.7) will result in activities that are consistent with tangata whenua cultural practices and preserve the inter-generational nature of cultural practices while still managing the effects of nitrogen, phosphorus, sediment and microbial pathogens. Flexibility will also promote cultural connections through the ability to use the land for traditional activities of farming and/or ceremonial activities (Coffin 2016, Document# 8723821).

Combining mātauranga Māori traditional practices with best western practices land use may present opportunities to highlight /exhibit / promote the culture to a wider audience. The provisions send a signal to governance and management that the connection between Māori and their lands is important and the provisions should provide confidence (Coffin 2016, Document# 8723821).

CSG's Policy Selection Criteria

The provisions aim to provide a pathway for the flexibility of tangata whenua ancestral land over the next 10 years within the overall goal of making reductions in contaminants and transitioning towards an allocation based on land suitability. This is based on the currently low rate trajectory of development of tangata whenua ancestral land due to historical and contemporary restrictions. Assessing proposed changes on a case by case basis through a resource consent process ensures consideration is given to the water quality goals of the sub-catchment and the way any new land use will be managed, as well as the unique relationship tangata whenua has with the land. This approach recognises the lesser extent to which tangata whenua ancestral land has contributed to current water quality degradation, due to the lower development rate on that type of land.

There is potential for the public to consider the approach of acknowledging the unique tangata whenua relationship within the policy as inequitable. The potential of this has been reduced by having all land use change applications considered under the same non-complying activity rule, with guidance provided on how to consider those applications in the policy.

| Policy Option 2: Develop new policy | | |
|--|--|---|
| | Benefits | Costs |
| Environmental | <p>Benefits from a traditional, holistic approach to managing the environment</p> <p>Increased awareness and understanding of sites</p> <p>The breach at Waikato River at Ohaaki is minor and does not cause an increase in chlorophyll-a</p> <p>No change to the number of sites that meet the 80 year water quality targets.</p> | <p>Additional contaminants entering the rivers</p> <p>Exacerbation of total nitrogen breaches at Waikato River at Ohakuri, Waipapa and Whakamaru</p> <p>Waipapa site will not achieve the median and 95th percentile nitrate levels</p> <p>Waikato River at Ohaaki will not achieve the water quality target for total phosphorus under the medium and high change scenarios.</p> |
| Economic (including opportunities for economic growth or reduction and employment to be provided or reduced) | <p>Enhanced tangata whenua economic wellbeing</p> <p>Investment in sites that were previously under-utilised.</p> <p>Up to \$9m increase in dairy profit and \$8m increase in drystock profit.</p> <p>Decrease in GRP is \$56m less in a high development simulation compared with no development of iwi land. Similarly,</p> | <p>Forestry profit decreases by \$3.5 million</p> <p>Transition costs up to \$28m</p> <p>Total catchment profit \$3.2m lower</p> |

| | | |
|--|---|--|
| | there are fewer job losses in a high development simulation (314 compared with 938). | |
| Social | Recognises historical and legal circumstances surrounding under-utilisation of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land Historical aspirations for sites are not constrained | The public may consider the policy inequitable |
| Cultural | Acknowledges rangatiratanga over Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land and resources Provides for the retention and protection of Māori culture and connection with land May provide opportunities to highlight /exhibit / promote culture | |
| CSG's Policy Selection Criteria Optimising environmental, social and economic outcomes | Provide a pathway for the flexibility of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land over the next 10 or so years while also achieving water quality goals Recognises the lesser extent to which Te Ture Whenua and settlement land has contributed to current water quality degradation | |

Efficiency of developing new policy

E.7.6.1 Summary of efficiency

The economic, social and cultural benefits would contribute to achieving the objectives of Plan Change 1.

The breaches of the 10 year targets of Plan Change 1 are only slightly exacerbated by development of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. These breaches occur at a small number of sites. Overall the breaches of the 10 year targets in total nitrogen, nitrate are predicted to not have a perceptible impact on chlorophyll-a levels. This highlights that the material implications of these breaches for ecosystem health of the waters within the catchment are rather benign (Doole, at al 2016).

This policy deals with significant unfavorable consequences, and the tension created with other catchment objectives, as a result of the land use change provisions outlined under E.4 'Restricting land use changes'.

E.7.7 Assessment of risk: certainty and sufficiency of information

Complete information is not available about the resource of Maori freehold land under Te Ture Whenua Maori Act 1993 or its current use. The provisions are worded to only apply to Māori freehold land under Te Ture Whenua Māori Act 1993, and land returned through settlement processes, which focuses on the tangata whenua connection with the land and restricts the amount of land.

The risk of acting is that land development may occur at a rate in the next 10 years that affects the ability to meet the 10 year water quality objectives, or that land that is developed needs to be de-intensified once property-level allocation is made in further RMA plan changes.

The risk of not acting is that further restrictions would impact on the flexibility of use of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land that has already been subject to historical and legal impediments. This would affect the co-management relationship between Council and River iwi, and the ability of tangata whenua to maintain a relationship with ancestral land.

E.7.8 Overall assessment of appropriateness and reasons for deciding on provisions

Overall the policy to restrict and manage land use change in the interim before setting property-level limits were deemed to be inappropriate for Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land. Therefore, the policy to provide flexibility for the use of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land is a necessary part of Plan Change 1 in order to achieve the objectives.

Providing for flexibility of the use of Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land reflects the council's co-management responsibilities, and recognises the unique historical and contemporary legal impediments that have been placed on that type of land. These impediments, and any further restrictions on the use of that land, has and will continue to have an impact on the relationship of tangata whenua with Maori freehold land under Te Ture Whenua Maori Act 1993 and settlement land and the ability to exercise mana whakahaere and kaitiakitanga.

E.7.9 Bibliography for Part E.7

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E.8 Prioritisation and sub-catchment planning

This section evaluates the appropriateness of the provisions of Plan Change 1 to achieve the objectives, with regard to prioritisation and sub catchment planning.

E.8.1 Plan Change 1 Provisions

The policies being evaluated are:

Policy 8: Prioritised implementation/Te Kaupapa Here 8: Te raupapa o te whakatinanatanga

Policy 9: Sub-catchment (including edge of field) mitigation planning, co-ordination and funding/Te Kaupapa Here 9: Te whakarite mahi whakangāwari, mahi ngātahi me te pūtea mō te riu kōawāwa (tae atu ki ngā taitapa)

Policy 14: Lakes Freshwater Management Units/Te Kaupapa Here 14: Ngā Wae Whakahaere Wai Māori i ngā Roto

Policy 15: Whangamarino Wetland/Te Kaupapa Here 15: Ngā Repo o Whangamarino

Policy 17: Considering the wider context of the Vision and Strategy/Te Kaupapa Here 17: Te whakaaro ake ki te horopaki whānui o Te Ture Whaimana

The other methods being evaluated are:

Method 3.11.4.1: Working with others/Te mahi tahi me ētehi atu

Method 3.11.4.4: Lakes and Whangamarino Wetland/Ngā Roto me ngā Repo o Whangamarino

Method 3.11.4.5: Sub-catchment scale planning/Te whakamāherehere mō te whānuitanga o ngā riu kōawaawa

Method 3.11.4.6: Funding and implementation/Te pūtea me te whakatinanatanga

Method 3.11.4.9: Managing the effects of urban development/Te whakahaere i ngā pānga o te whanaketanga ā-tāone

The relevant objectives are:

Objective 1: Long-term restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 1: Te whakaoranga tauroa me te tiakanga tauroa o te kounga wai ki ia riu kōawaawa me te Wae Whakahaere i te Wai Māori

By 2096, discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water result in achievement of the restoration and protection of the 80 year water quality attribute targets in Table 11-1.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

E.8.2 Reasonably practicable options

The following reasonably practicable options were identified to achieve the long term and short term freshwater objectives.

