

MARCH 2016

# Restoring and protecting our water

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## Te whakapaipai me te tiaki i ō tātou wai

Overview of Collaborative Stakeholder Group's  
Recommendations for Waikato Regional Plan Change No. 1  
– Waikato and Waipa River catchments



**Healthy Rivers**  
PLAN FOR CHANGE

Maniapoto Māori Trust Board  
Raukawa Charitable Trust  
Te Arawa River Iwi Trust

**Wai Ora**

HE RAUTAKI WHAKAPAIPAI

Tūwharetoa Māori Trust Board  
Waikato Raupatu River Trust  
Waikato Regional Council







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# Outline of this report

This report provides an overview of the Healthy Rivers: Plan for Change/ Wai Ora: He Rautaki Whakapaipai project and the recommendations from the Collaborative Stakeholder Group (CSG) to the project decision makers.

The first stage of managing nitrogen, phosphorus, sediment and microbes to help achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is a change to the Waikato Regional Plan, called Waikato Regional Plan Change 1: Waikato and Waipa River catchments (Plan Change 1).

The purpose of this report is:

1. To provide an overview of the work the CSG has undertaken in the past two years.
2. To guide the next stage of the process, which is:
  - a. the detailed write-up of objectives, policies and methods and rules that will go into Plan Change 1.
  - b. ongoing development of other agreements, funding and actions that are outside the Resource Management Act document, but need to be progressed in order for the CSGs recommendations to be implemented.

The document is structured in four parts A - D.

## Part A: Setting the Scene

Part A is intended to provide readers with enough context to understand the recommendations made by the Collaborative Stakeholder Group on the values, objectives, policies, methods and rules. It is a high level overview of the project purpose, scope and drivers, and the process followed by the CSG.

## Part B: How water quality outcomes were developed

Part B provides background information about long term outcomes for the Rivers and lakes and an outline of the consultation the CSG undertook with their sectors and the wider community. Part B includes:

1. Technical information on the current state of river water quality and how the CSG went about identifying options for improving it.

This includes:

  - identifying Freshwater Management Units (parts of the catchments) to help with accounting and limit-setting
  - identifying values and uses for the rivers
  - selecting attributes for measuring achievement of those values, and
  - investigating possible changes and their impacts through scenario modelling.
2. How the CSG connected with their sectors and communities, including:
  - initial technical information provided, and
  - principles or filters that the CSG used to assess policy options against (CSG Policy Selection Criteria).
  - an outline of the community engagement process, including the October/November 2015 and February 2016 opportunities that CSG provided

for the wider community to give them feedback on their overall policy framework.

## Part C: Policy framework recommendations

Part C provides the CSG recommendations on the overall policy framework that will guide the drafting of Plan Change 1 and the associated section 32 document that sets out alternatives, costs and benefits. Detailed drafting and some further refinements will be worked on by the CSG throughout March and April 2016.

Part C has two key parts.

The first is the CSG's recommendations about the outcomes to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, which will become the water quality limits and objectives of Plan Change 1. This is Section 10 of the report.

The second is the CSG's recommendations about the changes they expect to see on the land to start to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, which will become the policies, methods and rules of Plan Change 1. This is preceded by some background in Section 11 about the current policy and how Plan Change 1 will fit into the existing Regional Plan. Sections 12 – 18 set out the intent and application of the policies, methods and rules.

### 1. Outcomes – Water quality limits and objectives for Plan Change 1

The desired future water quality, and steps for achieving it include:

- Long term numerical water quality limits to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in 80 years.
- Objectives that signal a staged approach toward managing nitrogen, phosphorus, sediment and microbes.
- The CSG has expressed the first stage as 10% of the journey towards achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in the first 10 years; the second stage is 25% in 20 years, and so on. This includes an understanding that the effect of some contaminants (particularly nitrogen) discharged from land has not yet been seen in the water. This is often called 'load to come' and means that more effort is required over time to move to the desired water quality.

### 2. Changes needed on the land – Policies, methods and rules for Plan Change 1

Part C includes some topics which the CSG has settled on, and some which are still under active consideration and requiring further definition. The following areas have been agreed by CSG and set out in Part C:

- Restrictions on discharges to land and water by limiting major land use change and restricting stock access to water.
- Making some changes to the current rules in the Regional Plan that manage point source discharges, forestry and earthworks.
- Making some reductions in discharges, by requiring mitigation actions in property management plans.
- Identifying and managing two types of risk, including risk factors associated with losses of contaminants and the risk of not meeting the water quality targets due to the size of the gap between current and desired water quality.
- That Plan Change 1 will not contain an allocation framework for nitrogen in the form of numerical property level limits. Instead, this will occur in the next plan change; however the principles on which to base this allocation will be signalled now.
- Collecting information from landholders, and undertaking research, so that allocation can occur in the future.

**Aspects that are likely to become part of Plan Change 1, which are under active consideration and being refined by the CSG include:**

1. The outcomes CSG expect to see in the 10-20 years after Plan Change 1 is publicly notified, so that the community can be confident that progress will be tracked. These are referred to as short term objectives.
2. Enabling provisions for the development of land returned under Te Tiriti O Waitangi settlements and multiple Māori owned land.
3. Detail around how to guide the implementation of mitigation actions in property management plans, what this might cost, and how industry schemes need to be set up to manage contaminants discharged from farms and commercial vegetable production.
4. Which parts of the catchment should be a priority and 'start first' to implement the property management plan rules.
5. An overall alignment of the timeline for implementation, and dates when the different rules will come into force, including rules to require stock exclusion, nitrogen benchmarking, and completion of property management plans that contain actions for mitigating contaminants.

## **Part D: References, Glossary and Appendices**

Part D provides further detail, references, and a glossary that defines terms that may be unfamiliar to readers or where the CSG wants to avoid confusion about how the rules should be interpreted in Plan Change 1.

# Part A: Setting the scene

## 1.1 Fresh water, our lifeblood

In the Waikato, our rivers are valued by us all and are a taonga to iwi. They give us water to drink, as well as providing for our economically important industries. But water quality is becoming increasingly under threat.

Our rivers reflect what we do on the land, and some aspects of water quality are worsening. Surveys indicated that water pollution and quality is the most concerning environmental issue for Waikato residents. Landholders, iwi, industry, local government and others have already done much to address water quality issues, and continue to do so.

Our generation has a window of opportunity to do something about the water quality issues we are facing, before they become more difficult to fix. Protecting our increasingly precious water will safeguard it for us, and for future generations.