Note: this section (which includes a focus on prioritising areas for development of Farm Environment Plans) should also be read in conjunction with the evaluation of Farm Environment Plans in E.3 'Making reductions: Catchment wide rules, Farm Environment Plans and Nitrogen Reference Point'.

| | Reasonably practicable options | Description |
|---|--|---|
| 1 | Farm Environment Plans required of all landowners at the same time | All landowners would be required to prepare and implement Farm Environment Plans at the same time. |
| 2 | Prioritisation of implementation based on mitigation effort required to meet the water quality targets | Prioritisation based on the effort required by landowners to meet water quality limits and targets, and based on mapped and ranked subcatchment areas. |
| 3 | Prioritisation of implementation timing based on the gap between current and desired water quality and sub-catchment planning and co-ordination of actions | Prioritisation of implementation of Farm Environment Plans and other rules over time, based on the gap between current water quality and desired water quality, while sub-catchment planning is used to identify and co-ordinate actions in the Waikato and Waipa River catchments. |
| 4 | Risk based approach to implementation | Using a risk based approach to identify who is required to have a Farm Environment Plan. This option's risk focus is based at a catchment level. |
| 5 | Risk-based assessment undertaken as a part of a Farm Environment Plan | Assessment of risk factors for individual properties undertaken as part of the Farm Environment Plan. This options risk focus is based at a property level. |
| 6 | Open eligibility for catchment works support and subsidies for mitigations | Support or subsidies available for special projects, either large scale catchment works or focused on mitigations that capture contaminants at the edge of field - based on open eligibility. |

Reasonably Practicable Options for prioritisation and sub-catchment planning

E.8.3 Explanation of options

Note for options 2 and 3 refer also to section C.2.2.11.5 'Prioritisation of catchments for implementation of farm plans' for technical information that supported the consideration of these options.

Option 1: Farm Environment Plans required of all landowners, at the same time

This option would require all landowners to prepare and implement Farm Environment Plans within the same timeframe. A lead-in timeframe could be set or alternatively it could be a requirement as soon as Plan Change 1 is notified or when it becomes operative. This would impact on approximately 5,000⁽²⁰⁾ landowners within the Waikato and Waipa River catchments (Dragten, 2016, Document #8405574).

Option 2: Prioritisation of implementing a Farm Environment Plan based on mitigations effort required to meet the water quality targets

The aim of this option is prioritise the amount of effort or actions required in a Farm Environment Plan. This approach would be guided by Plan Change 1 scenario modelling information, which prioritised high risk sub-catchments based on mapping base loads, and the intensity of change required (WRC 2016, Document# 3691128). There would be additional requirements for landowners in some mapped sub-catchments to undertake more mitigation actions.

Option 3: Prioritisation of implementation timing based on the gap between current and desired water quality and sub-catchment planning and co-ordination of actions

The options includes prioritisation for provision implementation, planning processes and engagement to support Plan Change 1, the key components are:

²⁰ report provides an evaluation of number of landowners that would be affected by this rule

1. Prioritisation of implementation timing for Farm Environment Plans.
2. Sub-catchment scale planning, mitigation planning, coordination and funding to support edge of field mitigations
3. Lakes catchment plan development and implementation (including engagement with the community in plan development).
4. Managing the effects of urban development (including engagement with Territorial authorities and the urban community).

The aim of this option is to prioritise sub-catchments that have to start the Farm Environment Plan process first (but with a view to most landowners eventually having a Farm Environment Plan). This would be based on the gap between current water quality and the desired water quality (at 100 per cent of Objective 1) (WRC 2016, Document# 3691128). This would also include prioritised sub-catchments in the Lake FMUs, and all sub-catchments that flow into Whangamarino Wetland. In addition this option aims to undertake sub-catchment planning and to co-ordinate mitigation actions in line with catchment and sub-catchment priorities. Sub-catchment planning considerations will inform where Council, partners and key stakeholder focus their efforts to make a difference through cumulative gains achieved through special projects (for example, constructed wetlands or land retirement).

Options 4 and 5: Risk based approaches to implementation - either catchment wide or as part of a Farm Environment Plan

The aim of these two options is to take a risk based approach either across the whole of the Waikato and Waipa River catchments, or as a part of the property level Farm Environment Plans. This risk based approach would help in identifying where the highest risks are, and what actions, and in what areas are priorities.

Options 6: Open eligibility for catchment works support and subsidies for mitigations

This option would make subsidies available for special projects, based on open eligibility. This approach focuses on working with those who apply, and does not prioritise where funding is targeted.

The focus of subsidies would be on mitigation actions or technologies to reduce loss of contaminants from farm land by intervening at edge of field either on or off-farm, and includes constructed wetlands, sedimentation ponds and detention bunds.

E.8.4 Evaluation of options and reason for preferred option

Option 1: Farm Environment Plans required of all landowners at the same time

The long term water quality restoration and protection timeframe chosen for Plan Change 1 is 80 years. It is important in the first stage of this journey to make progress, where progress is defined as the amount of change made on the land to reduce contaminants entering waterways. This change should be reflected in reduced pressure on the river systems and eventually in trend information showing measured changes in water quality (WRC 2016, Document# 3691128).

There are approximately 14,000 properties⁽²¹⁾ in the catchments (Dragten 2016, Document #8405574). Many of the owners of these properties would require support and advice to implement new rules in Plan Change 1, including the requirement for Farm Environment Plans. This would take more resource to implement than is currently available from Waikato Regional Council, expert consultants, training organisations and industry organisations (WRC 2016, Document# 3691128). Therefore this option is not practicably feasible and suggests the need for some form of prioritisation process either for implementation or for effort/actions required on the land.

This option is not considered the most appropriate way to achieve the objectives.

Option 2: Prioritisation of implementation based on mitigation efforts required to meet the water quality targets

To meet the water quality limits landowners would have to implement mitigation actions to manage the sources of discharges. This option provides guidance on the extent of mitigation actions that would be required based on the relationship between current land use activities, management practices, and the water quality target. This option prioritises the effort required at a property level and means that some landowners will have to undertake more actions to reduce discharges than others. This would be supported by a rule structure clarifying which landowners would need to take priority in developing Farm Environment Plans.

²¹ A "property" in this report simply means an area of land reported by its owner as being a property, and recorded as being a single property in the Agribase® database. The property may be a single parcel, or multiple parcels, either contiguous or discontinuous

This approach would use the model data (data used for the Plan Change 1 scenario modelling -Doole, G et al 2015a Document #3483793 and 2015b Document #3564910), where on the basis of water quality in the catchment and other considerations, the types of mitigations that would be required at a catchment scale to meet water quality limits would be identified. This would set the context for setting the priority areas for Farm Environment Plans. Refer to the C.2.2.11.5 'Prioritisation of catchments for implementation of farm plans' for more detail on the technical information that informed the prioritisation options considered.

The model data can be sorted in different ways, depending on the question to be answered (WRC 2016, Document# 3691128). This method would be used as a basis for prioritisation, based on the change in contaminant load from each sub-catchment basis at the 25 per cent step as estimated in the Scenario modelling. This modelling of the 25 per cent step toward Objective 1 can be sorted into a list of sub-catchments that are ranked in order of the amount of contaminants to be removed on a per hectare basis. Sub-catchments can be ranked for the four contaminants. This ranking focuses on 'manageable sources', which excludes forested, urban land and point sources (WRC 2016, Document# 3691128).

This approach makes assumptions about the basis for decisions on what mitigations might occur, where they occur and the relationship with what is expected of landowners.

The modelling represents one option of assessing what changes are needed and at what scale. However, due to individual property biophysical considerations, or the type of farm system, this could mean that while the individual contaminant contribution is relatively low, the actions required due to the water quality in the sub-catchment, or the responses required to meet water quality targets elsewhere in the catchment, might need to be more than in other areas.