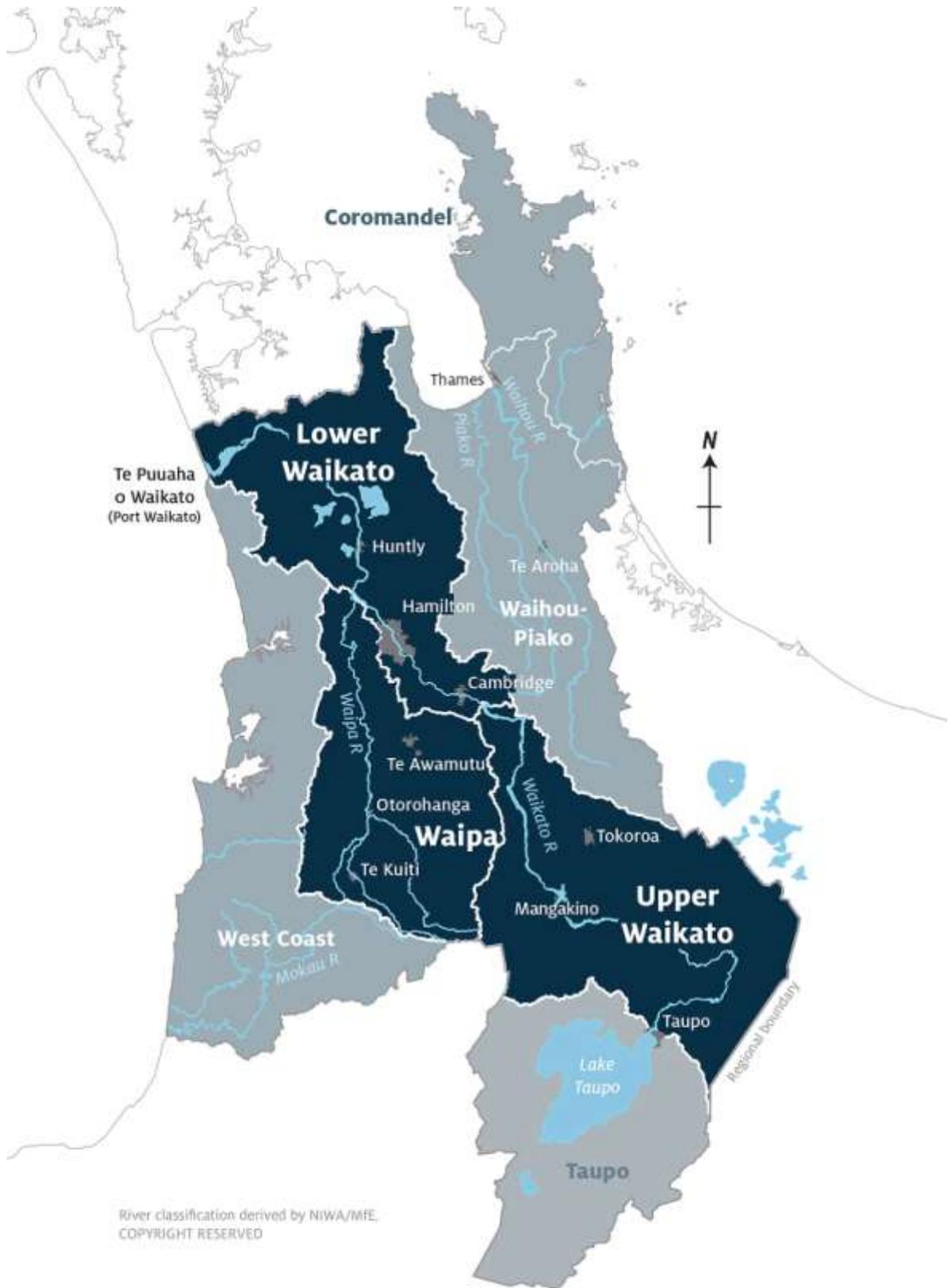
## 1.2 A project for healthy rivers

Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai is working with stakeholders to develop changes to the Waikato Regional Plan, to help restore and protect the health of the Waikato and Waipa rivers. Once developed, the plan change will help, over time, to reduce sediment, bacteria and nutrients (nitrogen and phosphorus) entering water bodies (including groundwater) in the Waikato and Waipa River catchments, an area of 1.1 million hectares.

A change to the Waikato Regional Plan:

- will assist in giving effect to the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* and the Government's *National Policy Statement for Freshwater Management 2014*
- will tackle issues that are apparent in monitoring of the rivers, and assist in making sure they do not become more difficult and expensive to fix
- will provide greater restoration and protection for fresh water – reviews of current Waikato Regional Council policy to protect fresh water concluded that more is needed
- will help meet expectations the Waikato community, iwi and industry hold for fresh water and the rivers. Waikato Regional Council plans to begin water quality reviews for the rest of the region from 2016, as part of the wider review of the Waikato Regional Plan.

Figure 1 Map of the Waikato and Waipa River catchments



## 1.3 Co-management of the Waikato and Waipa Rivers

Legislation passed in 2010 and 2012 introduced a new era of co-management for the Waikato and Waipa river catchments. Co-management provides ways for iwi to manage the rivers together with central and local government.

In line with co-management legislation, Waikato and Waipa River iwi – Ngāti Maniapoto, Raukawa, Ngāti Tūwharetoa, Te Arawa River Iwi and Waikato-Tainui – and Waikato Regional Council are partners on Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai. Waikato and Waipa River iwi are represented by the following groups in the project:



The Waikato River Authority<sup>1</sup> are ex officio members of Te Rōpū Hautū (project steering group).

## 1.4 Vision and Strategy for the Waikato River/ Te Ture Whaimana o Te Awa o Waikato

The *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is the primary direction-setting document for the Waikato and Waipa rivers and their catchments. It reflects community aspirations and expectations. The *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* must be 'given effect to' by regional and district plans within the rivers' catchments. Waikato Regional Council assessed whether the Waikato Regional Plan gave effect to the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*; the results supported the need for a regional plan change. The plan change plays a part in achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*.

The *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* applies to the rivers and to activities in the rivers' catchments, and focuses on restoring and protecting the health and wellbeing of the rivers for current and future generations. It takes a holistic approach and aims for the restoration and protection of the economic, social, cultural and spiritual relationships Waikato and Waipa River iwi and the Waikato Region's communities with the Waikato River.

<sup>1</sup> The Waikato River Authority is an independent Crown-Iwi organisation focused on helping to restore and protect the Waikato and Waipa Rivers. The purpose of the Waikato River Authority is to:

- set the primary direction through the Vision and Strategy to achieve the restoration and protection of the health and wellbeing of the Waikato River for future generations
- promote an integrated, holistic, and co-ordinated approach to the implementation of the Vision and Strategy and the management of the Waikato River
- fund rehabilitation initiatives for the Waikato River in its role as trustee for the Waikato River Clean-up Trust.

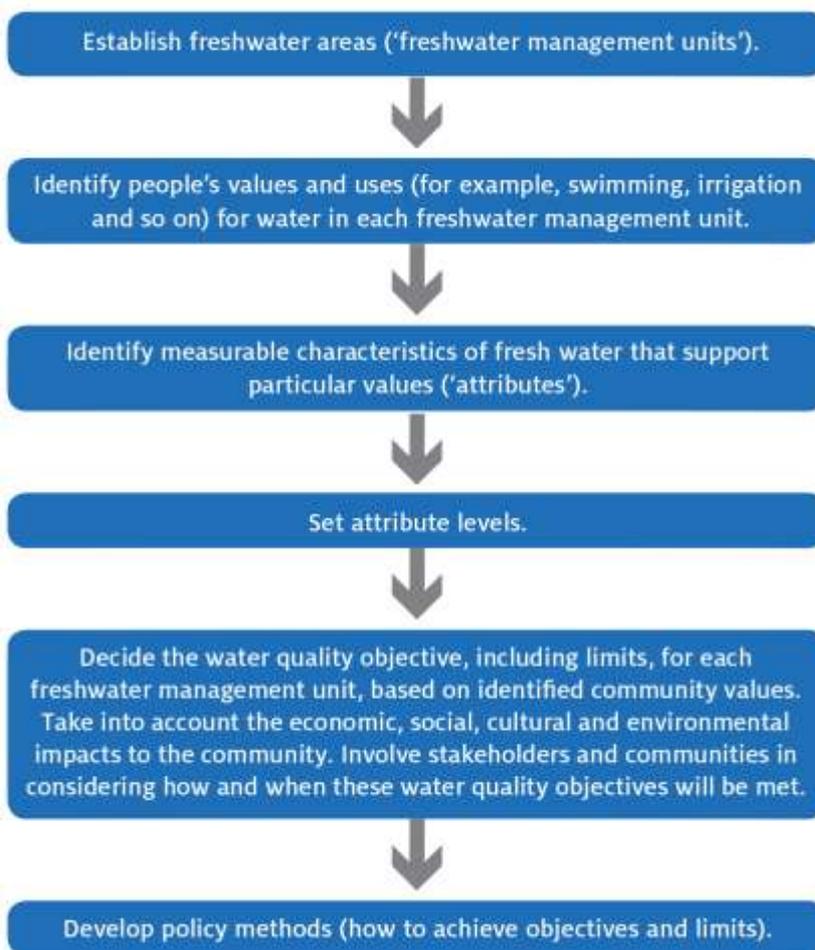
The *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* for the Waikato River prevails over the *National Policy Statement for Freshwater Management 2014* when there are any inconsistencies, and requires more stringent water quality conditions to be met. It requires the Waikato and Waipa rivers and their tributaries to be swimmable and safe for food collection.

## 1.5 National Policy Statement for Freshwater Management 2014

To improve management of fresh water in New Zealand, central government issued the *National Policy Statement for Freshwater Management 2014*.

The *National Policy Statement for Freshwater Management 2014* directs regional councils to establish objectives and set limits for fresh water in their regional plans. It also sets out how councils should do this, as shown below.

**Figure 2: Process to establish objectives and set limits for fresh water in regional plans**



The *National Policy Statement for Freshwater Management 2014* includes two compulsory national values, 'ecosystem health' and 'human health for recreation', which must be provided for everywhere. It sets minimum acceptable states for these two values ('national bottom lines').

## 1.6 Proposed Waikato Regional Policy Statement

All regions must have a regional policy statement (RPS), and are required to review it every 10 years. The Waikato region's existing regional policy statement became operative in 2000, and is currently being reviewed. Regional and district plans must "give effect to" a Regional Policy Statement. There are a number of topics in the Proposed Waikato Regional Policy Statement which are relevant to Healthy Rivers Wai Ora including:

- Integrated management
- Resource use and development
- Decision making
- Health and wellbeing of the Waikato River
- Energy
- Ecosystem services
- Relationship of tāngata whenua with the environment (te taiao)
- Sustainable and efficient use of resources
- Built environment
- Mauri and health of fresh water bodies
- Riparian areas and wetlands

## 2 Working together to develop policy

### 2.1 The Collaborative Stakeholder Group

The Collaborative Stakeholder Group (CSG) is central to developing the proposed plan change.

The CSG represents stakeholders and the wider community in Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai. They have been responsible for developing the solutions contained in this document that will be used in the development of a proposed plan change in mid-2016. Healthy Rivers/Wai Ora is dealing with complex issues, so it's important that those affected have been part of developing the solution. This will result in better and lasting solutions, providing for better outcomes for the rivers.

The CSG actively involved affected sectors and communities to understand their views. They considered environmental, social, cultural and economic technical information, as well as feedback from stakeholders and the community.

Around 130 stakeholders were involved in designing the CSG at a workshop in August 2013. Each sector nominated its own representative/s. Anyone living in the Waikato and Waipa river catchments could apply to be a community representative.

The CSG is chaired by Bill Wasley, and facilitated by Dr Helen Ritchie, both independent of the CSG membership.

**Table 1: List of Collaborative Stakeholder Group members and delegates**

			Delegate
Sector representatives	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	Jim Crawford
		Michelle Archer	Dr David Campbell
	Local government	Sally Davis	Tim Harty
	Tourism and recreation	Alastair Calder	Don Scarlet
	Forestry	Patricia Fordyce	Sally Strang/ Kelvin Meredith
	Māori interests	Alamoti Te Pou	-
		Weo Maag	Clinton Hemana
		Gina Rangi	-
Water supply takes	Garry Maskill	Mark Bourne	
Rural professionals	Phil Journeaux	-	
Community representatives	People living in the Waikato and Waipa river catchments	Jason Sebastian	No delegates
		Brian Hanna	
		Gayle Leaf	
		Evelyn Forrest	
		Dr Gwyneth Verkerk	
		Liz Stolwyk	
		Matt Makgill	

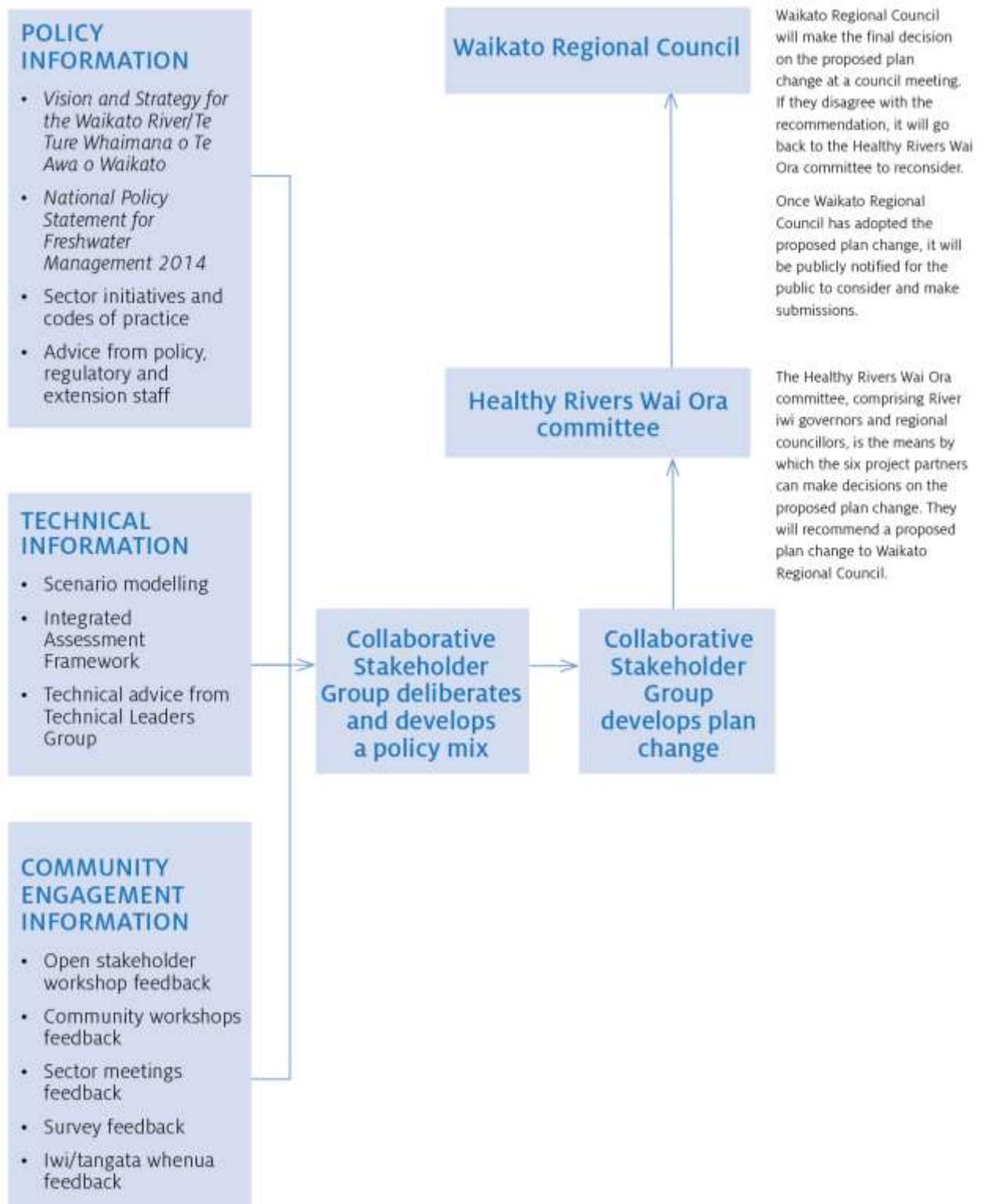
The CSG strived for unanimous agreement on decisions. If the CSG did not unanimously agree on decisions, members with concerns articulated them. The CSG then dealt with such concerns by discussing them, or by modifying the proposal.