Overall this option is about choosing the approach to identify effort required, and then translating the catchment scale modelling into a prioritisation approach. This will require a level of confidence that actions will occur and that they are the right group of actions. This approach suggests that those in defined high risk areas will be required to undertake more mitigation actions than other landowners, or to get a resource consent when other landowners may be able to operate under a Permitted Activity rule.

If this approach to prioritisation is incorporated into the policies, an important consideration is that in order to use the modelling produced by the TLG, further interpretation and manipulation of this data may be required to identify these priority sub-catchments in the rules (WRC 2016, Document# 3691128). This raises concern about the appropriateness of using this data generated for a different purpose (that is, the original purpose was to identify the magnitude of the change required and the costs of that change) and the requirement for further interrogation of what the decisions were that informed the modelling, along with what that would mean if embedded into a policy approach in the real world setting. It is important that the TLG modelling and analysis is not being stretched further than the purpose for which it was intended (WRC 2016, Document# 3691128).

This option is not considered the most appropriate way to achieve the objectives.

Option 3: Prioritisation of implementation timing based on the gap between current and desired water quality, and sub-catchment planning and co-ordination of actions

This option would prioritise which sub-catchments would be required to start implementing Farm Environment Plans first, based on the gap between the existing water quality and the desired state (Objective 1). This would also include prioritisation of some of the Lakes (so all lakes types are represented in Priority 1 sub-catchment), and all sub-catchments that flow into Whangamarino Wetland. Both of these groups of sub-catchments need to make reductions as a priority to enable progress to be made on protecting the shallow lakes and Whangamarino Wetland in the 80 year timeframe.

To meet the long term water quality limits, landowners would have to implement mitigation actions to manage the discharge of contaminants. The data can be sorted in different ways, depending on the question to be answered. One approach could be based around the size of the gap between the current state of water quality and the desired future state, that is, in terms of water quality attributes Nitrogen, Phosphorous, *E. coli* and clarity. The data used for this approach uses the current state of water quality at each water quality site and the desired state as defined in Objective 1. This was the data used as one of the inputs into the scenario model. The sub-catchments would then be ranked, to identify which sub-catchments have the biggest gap between existing contaminant discharges per hectare and that required to achieve the desired water quality (WRC 2016, Document# 3691128). Refer to the C.2.2.11.5 'Prioritisation of catchments for implementation of farm plans' for more detail on the technical information that informed the prioritisation options considered.

This option provides a practical way to prioritise resources required to develop Farm Environment Plans and was considered to be manageable from a resourcing perspective and aligns priority implementation effort to the quality in the water.

This option provides the opportunity to carry out further works to understand the sub-catchment dynamics that result in impacts in the water. This includes the option of undertaking sub-catchment "forensics" and to take a broader view to the management and actions that need to be focused in the various sub-catchments. This would also provide a context for the development of Farm Environment Plans, and mitigations designed to service multiple properties.

The key elements within the approach include:

- Support and or funding of large scale sub-catchment mitigation works (implementation method - sub-catchment planning): Eligibility would focus on key mitigations identified in the scenario modelling⁽²²⁾ for the achievement of water quality targets in the first 10 years, are mitigations that intercept contaminants (what have been defined as "Edge of Field" mitigations). These include constructed wetlands, detention bunds, sedimentation ponds (Doole G 2015, Report No. HR/TLG/2015-2016/4.6 Document# 3606268).
- Voluntary programmes for agencies and urban communities to become involved in sub-catchment planning.
- Planning considerations to inform special projects.
- Lake catchment plans (implementation method Lakes and Whangamarino wetland): The Waikato Region Shallow Lakes Management Plan⁽²³⁾ is divided into three areas: policy and planning, information and monitoring, and lake restoration and rehabilitation. The Plan identifies specific methods for protecting the Region's shallow lakes and associated wetlands. The restoration and rehabilitation section identifies integrated catchment management and restoration programmes as a method, in collaboration and partnership with stakeholders. Enhancement of habitat, pest fish management, improvement of access to sites for management purposes are also matters that could be considered (WRC 2016, Document# 3603451).
- Working with territorial authorities to implement the RPS principles guiding future urban development (implementation method - Plan change 1 Managing the effects of urban development and WRP and RPS provisions). The policy context for urban water quality management, already exists in the Regional Plan 3.5.11, and provisions of the RPS 3.12, 6.1 and 8.3. In relation to stormwater discharges the Regional Plan includes implementation methods that provide guidance on: developing and implementing good management practices or appropriate codes of practice; working with territorial authorities; and working with resources users and placing conditions on the discharge of storm water. Within the RPS there are provisions relating to urban environments, including policies about the built environment supported by implementation methods including: considerations in regional plans, district plans and development planning mechanisms; advocacy; development manuals and design codes; and information to support new urban development and subdivision. In addition, there is policy guiding the management of the effects of activities and implementation methods relating to non-point source discharges, the effects of subdivision, use and development and advocacy and education (WRC 2015, Document# 3633174).

This option is considered the most appropriate way to achieve the objectives.

Options 4 and 5: Risk based approach to implementation - either catchment wide or as part of a Farm Environment Plan.

These two options take a risk-based approach, but at different scales (that is, catchment as apposed to property-level).

Criteria for assessing risk would need to be developed, informed by relevant factors contributing to risk of contaminant loss. These criteria would need to be complemented by details of how this risk assessment would be implemented.

Planning advice, and actions chosen would incorporate identification of risk factors. For example, lower risk areas may not need a Farm Environment Plan, therefore this option could set criteria for determining low intensity, low risk activities/setting parameters on property. Alternatively, farm property-level risk assessments could be undertaken that also consider prioritisation maps (showing the gap in the water quality for the four contaminants, or separate priority for the each contaminant). These option are not considered to be practical at an implementation resourcing level.

These options are not considered the most appropriate way to achieve the objectives.

Option 6: Open eligibility for catchment works support and subsidies for mitigations

This option would offer available funding for any person to apply for funding/subsidies for large scale mitigations.

While the funding for this option is open to landowners, certain criteria may be used to refine what activities are eligible. For example in line with the CSG consideration about how public funds might be used, this funding may not be intended to be used for on-farm mitigation of effects, (which are a regulatory requirement under Farm Environment Plans or catchment wide rules), rather it would be focused on specific projects that provided multiple benefits for water quality (WRC 2016, Document# 3710575).

However open eligibility does not target efforts or actions, or necessarily relate to where actions are most needed to result in benefits in the water.

22 Doole et al 2015b Report No. HR/TLG/2015-2016/4.2 Document# 3564910 and Doole G 2015 Report No. HR/TLG/2015-2016/4.6 Document# 3606268

23 Dean-Speirs T, Neilson K, Paula Reeves P and Kelly J 2014a. Waikato region shallow lakes management plan: Volume 1 Objectives and strategies for shallow lake management. Waikato Regional Council Technical Report 2014/58 Document# 2365066 and Dean-Speirs T, Neilson K, Paula Reeves P and Kelly J 2014b. Shallow lakes management plan: Volume 2 Shallow lakes resource statement: Current status @ future management recommendations. Waikato Regional Council Technical Report 2014/59. Document #2256414

This option is not considered the most appropriate way to achieve the objectives.

Options 2, 3 and 5 include a prioritisation approach toward reducing contaminants, based on mapped sub-catchments that are higher risk or require more effort to achieve the water quality targets. Option 3 was chosen as most appropriate as it was considered to be more practical at an implementation resourcing level and the inclusion of the sub-catchment planning and co-ordination of actions takes a broader view and focuses on detailed catchment planning and co-ordination, to encourage larger scale mitigations that may provide benefits, or be required on adjoining properties. This was considered to be complementary to the Farm Environment Plan approach.