If a proposal was still not agreed unanimously due to one or more members:

- standing aside, then agreement was reached and the proposal accepted
- disagreeing, then the group decided if the level of disagreement warranted further modifications to the proposal, or rejection or acceptance of it.

## 2.2 Collaborative Stakeholder’s Group development of a plan change

**Figure 3: CSG development of the plan change**



## 2.3 Collaborative Stakeholder Group workshops and public engagement

Since March 2014, the Collaborative Stakeholder Group has been attending workshops every four to six weeks, with increasing frequency as the project progressed. Their workshops have been held in different parts of the catchments and have included field trips and presentations, so they heard different perspectives and experiences in order to understand the diversity of the Waikato and Waipa river catchments.

The CSG has also been connecting with the community and their sectors throughout the project.

**Table 2: Key project dates and public engagement**

<b>Aug 2013</b>	130 stakeholders attend workshop on forming CSG
<b>Sept 2013</b>	Almost 40 stakeholders attend workshop on forming Technical Alliance
<b>Mar 2014</b>	CSG workshops start, occurring every 4 to 6 weeks
<b>May 2014</b>	Technical Alliance announced, including Technical Leaders Group membership
<b>Oct 2014</b>	More than 200 people discuss CSG's draft policy selection criteria and working list of values and uses at stakeholder forum
<b>Mar-May 2015</b>	More than 500 people provide feedback to CSG at a large workshop and drop in sessions and in an online survey
<b>Oct – Nov 2015</b>	More than 1000 people provide feedback to the CSG at a large workshop, community workshops and in an online survey
<b>Feb 2016</b>	Sectors provide feedback to the CSG

# Part B: How water quality outcomes were developed

## 3 Technical information

The Technical Leaders Group (TLG) is an impartial, advisory group of specialists who provide technical information to the Collaborative Stakeholder Group. The seven member TLG called upon other technical experts 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.

Collectively the TLG and the experts it called upon, has expertise in:

- water quality
- ground water
- soil stability and land management
- catchment and water quality modelling
- aquatic ecosystems (invertebrates, fisheries)
- riparian (land and water interface)
- mātauranga Māori (traditional and contemporary Māori knowledge)
- farm systems
- land management systems (across main land use types)
- economic outcomes (including at property and catchment level)
- social outcomes
- health issues associated with water quality.

TLG attended CSG workshops and some CSG sub-group meetings, provided responses to specific CSG questions and worked with the CSG on the technical information on the project.

### 3.1 River water quality state and trends

The following summary is based on the TLG's analysis of monitoring information for the main stem and tributaries of the Waikato and Waipa rivers. Table 3 and Table 4 provide an overview of the state of water quality in the Waikato and Waipa River system and the change or trends over time in that state using data from the Waikato Regional Council's monitoring network. Due to short-term and inter-annual variability in water quality, 5 years of monthly data was used to describe current state (up to 2014) whilst assessment of trends used complete data records from 1993. The state of four of the plan change key attributes, E. coli, total nitrogen, total phosphorus and water clarity are shown in relation to the water quality bands A, B, C, or D. For total nitrogen, total phosphorus, and water clarity the minimum acceptable state is the bottom of the C band. For E.coli, the requirement for swimmable quality is A or B band so the minimum acceptable state (MAS) is the bottom of the B band.

**Table 3: Water quality state and trends – nitrogen and phosphorus**

	Nitrogen		Phosphorus	
	State	Trend	State	Trend
Upper Waikato River	A or B	general deterioration	A, B, or C	some improvement
Upper Waikato tributaries	C or D	general deterioration	C or D	mixed
Central Waikato River	C	general deterioration	C	general improvement
Central Waikato tributaries	D	mixed	C or D	general improvement
Waipa River	C or D	general deterioration	B, C or D	mixed
Waipa tributaries	C or D	some deterioration	B, C or D	no change
Lower Waikato River	C	general deterioration	D	general improvement
Lower Waikato tributaries	B or D	mixed	B, C or D	some deterioration
Shallow lakes	C or D	general deterioration	A, B C, or D, or no data	general improvement

**Table 4: Water quality state and trends - E. coli and clarity**

	<i>E.coli</i>		Clarity	
	State	Trend	State	Trend
Upper Waikato River	A	some deterioration	A, B or C	general deterioration
Upper Waikato tributaries	A, B, or < MAS	no change	B, C or D	general deterioration
Central Waikato River	<MAS	no change	C	general improvement
Central Waikato tributaries	<MAS	no change	C or D	mixed
Waipa River	<MAS	no change	B, C or D	mixed
Waipa tributaries	<MAS	no change	B, C or D	some deterioration
Lower Waikato River	<MAS	general deterioration	D	general deterioration
Lower Waikato tributaries	<MAS	no change	C or D	general deterioration
Shallow lakes	Not determined	no data	No data	some deterioration

## 3.2 Lakes in the Waikato and Waipa River catchments

There are 62 lakes in the Waikato and Waipa river catchments:

- 35 peat lakes
- dune lakes
- 15 riverine lakes
- volcanic lakes
- geothermal lakes (which are outside the scope of Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai).

Most lakes in the catchments breach the *National Policy Statement for Freshwater Management 2014* national bottom lines for total nitrogen, total phosphorus, and chlorophyll a, and significant improvement is needed to meet these bottom lines. *E. coli* levels in the lakes are not currently monitored. The best water quality can be found in two of the dune lakes, and the worst in the riverine lakes, such as Lake Waikare.

Healthy Rivers: Plan for Change/Wai Ora: He Rautaki Whakapaipai is one of a number of initiatives underway to help to restore and protect lakes. Rehabilitating the catchment's shallow lakes (lakes less than 10m deep) is likely to be a multi-generational effort.

The Waikato River and Waipa River Restoration Strategy is being developed through a partnership between DairyNZ, the Waikato River Authority and the Waikato Regional Council, and will provide a framework for all organisations involved in Waikato and Waipa River catchment restoration activities. Its purpose is to guide tangible restoration work through specific, achievable, and prioritised activities that have been developed in consultation with catchment stakeholders, including shallow lakes.

Waikato Regional Council has recently developed the Waikato region shallow lakes management plan which sets out high level management actions to address key issues for these lakes, including water quality.

## 3.3 Mātauranga Māori

Both Mātauranga Māori (traditional and contemporary Māori knowledge) and science are important to Healthy Rivers/Wai Ora.

Mātauranga Māori is a holistic, dynamic, continually evolving knowledge system involving generational observations and experiences.

Mātauranga Māori has been incorporated into the project in a number of ways, including into:

- the Collaborative Stakeholder Group's list of values and uses for the rivers and policy selection criteria
- the integrated assessment framework
- development of the attributes and their numerical limits.

## 4 Freshwater management units

Freshwater management units (FMUs) are required by central government's *National Policy Statement for Freshwater Management 2014*.

Freshwater management units enable monitoring of progress towards meeting targets and limits. Contrary to what the name suggests, setting a freshwater management unit does not dictate the management or policy in the area it includes.