Having regard to this information, it is the Council's view that policies, rules and other methods to implement Option 3 (Prioritisation based on gap and sub-catchment planning/subsidies) is the most appropriate way to achieve the objectives of Plan Change 1.

E.8.5 Effectiveness of Option 3 prioritisation of implementation timing, sub-catchment planning and co-ordination of actions

Effectiveness is evaluated as the success of the proposed provisions in achieving long term and short term objectives, or the extent to which progress will be made even if the objectives are not to be met.

Refer to 'Explanation of the effectiveness criteria for evaluation in this Section 32' for criteria used in the effectiveness evaluation.

E.8.5.1 Relevance

Prioritisation of implementation

The long term water quality restoration and protection timeframe chosen for discharges of nitrogen, phosphorus, sediment and microbial pathogens in the Waikato and Waipa River catchment is 80 years. It is important in the short term to make progress, where progress is defined as the amount of change made on the land to reduce contaminants entering water. This change should be reflected in reduced pressure on the system and eventually in trend information showing measured changes in water quality (WRC 2016, Document# 3691128). Land use rules for farming and horticulture activities will be used to manage diffuse source discharges.

For interventions in the priority Lakes and Whangamarino Wetland sub-catchments to be effective over the next 80 years, an immediate and extensive reduction in discharges of nitrogen, phosphorus, sediment and microbial pathogens is required in the sub-catchments that flow into these water bodies.

Sub-catchment scale planning, mitigation planning, coordination and funding to support edge of field mitigations

The mitigation and actions targeted in this approach are consistent with the achievement of water quality outcomes (as identified in the scenario modelling⁽²⁴⁾ and described in the mitigations used in the modelling.⁽²⁵⁾

The provision of assistance with sub-catchment planning means an increased likelihood that the approach will be adopted and that assistance would be used to target areas or actions where the greatest improvement can be achieved.

Funding of actions does not address activities that may cause discharges in the rest of the catchment, that is, it would only apply in areas where landowners seek assistance, take up funds and take actions.

Variation in the way landowners undertake the practices or technology may mean the new approach does not provide expected water quality benefits.

E.8.5.2 Feasibility

Prioritisation of implementation

Prioritisation contributes to making the Farm Environment Plan approach realistic to implement, monitor and enforce over time, and would be acceptable to the wider community. The main risks would be: the large number of consents required; that sub-catchment planning does not occur fast enough; that there are limitations on the level of industry support and service providers to assist landowners; that there is not a clear undertaking by landowners and service providers for the prioritisation process.

24 Doole et al 2015a Report No. HR/TLG/2015-2016/4.1 Document# 3606268 and Doole G 2015b Report No. HR/TLG/2015-2016/4.2 Document #3564910

25 Doole et al 2015a Report No. HR/TLG/2015-2016/4.6 Document# 3606268

There are thousands of landowners (WRC 2016, Document# 3682835) in the catchments who will require support and advice to implement new rules in Plan Change 1, and this will take more resource than is currently available from the Council, expert consultants, training organisations and industry organisations (WRC 2016, Document# 3691128). This suggests the need for some form of prioritisation process for either implementation or effort/action on the land. For example, considerable time and resources would be needed for:

- Establishing a Nitrogen Reference Point at a property level (taking into account the rate that the Upper Waikato sustainable milk plans were able to be developed in the DairyNZ managed process).
- Developing a tailored Farm Environment Plan with actions to manage all four contaminants.

Experience from the implementation of such processes in the past has shown that: the implementation of changes to policies for water allocation in Regional Plan Variation 6 required 2 years, while landowners became aware of the requirements, and understood what they needed to do (that is, to apply for resource consent). The implementation of voluntary property-level plan programmes by Council and industry suggest that the roll out and uptake of the policy has to be staggered and prioritised (that is, where implementing agencies focus on some areas over others).

Sub-catchment scale planning, mitigation planning, coordination and funding to support edge of field mitigations

This policy is consistent with RMA s30 functions in particular the integrated management of resources in the region.

This policy, if prioritised, can be accommodated within existing resources, however the cost of developing 74 sub-catchment plans could be substantial. This approach would have to be resourced in conjunction with other funding sources or support agencies or organisation (for example industry).

The approach to any funding of mitigations is very focused, on edge of field mitigations (and in line with any completed sub-catchment planning). It is anticipated that implementation of the special project funding would require multiple visits by technical staff before funds could be awarded. The size of the fund, to achieve the desired amount of landowner action, would be critical. Evidence would also be required to ensure that the funding is not applied to any actions that were done prior to any funding being made available/ awarded. Expertise would be required in assessing the value for funds invested by agencies. However, alignment with existing funding programmes and or building on Council experiences in catchment planning (such as the Waipa Catchment Plan) and experience from past funding support for works will help streamline implementation. The focus on particular mitigations or sub-catchment projects (align works and services) also will help with implementation feasibility.

Risk and uncertainty lies in: the level of funding available; enough resources being available for implementation and monitoring (for example checking that funded activities have been undertaken); the extent that activities chosen by landowners align with practices that reduce discharges; and enough landowners being motivated to act (undertake actions to reduce contaminants in waterways). Those considering the direction set in sub-catchment plans and assessing the placement and funding of mitigations, would need to draw on research and appropriate knowledge in order to develop mitigations that contribute effectively to discharge reductions.

It is only under certain conditions that subsidies substantially influence the rate of actions undertaken and they have limited potential to influence the scale of change in the sub-catchment. The Plan Change 1 Policy 9 does recognise that where multiple enterprises contribute to the cost of edge of field mitigation can be apportioned to each enterprise. For some these mitigations therefore may be an mitigation option they choose to adopted.

It would be moderately easy to monitor (that funded edge of field mitigations are undertaken), report on and enforce (that any investment of public funds is protected) and funding not paid until works completed. Some management practices would be harder to audit than others, depending on the proposed technologies, (for example, Council can manage the details of the construction and technical specifications of a wetland but not the ongoing management of the wetland so that it continues to function in the way required to capture discharges).

The use of the sub-catchment planning information in conjunction with Farm Environment Plans is reliant on an accredited person working with landowners to develop their Farm Environment Plan. The landowner could work with the certified farm environment planner who would be drawing on relevant research and information to inform the use of edge of field mitigations.

Lakes catchment plan development

This approach includes methods and policy addressing the management of lakes in the Lake FMUs, including the collection of data to support Plan Change 1 approach to lakes. Preparing Lake Catchment Plans (method in Plan Change 1 for Lakes and Whangamarino wetland) will be resource intensive (up to 60 plans for individual lakes or lake complexes). Also in some cases supporting technical information may not be available in the same time frame, which is a limitation of the Lake Catchment Plans.

The general approach to the management of lakes within the existing Regional Plan is through controls on discharges, allocations (water takes) and standards for maximum and minimum flow and levels. In addition there are a number of current programmes, planning and funding that support works to manage lakes including:

1. The **Waikato and Waipa River Restoration Strategy** sits under the Waikato River Restoration Forum. It is a 5-15 year strategy for the Waikato-Waipā catchment. The Strategy's purpose is to guide future 'on the ground' activities for all organisations undertaking restoration (WRC 2016, Document# 3603451). Shallow lakes in the catchment are a specific area of focus for the Strategy. The Strategy will look at current state of the lakes and identify 15 year goals and priority locations and actions. The Strategy will address the aspects of lake restoration not covered by the Plan Change 1 (WRC 2016, Document# 3603451).
2. The **Waikato Region Shallow Lakes Management Plan** identifies methods for protecting the shallow lakes and associated wetlands (WRC 2016, Document# 3603451).
3. The council has a set of **peat lake guidelines** for landowners in peat lake catchments, which sets out the current best management practices for farming sustainably to protect the peat lakes (WRC 2016, Document# 3603451).

Managing the effects of urban development

The implementation method for managing the effects of urban development links with the sub-catchment planning approach. The approach to sub-catchment planning (method in Plan change 1 Sub-catchment scale planning) in urban sub-catchment includes engage with these communities and raising awareness of water quality problems in an urban context. Urban sub-catchment planning would need to be undertaken in conjunction with territorial authorities, in order to implement the RPS principles that guide future urban development. Some aspects of this approach may be outside Council functions.

E.8.5.3 Acceptability

Prioritisation of implementation

This approach focuses on the gap in concentration at a sub-catchment level to meet the percentage reduction required in Plan Change 1. (Note - Concentration is the amount of contaminants in the water divided by the volume, and the gap is the difference in concentration of contaminants between the current state and Objective 1).

There is variability between sub-catchments, and for some sub-catchments the gap between the current state and Objective 1 is minimal, meaning that the desired state is nearly being met; whereas for other sub-catchments the gap can be significant. The actions taken on land can only reduce contaminants in the water where interventions are possible (that is in this instance defined as not native forest or forestry). If the area in the sub-catchment is relatively small but the gap large, then the required actions to reduce discharges from land could be significant. By targeting those sub-catchments where the gap is the greatest, the areas with high contaminant loads would be treated as priority areas. This addresses in part issues of equity, by focusing in the first instance on those areas that are contributing more to the problem.

This prioritisation process can be supported by sub-catchment planning, which would involve undertaking detailed investigations in the sub-catchment and tributaries to identify landowners to be involved and where to concentrate efforts and investment.

Those landowners located in priority 1 sub-catchments would have to act first, and because of the extended time frame to implement actions across the entire Waikato and Waipā catchment, means that some landowners would not be required to make changes for almost 10 years.

Sub-catchment scale planning, mitigation planning, coordination and funding to support edge of field mitigations

Investment in sub-catchment planning (method in Plan change 1 Sub-catchment scale planning) can be targeted to high risk areas, or areas where the contribution of the mitigation to meeting water quality targets would be more significant (as opposed to providing for open eligibility and in line with the approach taken in Plan Change 1 to focus on the gap in water quality between desired and current state)).

Practices to be funded would be identified through research as contributing to water quality outcomes, with appropriate efficacy that allows for geographic differences.

In terms of any funding made available, there is less certainty about what implementation agencies should pay (that is, separately fund the works or cost share with landowners being funded on private land) in order to get the desired change on ground, that is, public funding could be more than the cost to the landowner if based on set rate.

There is also a risk that funding may result in only getting the change in activity or technology that was funded and not the associated management actions that would have positive benefits for water quality.

Policy design could consider encouraging multiple positive actions being undertaken on a farm (for example through a matrix of payments recognising previous investment in other positive actions in the level of funding provided).

It is only under certain conditions that subsidies substantially influence the level or rate of actions and they have limited potential to influence the scale of change required.

The approach would need to recognise that the public funding contribution for water quality benefits, would need to be applied when considering how and if to apportion recognition of contribution to private landowner.

The approach to sub-catchment planning (policy sub catchment (including edge of field) mitigation planning, coordination and funding and method in Plan change 1 Sub-catchment scale planning) that includes engagement with; funding partners, communities, urban communities, tangata whenua and landowners is planning and focusing on efficient and effective approaches in contributing to water quality improvement, would be expected to be in line with community expectations.

E.8.5.4 CSG's Policy Selection Criteria

Some relevant criteria, 'realistic to implement, monitor and enforce', and 'acceptable to the wider community', have been captured in the above assessment. The additional relevant criterion, 'allows for flexibility and intergenerational land use', is considered in this section.

Prioritisation of implementation

Those in Priority 1 sub-catchments will have less flexibility to change management practices outside of their Farm Environment Plans, than those in lower priority catchments who have Farm Environment Plan requirements that come into force in later years. Positive action will occur at different times and at different locations.

Sub-catchment scale planning, mitigation planning, coordination and funding to support edge of field mitigations

Investment in interception mitigations cannot easily be changed, where a requirement of the funding body is to maintain the investment (of public funds) in these mitigations.

Funding could encourage the uptake of these mitigations sooner than without funding support, however to what extent is unclear.

Sub-catchment planning could identify opportunities for focusing efforts in the catchment.

It is also noted that different actions could cost different amounts, and that there is no way of making transparent trade-offs.

E.8.5.5 Summary of effectiveness

In light of the above discussion on implementation efforts (Prioritisation of implementation) to reduce contaminant discharges in sub-catchments, prioritisation should be included in this Plan Change 1 with an emphasis on those areas where there is the biggest gap between the current water quality and the desired future water quality (Report to CSG 18-19th Feb 2016. Update on prioritising reductions (WRC 2016, Document# 3691128).

Achieving improvements in water quality needs to be taken incrementally over time, and therefore there is a practical logic in focusing on priority areas. The focus would be on landowners who are required to do more in order to meet the desired water quality outcomes. This reflects the start of a staged reduction in contaminants entering the water and that future plan changes are likely to require more of everybody (WRC 2016, Document# 3691128).

This supports the need for an approach that targets those sub-catchments where the gap is the greatest and those areas that have the highest contaminant loads that are manageable.

Sub-catchment planning provides a guide to council, service providers, landowners, the community, partners and other stakeholders on the implementation of management activities within the Waikato and Waipa River catchments, including the lake catchments.

This includes supporting the uptake of mitigations with public funding, which has the following considerations:

- It may encourage actions on-farm sooner because landowners would not be paying the full cost of mitigations. However, the other policy approaches (complying with the Farm Environment Plans and catchment-wide rule for stock exclusion as proposed in Plan Change 1) may compete with the likely small number of landowners interested in undertaking or supporting large-scale mitigations.

- The criteria used to determine what activities are funded may not be the "best" solution for Plan Change 1 water quality objectives or for encouraging landowner actions (funders programme may be focused on other problems, so selection criteria and funding priority may be different).
- There can be lots of variety in the way landowners undertake the new practices or technology, which may mean the their approach, (for example insufficient ongoing management of the constructed wetland) does not provide expected water quality benefits.
- There is a need to ensure that practices funded are those identified in research as contributing to water quality outcomes, with appropriate efficacy that allows for locational differences.

This sub-catchment planning and Lakes and Whangamarino Wetland implementation methods support and aligns with implementation methods for lake specific management plans, which recognises that:

- there is a need to deal with the legacies of catchment management,
- lakes present a range of scales for issues and actions,
- management can be undertaken to improve specific lake attributes and/or uses,
- an adaptive management approach may be required,
- there is a need for long term interventions and monitoring, due to the likely timescales for improvements in lake water quality and associated values (that is, the 80 year targets in Objective 1).