The CSG decided on their preferred option for freshwater management units in June 2015. At their July and August 2015 workshops they further considered the best freshwater management unit option for lakes. Stakeholders and the community provided feedback on freshwater management units at a series of events and in an online survey from March to May 2015.

In early 2016 CSG investigated the option of having a freshwater management unit for Whangamarino wetland. The wetland is a RAMSAR site, is internationally recognised and includes the spectrum of wetlands types (marsh, swamp, fen, bog). In the last 100 years there has been considerable degradation of high value ecosystem types.

The CSG agreed on the following points:

1. CSG recognises that the wetland has highly significant values and should be recognised as such and accorded a priority in respect of addressing matters related to the four contaminants through the Healthy Rivers Wai Ora plan change process.
2. CSG notes that while the proposal to establish a separate Whangamarino Wetland FMU has considerable merit, it was not considered appropriate to do so at this stage for the following reasons:
  - that no community or sector engagement has occurred on such a proposal and the CSG does not wish to place the collaborative plan development processes at risk by changing FMUs without going back out to the community for feedback;
  - that further technical information is required prior to considering the establishment of a separate FMU.
3. CSG supports in principle narrative objectives being included in the plan change and notes that a range of regulatory and non-regulatory methods are likely to be required to address the four contaminants in respect to Whangamarino Wetland.
4. CSG notes that the catchments of rivers flowing into Whangamarino Wetland should be among the higher priority sub-catchments where property and sub-catchment plans will occur.

As Waikato Regional Council continues to address requirements to protect the significant values of wetlands, and more technical information on wetlands is developed, CSG consider it is likely to be appropriate to establish a freshwater management unit for Whangamarino wetland in the future.

The CSG chose their preferred option for freshwater management units for the rivers for the following reasons:

- This option is relatively simple.
- Partly combines geomorphic or hydrogeological units.
- Recognises impounded versus flowing water in the Waikato River.
- The Waipa and Waikato catchments are separate.
- Aligns with catchment management zones.
- Clear boundaries for water quality/attribute state for policy development.
- Recognises Hamilton urban and peri-urban area.
- Monitoring sites are representative, in large part.
- Partly aligns with water quantity boundaries currently in the Waikato Regional Plan.
- Reflects policy issues to be managed e.g. flood management.
- Aligns with Waikato River Independent Scoping Study sub-regions.

- Compatible with the Report Card framework being developed by the Waikato River Authority.

The reason for the freshwater management units for the lakes and their catchment areas is:

- Lakes can be treated separately based on their lake type.

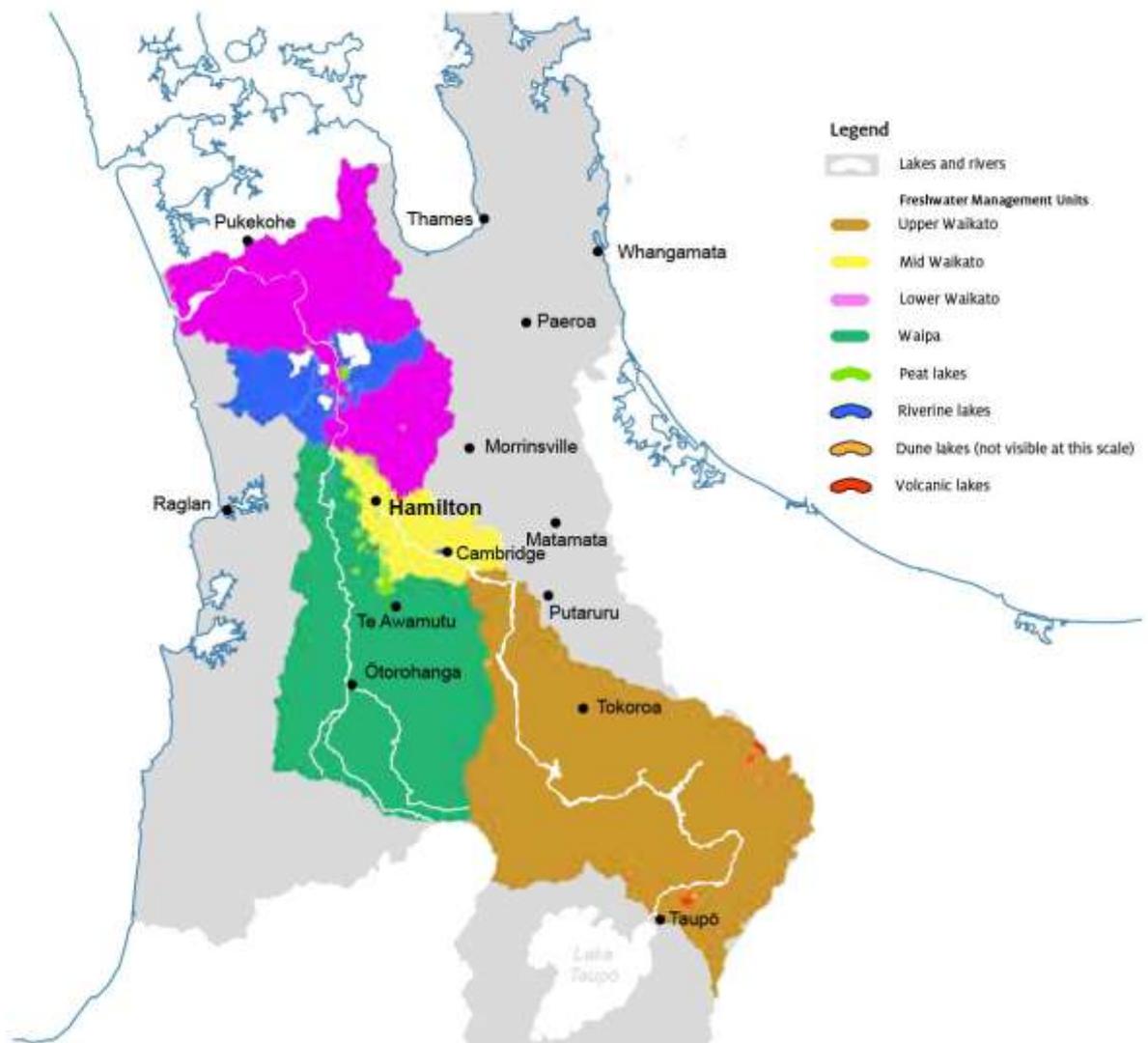
The freshwater management units will form part of Plan Change 1 when formally notified.

**Table 5: Description of freshwater management units for the Waikato and Waipa River catchments**

<b>Upper Waikato</b>	Waikato River from Huka Falls to Karapiro dam
<b>Middle Waikato</b>	Waikato River from Karapiro dam to Ngaruawahia
<b>Lower Waikato</b>	Waikato River from Ngaruawahia to Port Waikato
<b>Waipa</b>	The entire Waipa River catchment to Ngaruawahia, where the Waipa joins the Waikato River
<b>Riverine lakes</b>	15 riverine lakes and their catchments  Many riverine lakes, such as Waikare, Whangape and Waahi are in the northern parts of the catchments
<b>Peat lakes</b>	35 peat lakes and their catchments  Many peats lakes, such as Ngaroto, are in the Waipa catchment. Others include a cluster of eight peat lakes north east of Hamilton in Horsham Downs, and Lake Rotoroa (Hamilton Lake)
<b>Dune lakes</b>	4 dune lakes and their catchments, north of Port Waikato
<b>Volcanic lakes</b>	5 volcanic lakes and their catchments, in the south eastern part of the catchment

Figure 4: Map of freshwater management units for the Waikato and Waipa River catchments

The CSG's preferred freshwater management unit option



## 5 Values and uses for the Waikato and Waipa Rivers

Identifying people's values for fresh water is required by the *National Policy Statement for Freshwater Management 2014*. 'Values' are the qualities, uses and potential uses that are important to people about water bodies, and what they want to see recognised in their ongoing management.