E.8.6 Efficiency of Option 3 prioritisation of implementation timing, sub-catchment planning and co-ordination of actions

| Option 3: Prioritisation of implementation timing based on the gap between current and desired water quality, and sub-catchment planning and co-ordination | | |
|--|--|---|
| | Benefits | Costs |
| Environmental | <p>Prioritised implementation</p> <p>A small to medium cumulative environmental benefit across the catchment would be achieved through landowners undertaking activities and mitigations to reduce discharges.</p> <p>Actions and benefits will occur earlier where the gap in water quality is the highest.</p> <p>The lakes FMUs and Whangamarino Wetland that contain threatened and vulnerable ecosystems highly dependent on water quality, will benefit.</p> <p>Sub-catchment planning</p> <p>Developing sub-catchment plans provides a strong context for the future development of Farm Environment Plans.</p> <p>Enables priorities to be established to maximise resource input and prioritise funding, by focusing on those areas where water quality benefits are most needed.</p> | <p>Prioritised implementation</p> <p>In isolation, this option is unlikely to make a significant difference to direct effects outside the prioritised areas (areas of lower priority, so provisions implemented later).</p> <p>Sub-catchment planning</p> <p>Delays implementation since ideally a sub-catchment plan is developed before Farm Environment Plan can be prepared and not all sub-catchment plans can be developed in the same timeframe.</p> |
| Economic | <p>Prioritised implementation</p> <p>Prioritisation would enable better support for those required to make changes sooner.</p> | <p>Prioritised implementation</p> <p>The cost of implementing Farm Environment Plans would fall on those located in the highest priority sub-catchments first.</p> |

| | | |
|---|---|--|
| <p>(including opportunities for economic growth or reduction and employment to be provided or reduced)</p> | <p>Delayed costs for landowners in non-priority areas.</p> <p>Sub-catchment planning</p> <p>The economic costs of farm actions may be off-set by funding options available.</p> | <p>Sub-catchment planning</p> <p>Development costs of sub-catchment plans could be significant (process and the level of detail could be varied to speed up development). Costs also depends on who is expected to be involved in developing sub-catchment plans.</p> |
| <p>Social</p> | <p>Prioritised implementation</p> <p>Improvements tend to be most highly valued when current water quality is worst (WRC 2014 TR2014/17 Document# 3114767)</p> <p>Sub-catchment planning</p> <p>Sub-catchment planning provides a context for landowners to assess their actions and management practices as contributors to the state of water quality in the sub-catchment, along with recognising that some actions need to be undertaken at a joint-project scale. Sub-catchment planning enables all landowners in the area to be informed of the local issues and to be part of the solution to the degraded water quality. This could result in a socially cohesive approach to action within the catchment (for example, through peer support).</p> | <p>Prioritised implementation</p> <p>There could be a perception of inequity when only some landowners need to take actions</p> <p>Sub-catchment planning</p> <p>There could be a perception that neighbouring or other areas are not 'pulling their weight' in improving water quality, which could be a barrier to changes in actions and practices.</p> |
| <p>Cultural</p> | <p>Prioritised implementation</p> <p>Improvements in cultural use values from improved water quality.</p> <p>Sub-catchment planning</p> <p>Sub-catchment plans can consider local cultural values in more detail than a catchment-wide plan.</p> | <p>Prioritised implementation</p> <p>Prioritised areas may not be the most important from a cultural values perspective.</p> |
| <p>CSG's Policy Selection Criteria</p> <p>Optimising environmental, social and economic outcomes</p> | <p>Prioritised implementation</p> <p>Prioritising sub-catchment areas means focusing on those areas first where the most benefit can be gained from reductions in contaminants. This is an efficient use of resources in a project where future plan changes are also envisaged.</p> | <p>Prioritised implementation</p> <p>Incremental changes over the whole of the Waikato and Waipa River catchment may not result in the desired level of change in water quality.</p> <p>Sub-catchment planning</p> |

| | | |
|--|--|--|
| | <p>Sub-catchment planning Targeted investment would be made to high risk areas, rather than open eligibility. Sound evidence-based and knowledge-based approach to identify priority areas.</p> | <p>More complex and time-consuming than a catchment-wide plan.</p> |
|--|--|--|

Efficiency of prioritisation of implementation timing based on gap between current and desired water quality, and sub-catchment planning and co-ordination

E.8.6.1 Summary of efficiency

Sub-catchment planning and Lakes Catchment Plans provides the opportunity for the integrated management of sub-catchments and lake catchments for water quality outcomes, but the success of incorporation of the sub-catchment planning consideration in the regulatory framework is less certain. The prioritisation process can be supported by sub-catchment planning. Prioritisation contributes to the realistic implementation of Farm Environment Plans.

The investment of public funds in interception mitigations could be significant, but is reliant on the funding being available. The success of edge of field mitigation depends on the willingness and ability of landowners to undertake works and/or change their management practices. Placing some of these cost onto the public is a significant decision (however at this stage it is unclear what the cost share might be between the funder and the landowner).

These are key mitigations for the achievement of desired water quality outcomes, and reflect the need for making significant changes over time.

E.8.7 Assessment of risk: certainty and sufficiency of information

There is sufficient information on which to base the proposed policies and methods.

There are practical issues associated with the implementation of sub-catchment planning. Prioritisation of areas and actions will be required to ensure best use of resources available. This prioritised approach to sub-catchment planning and Farm Environment Plans means that effort will be made in those areas where water quality is particularly degraded and that the most benefits can be achieved through actions taken sooner, some of which may be assisted through public funding. It also recognises that a step approach to addressing the whole of the Waikato and Waipa River catchments will be required.

A key risk of achieving the overall outcomes sought for the catchment is that managing land use and farming activities to improve practice around the loss of nitrogen, phosphorus, sediment and microbial pathogens, alone with not achieve the freshwater outcomes sought.

Not acting because of this uncertainty would increase the risk of not achieving the water quality objectives, including further degradation of the waters in the Waikato and Waipa River catchments, or prolonging the time taken to achieve the desired water quality objectives.

It is essential that a clear message is provided to landowners as to how and when they will be required to participate in improving water quality in their sub-catchment. The modelling has indicated significant land use change needs to occur to meet the 80 year limits, and there is the risk that early investment (in mitigations) made by landowners to meet 10 year targets may need to be replaced by land use change at some future stage.

E.8.8 Overall assessment of appropriateness and reasons for deciding on provisions

The efficiency and effectiveness of the policy package (prioritisation of sub-catchments, Farm Environment Plans and sub-catchment planning, co-ordination of actions) depends on resources available, including skill sets available to undertake plans, as well as identifying co-ordinated approaches to actions that would have cumulative benefits; and best use of funding available to support changes in land management practices.

To achieve the long term and short term numerical and narrative freshwater objectives, a prioritised sub-catchment approach would enable the focus to be placed on those areas where water quality is most degraded and would benefit most from land management changes, particularly in the short term. This staged approach also recognises that future RMA plan changes are likely to be required, and these are likely to require more actions from all discharge sources.

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E.9 National Environmental Standards

Under RMA s32(4) this report must consider if the Plan Change 1 will impose a greater prohibition or restriction on an activity to which a National Environmental Standard applies, and to examine whether the prohibition or restriction is justified.

The National Environmental Standards for Sources of Human Drinking Water is relevant to the subject matter of Plan Change 1.

National Environmental Standards for Sources of Human Drinking Water

The National Environmental Standard for Sources of Human Drinking Water sets requirements for protecting sources of human drinking water from becoming contaminated. It came into effect on 20 June 2008. For the purpose of this NES, a human drinking water source is a natural water body such as a lake, river or groundwater that is used to supply a community with drinking water. The standard applies to source water before it is treated and only sources used to supply human drinking water, that is, not stock or other animals.⁽²⁶⁾

The NES requires regional councils to ensure that effects of activities on drinking water sources are considered in decisions on resource consents and regional plans.

Specifically regional councils are required to:

- decline discharge or water permits that are likely to result in community drinking water becoming unsafe for human consumption following existing treatment
- be satisfied that permitted activities in regional plans will not result in community drinking water supplies being unsafe for human consumption following existing treatment
- place conditions on relevant resource consents that require notification of drinking water suppliers if significant unintended events occur (for example spills) that may adversely affect sources of human drinking water.

Different criteria apply depending on whether or not the drinking water concerned currently meets the health quality standards.

The National Environmental Standards are to be implemented when plans are changed or reviewed. Knowledge of the locations of takes for drinking water supply will be relevant when considering limits, land-use and the potential for water contaminants to affect drinking water supplies. In developing Plan Change 1, elevated nitrate levels were noted in some areas, see C.2 'Key findings'. Plan Change 1 is aimed at managing diffuse source discharges from land uses, including reducing diffuse discharges of nitrates into waterways.