Since their first workshop in March 2014, the CSG has considered the values and uses of a wide range of different people, groups and perspectives. Surveys, field trips, feedback from sectors, community engagement and River iwi have all provided the CSG with information on people's values and uses.

The CSG presented their working list of values for feedback at a Healthy Rivers/Wai Ora stakeholder forum in October 2014. At a series of events and in an online survey

between March and May 2015, they also asked people to identify what they use water bodies for.

The *National Policy Statement for Freshwater Management 2014* includes two compulsory values, 'ecosystem health' and 'human health for recreation', which must be provided for everywhere in New Zealand. Mahinga kai (food collection) and swimming are also prominent values expressed in the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, so have been included in the final list.

The CSG finalised their list of values and uses at their workshop in early August 2015.

The values and uses will form part of Plan Change 1 when formally notified. They are described below.

## 5.1 Vision and Strategy for the Waikato River

*"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."*<sup>2</sup>

## 5.2 Te Mana o te Wai: Mana Atua, Mana Tangata

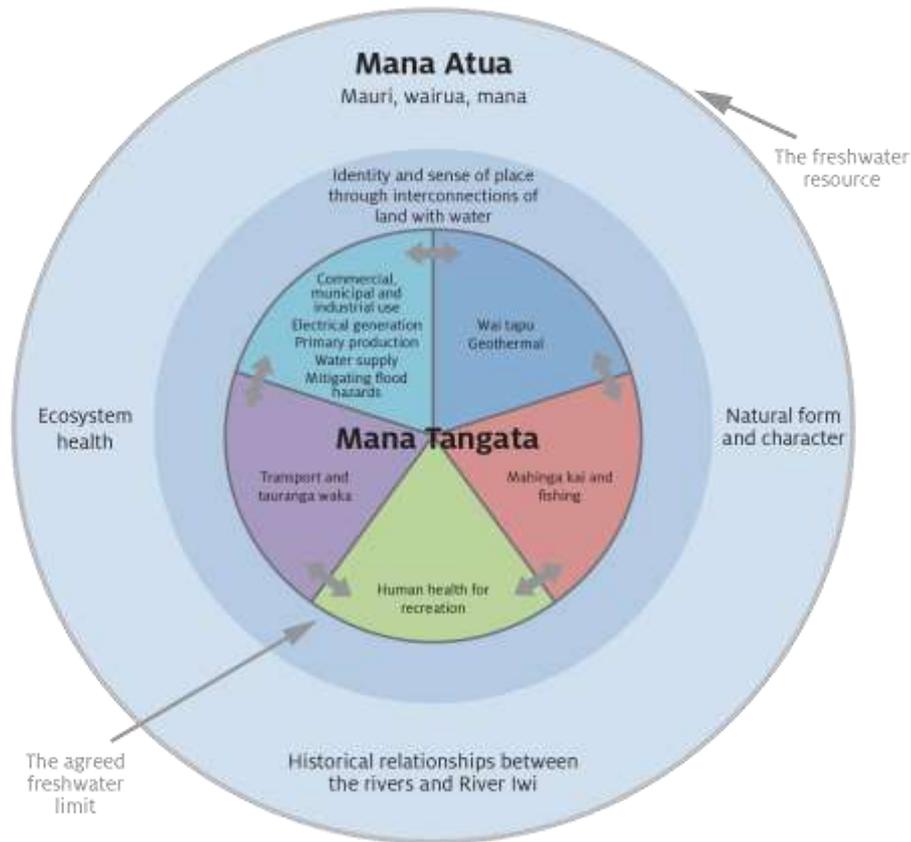
Values can be thought of in terms of Mana Atua and Mana Tangata, which represent Te Mana o te Wai.<sup>3</sup> Mana Atua represents the intrinsic values of water including the mauri (the principle of life force), wairua (the principle of spiritual dimension) and inherent mana (the principle of prestige, authority) of the water and its ecosystems in their natural state. Mana Tangata refers to values of water arising from its use by people for economic, social, spiritual and cultural purposes. Mana Atua and Mana Tangata values encompass past, present and future.

A strong sense of identity and connection with land and water (hononga ki te wai, hononga ki te whenua) is apparent through the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* and the many values associated with the rivers. This is represented in the figure below as a unifying value that provides an interface between the Mana Atua and Mana Tangata values.

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<sup>2</sup> The Vision and Strategy is intended by Parliament to be the primary direction setting document for the Waikato River and activities within its catchment affecting the Waikato River. Values and uses are intrinsic to, and embedded in the Vision and Strategy.

<sup>3</sup> The *National Policy Statement for Freshwater Management 2014* states that the aggregation of a range of community and tangata whenua values, and the ability of fresh water to provide for them over time, recognises the national significance of fresh water and Te Mana o te Wai.



### 5.3 Hononga ki te wai, hononga ki te whenua - Identity and sense of place through the interconnections of land with water

- The rivers contribute to a sense of community and sustaining community wellbeing.
- The rivers are an important part of whānau/family life, holding nostalgic feelings and memories and having deep cultural and historical significance.
- 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. The river is not separate from the people but part of the people, “Ko au te awa, ko te awa ko au” (I am the river and the river is me).
- The rivers are a shared responsibility, needing collective stewardship: kaitiakitanga – working together to restore the rivers. There is also an important intergenerational equity concept within kaitiakitanga.
- Mahitahi (collaborative work) encourages us all to work together to achieve common goals.

### 5.4 Mana Atua – Intrinsic values

**Ko te whakapapa o ngā iwi ki ōna awa tūpuna / Historical relationships between the rivers and River Iwi**

**Ko ngā kōrero o neherā / History**

<p>Each River Iwi has their own unique and intergenerational relationship with the rivers.</p>	<ul style="list-style-type: none"> <li>• The rivers have always been seen as taonga (treasures) to all River Iwi.</li> <li>• The rivers have always given River Iwi a strong sense of identity and connection with the land and water.</li> <li>• Rivers were used holistically; River Iwi understood the</li> </ul>
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	<p>functional relationships with and between all parts of the rivers, spiritually and physically.</p> <ul style="list-style-type: none"> <li>• Iwi strive to maintain and restore these relationships despite the modification and destruction that has occurred through different types of development along the rivers.</li> </ul>
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### **Ko te hauora me te mauri o te wai / The health and mauri of water**

#### Ecosystem health

<p>The Waikato and Waipa catchments support resilient freshwater ecosystems and healthy freshwater populations of indigenous plants and animals.</p>	<ul style="list-style-type: none"> <li>• Clean fresh water restores and protects aquatic native vegetation to provide habitat and food for native aquatic species and for human activities or needs, including swimming and drinking.</li> <li>• Clean fresh water restores and protects macroinvertebrate communities for their intrinsic value and as a food source for native fish, native birds and introduced game species.</li> <li>• Clean fresh water supports native freshwater fish species.</li> <li>• Wetlands and floodplains provide water purification, refuge, feeding and breeding habitat for aquatic species, habitat for water fowl and other ecosystem services such as flood attenuation.</li> <li>• Fresh water contributes to unique habitats including peat lakes, shallow riverine lakes and karst formations which all support unique biodiversity.</li> <li>• Rivers and adjacent riparian margins have value as ecological corridors.</li> </ul>
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### **Ko te hauora me te mauri o te taiao / The health and mauri of the environment**