National Policy Statement for Renewable Electricity Generation

The National Policy Statement for Renewable Electricity Generation (NPS-REG) came into force 2011. This NPS-REG ensures a consistent approach is taken to planning for renewable electricity generation in New Zealand by giving national direction on the benefits of renewable electricity generation and requiring all councils to make provision for it in their plans. The NPS-REG defines the need to develop, operate, maintain and upgrade renewable electricity generation activities throughout New Zealand and the benefits of renewable electricity generation as matters of national significance.

E.10 Overall conclusion

A staged approach is considered most appropriate to achieve the water quality that reflects the values expressed in the Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato. This allows for progress to be made towards achieving these long term objectives while minimising social disruption. In the first stage (covered in the Plan Change 1 period), contaminant discharges will be held and reduced, while information is collected and systems established to support the second stage of change. This second stage of change envisages the use of property-level allocation of discharges based on land suitability as a starting point (taking into account the risk of contaminant discharges from the land and the sensitivity of the receiving water).

Objectives have been set for both the long term and short term water quality targets.

The approaches considered most appropriate to achieve the objectives and meet the short term targets for sediment, nitrogen, phosphorus and microbial pathogens in the Waikato and Waipa Rivers include the following:

- Requiring exclusion of cattle, horses, deer, and pigs from all water bodies that continually contain water, by 2026
- Placing an immediate constraint on changing from lower contaminant-discharging land uses to higher contaminant-discharging land uses, effective until 2026 (with provision in policies for flexibility to recognise and provide for the relationship of Maori with their ancestral land)
- Requiring registration of properties and establishing a nitrogen reference point for all farming activity, other than on small or low-intensity properties
- Using a tailored approach (Farm Environment Plan) to identify how reductions will be made on all farming properties, other than those that are small, low intensity, or with low risk factors for contaminant discharge
- Requiring certain minimum standards to be met through Farm Environment Plans, including grazing and cultivation setbacks from waterways, and avoiding cultivation on steeper land
- Holding constant the area under commercial vegetable production, and requiring commercial vegetable enterprises to prepare a Farm Environment Plan following specified management practices to reduce nutrient and sediment discharges
- Requiring those carrying out farming activities to not exceed their nitrogen reference point, and to reduce their contaminant discharges, with the degree of reduction proportionate to their current discharges (that is, those currently discharging more make greater reductions)
- Requiring those with nitrogen leaching above the value of the 75th percentile of dairy farms (to be determined in each Freshwater Management Unit), to bring their discharges back to that value by 2026
- Prioritising sub-catchments for the timing of Farm Environment Plans and stock exclusion, and using sub-catchment scale planning to identify and coordinate cost-effective action, including specific plans for Whangamarino Wetland and priority lake catchments
- Requiring point source consent decisions to consider the water quality targets set, and to adopt the best practicable option to assist in meeting those targets, with an allowance for offsetting where all adverse effects cannot be avoided or mitigated at that location
- Requiring that forestry harvest comes under a forest harvest plan, to be notified to the Waikato Regional Council prior to commencing harvest.

The assessment of the effects of this package of policy measures indicates that, as long as it is fully implemented by 2026, sufficient action will be taken to result in the short-term water quality objectives being met (with a few exceptions at a small number of sites). The timing for seeing these changes in water quality will be affected by biophysical processes (such as the time taken for nitrogen to travel through groundwater to the rivers). An increasing number of sites will also meet the long term water quality objectives through the full implementation of these measures, in particular for the attributes of clarity and *E. coli*. The findings are based on a future, when the mitigation actions due to the policy mix have reached their full efficacy and when the result of that has been fully expressed in receiving water quality. They do not describe what will be seen in the water in 10 years - water-quality response timeframes range from immediate to many decades depending on the mitigation, the contaminant, the location, and the receiving water body.

Short term targets have been set to indicate that water quality would be expected to improve if mitigation actions were implemented, but these targets may not be observable in the short term. This is due to a number of factors, including: at some locations and for some contaminants the changes would be small and may not be proven with statistical significance; natural temporal variability in water quality (e.g., wet vs dry years) could mask improvements if a short-term comparison is made; and, lags in the response times (refer to [Limits and targets](#)). However, monitoring of the mitigation actions implemented can be used as a proxy or 'lead' indicator of the gains that have been achieved even if these gains are not apparent in the water quality monitoring in the short-term.

This report has been prepared in accordance with s32 of the RMA.

Having undertaken the above evaluation and considered the risk of acting or not acting due to uncertain or insufficient information, it is considered that the objectives are the most appropriate way to achieve the purpose of the RMA and having regard to efficiency and effectiveness, the provisions are the most appropriate for achieving the objectives.

E.11 Appendices

E.11.1 Appendix 1: List of Plan Change 1 Objectives, Policies, Methods and Rules

Objective 1: Long-term restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 1: Te whakaoranga tauroa me te tiakanga tauroa o te kounga wai ki ia riu kōawaawa me te Wae Whakahaere i te Wai Māori

By 2096, discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water result in achievement of the restoration and protection of the 80 year water quality attribute targets in Table 11-1.

Objective 2: Social, economic and cultural wellbeing is maintained in the long term/Te Whāinga 2: Ka whakaūngia te oranga ā-pāpori, ā-ōhanga, ā-ahurea hoki i ngā tauroa

Waikato and Waipa communities and their economy benefit from the restoration and protection of water quality in the Waikato River Catchment, which enables the people and communities to continue to provide for their social, economic and cultural wellbeing.

Objective 3: Short-term improvements in water quality in the first stage of restoration and protection of water quality for each sub-catchment and Freshwater Management Unit/Te Whāinga 3: Ngā whakapainga taupoto o te kounga wai i te wāhanga tuatahi o te whakaoranga me te tiakanga o te kounga wai i ia riu kōawāwa me te Wae Whakahaere Wai Māori

Actions put in place and implemented by 2026 to reduce discharges of nitrogen, phosphorus, sediment and microbial pathogens, are sufficient to achieve ten percent of the required change between current water quality and the 80 year water quality attribute targets in Table 11-1. A ten percent change towards the long term water quality improvements is indicated by the short term water quality attribute targets in Table 11-1.

Objective 4: People and community resilience/Te Whāinga 4: Te manawa piharau o te tangata me te hapori

A staged approach to change enables people and communities to undertake adaptive management to continue to provide for their social, economic and cultural wellbeing in the short term while:

- a. considering the values and uses when taking action to achieve the attribute targets for the Waikato and Waipa Rivers in Table 11-1; and
- b. recognising that further contaminant reductions will be required by subsequent regional plans and signalling anticipated future management approaches that will be needed to meet Objective 1.

Objective 5: Mana Tangata – protecting and restoring tangata whenua values/Te Whāinga 5: Te Mana Tangata – te tiaki me te whakaora i ngā uara o te tangata whenua

Tangata whenua values are integrated into the co-management of the rivers and other water bodies within the catchment such that:

- a. tangata whenua have the ability to:
 - i. manage their own lands and resources, by exercising mana whakahaere, for the benefit of their people; and
 - ii. actively sustain a relationship with ancestral land and with the rivers and other water bodies in the catchment; and
- b. new impediments to the flexibility of the use of tangata whenua ancestral lands are minimised; and
- c. improvement in the rivers' water quality and the exercise of kaitiakitanga increase the spiritual and physical wellbeing of iwi and their tribal and cultural identity.

Objective 6: Whangamarino Wetland/Te Whāinga 6: Ngā Repo o Whangamarino

- a. Nitrogen, phosphorus, sediment and microbial pathogen loads in the catchment of Whangamarino Wetland are reduced in the short term, to make progress towards the long term restoration of Whangamarino Wetland; and
- b. The management of contaminant loads entering Whangamarino Wetland is consistent with the achievement of the water quality attribute targets in Tables 11-1.

Policy 1: Manage diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens/Te Kaupapa Here 1: Te whakahaere i ngā rukenga roha o te hauota, o te pūtūtae-whetū, o te waiparapara me te tukumate ora poto

Policy 2: Tailored approach to reducing diffuse discharges from farming activities/Te Kaupapa Here 2: He huarahi ka āta whakahāngaihia hei whakaiti i ngā rukenga roha i ngā mahinga pāmu

Policy 3: Tailored approach to reducing diffuse discharges from commercial vegetable production systems/Te Kaupapa Here 3: He huarahi ka āta whakahāngaihia hei whakaiti i ngā rukenga roha i ngā pūnaha arumoni hei whakatupu hua whenua

Policy 4: Enabling activities with lower discharges to continue or to be established while signalling further changes may be required in the future/Te Kaupapa Here 4: Te tuku kia haere tonu, kia whakatūria rānei ngā tūmahi he iti iho ngā rukenga, me te tohu ake ākuanei pea me panoni anō hei ngā tau e heke mai ana

Policy 5: Staged approach/Te Kaupapa Here 5: He huarahi wāwāhi

Policy 6: Restricting land use change/Te Kaupapa Here 6: Te here i te panonitanga ā-whakamahinga whenua

Policy 7: Preparing for allocation in the future/Te Kaupapa Here 7: Kia takatū ki ngā tohanga hei ngā tau e heke mai ana

Policy 8: Prioritised implementation/Te Kaupapa Here 8: Te raupapa o te whakatinanatanga

Policy 9: Sub-catchment (including edge of field) mitigation planning, co-ordination and funding/Te Kaupapa Here 9: Te whakarite mahi whakangāwari, mahi ngātahi me te pūtea mō te riu kōawāwa (tae atu ki ngā taitapa)

Policy 10: Provide for point sources discharges of regional significance/Te Kaupapa Here 10: Te whakatau i ngā rukenga i ngā pū tuwha e noho tāpua ana ki te rohe

Policy 11: Application of Best Practicable Option and mitigation or offset of effects to point source discharges/Te Kaupapa Here 11: Te whakahāngai i te Kōwhiringa ka Tino Taea me ngā mahi whakangāwari pānga; te karo rānei i ngā pānga ki ngā rukenga i ngā pū tuwha

Policy 12: Additional considerations for point source discharges in relation to water quality targets/Te Kaupapa Here 12: He take anō hei whakaaro ake mō ngā rukenga i ngā pū tuwha e pā ana ki ngā whāinga ā-kounga wai

Policy 13: Point sources consent duration/Te Kaupapa Here 13: Te roa o te tukanga tono whakaaetanga mō te pū tuwha

Policy 14: Lakes Freshwater Management Units/Te Kaupapa Here 14: Ngā Wae Whakahaere Wai Māori i ngā Roto

Policy 15: Whangamarino Wetland/Te Kaupapa Here 15: Ngā Repo o Whangamarino

Policy 16: Flexibility for development of land returned under Te Tiriti o Waitangi settlements and multiple owned Māori land/Te Kaupapa Here 16: Te hangore o te tukanga mō te whakawhanaketanga o ngā whenua e whakahokia ai i raro i ngā whakataunga kokoraho o Te Tiriti o Waitangi me ngā whenua Māori kei raro i te mana whakahaere o te takitini

Policy 17: Considering the wider context of the Vision and Strategy/Te Kaupapa Here 17: Te whakaaro ake ki te horopaki whānui o Te Ture Whaimana

Method 3.11.4.1: Working with others/Te mahi tahi me ētehi atu

Method 3.11.4.2: Certified Industry Scheme/Te kaupapa ā-ahumahi kua whai tohu

Method 3.11.4.3: Farm Environment Plans/Ngā Mahere Taiao ā-Pāmu

Method 3.11.4.4: Lakes and Whangamarino Wetland/Ngā Roto me ngā Repo o Whangamarino

Method 3.11.4.5: Sub-catchment scale planning/Te whakamāherehere mō te whānuitanga o ngā riu kōawaawa

Method 3.11.4.6: Funding and implementation/Te pūtea me te whakatinanatanga

Method 3.11.4.7: Information needs to support any future allocation/Ngā pārongo e hiahiatia ana hei taunaki i ngā tohanga o anamata

Method 3.11.4.8: Reviewing Chapter 3.11 and developing an allocation framework for the next Regional Plan/Te arotake i te Upoko 3.11, te whakarite hoki i tētehi anga toha mō te Mahere ā-Rohe e whai ake ana

Method 3.11.4.9: Managing the effects of urban development/Te whakahaere i ngā pānga o te whanaketanga ā-tāone

Method 3.11.4.10: Accounting system and monitoring/Te pūnaha kaute me te aroturuki

Method 3.11.4.11: Monitoring and evaluation of the implementation of Chapter 3.11/Te aroturuki me te arotake i te whakatinanatanga o te Upoko 3.11

Method 3.11.4.12: Support research and dissemination of best practice guidelines to reduce diffuse discharges/Te taunaki i te rangahautanga me te tuaritanga o ngā aratohu mō ngā mahi tino whai take hei whakaiti i ngā rukenga roha

Rule 3.11.5.1: Permitted Activity Rule - Small and low intensity farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi iti, ngā mahi pāiti hoki i runga pāmu

Rule 3.11.5.2: Permitted Activity Rule – Other farming activities/Te Ture mō ngā Mahi e Whakaaetia ana – Ētehi atu mahi i runga pāmu

Rule 3.11.5.3: Permitted Activity Rule - Farming activities with a Farm Environment Plan under a Certified Industry Scheme/Te Ture mō ngā Mahi e Whakaaetia ana – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.4: Controlled Activity Rule - Farming activities with a Farm Environment Plan not under a Certified Industry Scheme/Te Ture mō ngā Mahi ka āta Whakahaerehia – Ngā mahi i runga pāmu kua whai Mahere Taiao ā-Pāmu kāore i raro i te Kaupapa ā-Ahumahi kua Whai Tohu

Rule 3.11.5.5: Controlled Activity Rule - Existing commercial vegetable production/Te Ture mō ngā Mahi ka āta Whakahaerehia – Te whakatupu hua whenua ā-arumoni o te wā nei

Rule 3.11.5.6: Restricted Discretionary Activity Rule - The use of land for farming activities/Te Ture mō ngā kōwhiringa mahi e herea ana – te whakamahinga o te whenua mō ngā mahinga pāmu

Rule 3.11.5.7: Non-complying Activity Rule - Land Use Change/Te Ture mō ngā mahi kāore e whai i ngā ture – Te Panonitanga ā-Whakamahinga Whenua

Schedule A - Registration with Waikato Regional Council/Te Āpitihianga A – Te rēhita me te Kaunihera ā-Rohe o Waikato

Schedule B - Nitrogen Reference Point/Te Āpitihianga B – Te tohu ā-hauota

Schedule C - Stock exclusion/Te Āpitihianga C – Te aukatinga o ngā kararehe

Schedule 1 - Requirements for Farm Environment Plans/Te Āpitihianga 1: Ngā Herenga i ngā Mahere Taiao ā-Pāmu

Schedule 2 - Certification of Industry Schemes/Te Āpitihianga 2 – Te whakamana i ngā tohu o ngā Kaupapa Ahumahi

HE TAIAO MAURIORA

HEALTHY ENVIRONMENT

HE ŌHANGA PAKARI

STRONG ECONOMY

HE HAPORI HIHIRI

VIBRANT COMMUNITIES

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