#### Natural form and character

<p>Retain the integrity of the rivers within the landscape and its aesthetic features and natural qualities for people to enjoy.</p>	<ul style="list-style-type: none"> <li>• The rivers have amenity and naturalness values, including native vegetation, undeveloped stretches, and significant sites.</li> <li>• People are able to enjoy the natural environment; it contributes to their health and wellbeing.</li> <li>• The rivers are an ecological and cultural corridor.</li> <li>• The rivers as a whole living entity.</li> </ul>
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## **5.5 Mana Tangata – Use values**

### **Ko ngā wai tapu / Sacred waters**

#### Wai tapu

<p>Area of water body set aside for spiritual activities that support spiritual, cultural and physical wellbeing.</p>	<ul style="list-style-type: none"> <li>• The rivers are a place for sacred rituals, wairua, healing, spiritual nurturing and cleansing.</li> <li>• The rivers provide for cultural and heritage practices and cultural wellbeing, particularly at significant sites.</li> </ul>
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### **Ngāwhā / Geothermal**

#### Geothermal

<p>A valued resource that is naturally gifted to sustain certain activities (meeting spiritual and physical</p>	<ul style="list-style-type: none"> <li>• Geothermal areas and their various resources were prized by tūpuna (ancestors) for their many uses and are still valued and used today.</li> <li>• Geothermal areas of the river have natural form and character, and unique flora found only in the geothermal</li> </ul>
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needs).	<p>environment.</p> <ul style="list-style-type: none"> <li>• Geothermal areas are a special microclimate.</li> </ul>
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### **Ko ngā wāhi mahinga kai / Food gathering, places of food**

#### Mahinga kai

<p>The ability to access the Waikato and Waipa and their tributaries to gather sufficient quantities of kai (food) that is safe to eat and meets the social and spiritual needs of their stakeholders.</p>	<ul style="list-style-type: none"> <li>• The rivers provide for freshwater native species, native vegetation, and habitat for native animals.</li> <li>• The rivers provide for freshwater game and introduced kai species.</li> <li>• The rivers provide for cultural wellbeing, knowledge transfer, intergenerational harvest, obligations of manaakitanga (to give hospitality to, respect, generosity and care for others) and cultural opportunities, particularly at significant sites.</li> <li>• The rivers should be safe to take food from, both fisheries and kai.</li> <li>• The rivers support aquatic life, healthy biodiversity, ecosystem services, flora and fauna and biodiversity benefits for all.</li> <li>• The rivers are a corridor.</li> <li>• The rivers provide resources available for use which could be managed in a sustainable way.</li> <li>• The rivers provide for recreation needs and for social wellbeing.</li> </ul>
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### **Ko te hauora me te mauri o ngā tāngata / The health and mauri of the people**

#### Human health for recreation

<p>The rivers are a place to swim and undertake recreation activities in an environment that poses minimal risk to health.</p>	<ul style="list-style-type: none"> <li>• The rivers provide for recreational use and social needs, are widely used by the community, and are a place to relax, play, exercise and have an active lifestyle.</li> <li>• An important value for the rivers is cleanliness; the rivers should be safe for people to swim in.</li> <li>• The rivers provide resources available for use which could be managed in a sustainable way.</li> <li>• The rivers provide for recreation needs and for social wellbeing.</li> </ul>
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### **He urungi / Navigation**

#### Transport and tauranga waka

<p>All communities can use the rivers to pilot their vehicles and waka and navigate to their destinations.</p>	<ul style="list-style-type: none"> <li>• The rivers provide for recreational use (navigation), and sporting opportunities.</li> <li>• The rivers are a corridor, mode of transport and mode of communication.</li> <li>• The rivers provide for culture and heritage, cultural wellbeing, and social wellbeing, particularly at significant sites.</li> </ul>
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### **Ko ngā mahi māra me ngā mahi ahu matua / Cultivation and primary production**

#### Primary production

<p>The rivers support regionally and nationally significant primary production in the catchment (agricultural, horticultural, forestry). These industries contribute to the</p>	<ul style="list-style-type: none"> <li>• The rivers support a wide variety of primary production in the catchment, including dairy, meat, wool, horticulture and forestry.</li> <li>• Due to the economies of scale of these industries, other service sectors, such as agritech, aviation and manufacturing, are able to operate.</li> <li>• These industries combined contribute significantly to regional and national GDP, exports, food production and employment.</li> </ul>
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<p>economic, social and cultural wellbeing of people and communities, and are the major component of wealth creation within the region. These industries and associated primary production also support other industries and communities within rural and urban settings.</p>	<ul style="list-style-type: none"> <li>• The rivers and the surrounding land offer unique opportunities for many communities and industries to operate, contributing to the lifestyle and sense of community, pride and culture in rural Waikato.</li> </ul>
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### **Ko ngā hapori wai Māori / Municipal and domestic water supply**

#### Water supply

<p>The rivers provide for community water supply, municipal supply, drinkable broader water supply and health.</p>	<ul style="list-style-type: none"> <li>• The catchments' surface and subsurface water is of a quality that can be effectively treated to meet appropriate health standards for both potable and non-potable uses.</li> </ul>
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### **Ko ngā āu putea / Economic or commercial development**

#### Commercial, municipal and industrial use

<p>The rivers provide economic opportunities to people, businesses and industries.</p>	<p>Fresh water is used for industrial and municipal processes, which rely on the assimilative capacity for discharges to surface water bodies. In addition:</p> <ul style="list-style-type: none"> <li>• Provide for economic wellbeing, financial and economic contribution, individual businesses and the community and the vibrancy of small towns. They are working rivers; they create wealth.</li> <li>• Those industries are important to the monetary economy of Waikato region, enabling a positive brand to promote to overseas markets.</li> <li>• The rivers provide for domestic and international tourism. Promotion of a clean, green image attracts international and domestic visitors.</li> <li>• The rivers provide assimilative capacity for wastewater disposal, flood and stormwater, and ecosystem services through community schemes or on site disposal.</li> </ul>
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#### Electricity generation

<p>The river provides for reliable, renewable hydro and geothermal energy sources and thermal generation, securing national self-reliance and resilience. New Zealand's social and economic wellbeing are dependent on a secure, cost-effective</p>	<ul style="list-style-type: none"> <li>• Waikato hydro scheme extends over 186km, comprising Lake Taupō storage, dams, lakes, and power stations. Tongariro Power scheme adds 20 per cent to natural inflows to Lake Taupō.</li> <li>• Huntly Power Station's role in the New Zealand electricity system is pivotal, particularly when weather dependent renewable generation is not available. Fresh water is used for cooling and process water.</li> <li>• Geothermal power stations located on multiple geothermal systems use fresh water for cooling, process water and drilling.</li> </ul>
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<p>electricity supply system. Renewable energy contributes to our international competitive advantage. Electricity also contributes to the health and safety of people and communities.</p>	
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Mitigating flood hazards

<p>Flood management systems protect land used and inhabited by people.</p>	<ul style="list-style-type: none"> <li>• River engineering, including stopbanks and diversions, protect land and infrastructure from damage by flooding.</li> </ul>
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## 6 Attributes

Attributes are measurable characteristics of fresh water that support particular values. Attributes are part of the process set out by the *National Policy Statement for Freshwater Management 2014*.

The NPS-FM 2014 National Objectives Framework provides a framework of attributes to assess the quality of water using numeric and narrative attribute states. The attributes describe two compulsory values – ecosystem health and human health for recreation – and provide national bottom lines and in the case of *E.coli*, a minimum acceptable state for swimming. The numeric values are graded from A to D, allowing water quality to be readily assessed using the national standards.

The TLG has been providing the CSG with information on attributes. An attributes expert panel was specifically tasked with recommending attributes to the CSG. Most of the attributes the TLG advised the CSG to adopt were also contained in the National Objectives Framework. However, they developed a Waikato-specific attribute for clarity, reflecting the desired values of swimming and ecosystem health (Ko te hauora me te mauri o te wai / The health and mauri of water).

At a series of events and in an online survey between March and May 2015, the CSG asked for community and stakeholder feedback on a draft list of attributes. The CSG's list of attributes (confirmed at their July 2015 workshop). Refer to Table 1Table 6.

**Table 6: List of attributes**

Value	Attribute	Apply to
Human Health	<i>E. coli</i>	Waikato and Waipa Rivers and tributaries, lakes
	Clarity	Waikato and Waipa Rivers and tributaries, lakes
	Cyanobacteria (planktonic)	Lakes only
Ecosystem Health	Phytoplankton	Lakes and Waikato River
	Total Nitrogen	Waikato River and lakes
	Total Phosphorus	Waikato River and lakes
	Nitrate	Waikato and Waipa Rivers and tributaries
	Ammonia	Waikato and Waipa Rivers and tributaries
Mahinga kai	<i>E. coli</i>	Waikato and Waipa Rivers and tributaries
	Cyanobacteria (planktonic)	Lakes only

The attribute set is tightly linked to nitrogen, phosphorus, bacteria and sediment (the scope of the Healthy Rivers: Plan for Change/ Wai Ora: He Rautaki Whakapaipai project). Limits will be set for these attributes.

CSG discussed extending the Total Nitrogen (TN) and Total Phosphorus (TP) attributes to tributaries. At the national scale the bands for TN and TP were developed to relate to levels of eutrophication in lakes. The TLG has recommended extending the use of these bands to the Waikato River main stem, a lake-fed river with impoundments that increase residence time and provide the opportunity for algal growth. TN and TP are not relevant for tributaries and the Waipa due to their short residence times. However, within an FMU it is possible to identify which tributary catchments are “hot-spots” for contributing nitrogen and phosphorus loads to the main stem. This knowledge was incorporated into the scenario modelling so as to indicate where mitigation actions would be required to achieve the desired attribute states with respect to TN and TP in the main stem. Therefore the TLG recommended that TN and TP levels in tributaries be used as indicators, but not attributes.

For the details of the attribute states band thresholds see Appendix 3.

Other indicators of ecosystem health, such as Macroinvertebrate Community Index, can indicate progress towards objectives for fresh water. Waikato Regional Council currently monitors these, and the CSG wishes to see this monitoring continue. The Waikato River Authority is also developing a ‘report card’ on progress being made towards achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*.

The wider social, economic, environmental and cultural effects of possible limits and policies were assessed through the scenario modelling and integrated assessment. The indicators chosen to be part of this assessment show impacts on the whole range of the community’s values.

# 7 Assessing changes and their impacts

Possible changes and their impacts were assessed using scenario modelling. In the Healthy Rivers Wai Ora project 'scenarios' refer to possible futures. Scenarios provide information to consider when setting attribute levels for each freshwater management unit (FMU), and timeframes for achieving them (limits and targets). Refer to Section 1.5 for a picture of this process.

The scenarios in this project were focused on water quality outcomes in the rivers, and what would need to be done on the land to achieve those outcomes. Lakes were not included in the scenario modelling.

## How the scenarios were defined

The CSG operated on the understanding that the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is the ultimate goal or desired 'scenario'. The National Policy Statement, the Regional Policy Statement and Iwi Management Plans are also relevant; however the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is the primary direction-setting document. The task was then to set limits and targets that would achieve the water quality elements of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*. Central to this was to define attributes that would deliver on the 'safe to take food from' and 'swimmable' objectives of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* (i.e. going further than the 'wadeable' national bottom line standards in the National Objectives Framework of the National Policy Statement). In light of this, scenarios that would not deliver on the objectives of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* were not viewed as alternative end points, but rather as potential steps on the way.

Using the attributes recommended by the TLG, the CSG deliberated over a series of meetings to define desired water quality bands for each FMU. Meetings were also held with river iwi staff and WRA staff to understand their perspectives on the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in terms of water quality. All of this information was pulled together into a suite of strawman narrative scenarios for presentation and discussion by the CSG.

CSG discussion focused on water quality in the tributaries as well as in the main stem of the rivers. River iwi also confirmed that the tributaries were important in terms of iwi members' relationship with water, food gathering and other activities. Feedback from river iwi staff was that 'averaging' across an FMU (where some sites degraded and others improved) was not consistent with their interpretation of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*. For this reason, CSG were mindful that water quality should be restored and protected at every site that is currently monitored. Information was provided by the TLG allowing CSG to discuss the level and degree of change required by each scenario for each attribute across the four contaminants in each FMU area.

During the discussion with river iwi staff and WRA staff, the desire had also been expressed to include a scenario describing the water quality that might have existed when Kiingi Taawhiao looked at the river in 1863 and composed his maimai aroha. The TLG advised that an '1863 scenario' could be developed using the scenario model, supported by other lines of evidence (such as water quality data from native bush catchments). It was agreed by CSG that this '1863 scenario' and the baseline scenario required for Section 32 RMA analysis (but not an acceptable option under the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*) should be modelled at some point in the process.

### **First round modelling scenarios**

The scenarios for the first round of modelling were defined and approved by the CSG (see – end of this section). In summary they were:

- 1st scenario – Restore to a high level
- 2nd scenario - Protect and restore to at least reach minimum acceptable standard (above national bottom lines) for all attributes
- 3rd scenario - Protect and some restoring but not fully swimmable
- 4th scenario - Protect but not restore ('hold the line').

It was agreed that if the 1863 modelling was the next priority, while the baseline (status quo) report required for Section 32 RMA could be left until 2016.

### **Modelling a step-wise achievement of restoring to a high level of water quality**

Modelling a step-wise achievement of restoring to a high level of water quality

Once the first set of modelling results came back to the CSG, there was an opportunity to explore and discuss the findings and identify appropriate scenarios for Round 2 modelling. The CSG remained committed to achieving the water quality defined in Scenario 1, but requested the TLG to model the steps of 10%, 25%, 50% and 75% of the way from the current situation to Scenario 1 (taking into account groundwater N to come). This reflected discussion with river iwi staff and WRA staff indicating that achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* could be considered an inter-generational goal, that would require clear and steady progress to be made over time.

The CSG had also received information from the TLG on nutrient dynamics in the river. This led to the request that the TLG explore the option of 'smart scenarios' that would target certain contaminants earlier than others, rather than the stepped %age approach described above. This modelling indicated that no particular advantage was gained through the 'smart scenarios', as mitigations to address one contaminant tended to also achieve gains with the others.

The TLG therefore carried out the full regional economic analysis and Integrated Assessment on the steps towards the original Scenario 1.

**Table 7: CSG agreed scenarios for the first round of modelling (CSG12)**

No	Narrative description	Attributes			
		E. coli	Clarity	Algae (Chlorophyll)	Nutrients
1 <sup>st</sup>	<p><b>Substantial improvement in water quality for swimming, taking food and healthy biodiversity</b></p> <p>Means: Swimmable in all seasons for microbes and clarity. Water quality supports ecological health. Some improvement in all parameters.</p> <p>[Represents CSG suggestion of E. coli to B, TP to minimum B, all others up one band – ‘Restore’]</p>	<p><b>Upper</b> Main stem remains A. Tributaries min B at 95%ile</p> <p><b>Middle</b> Main stem A at Narrows at 95%ile; Horotiu and tributaries B</p> <p><b>Lower and Waipa</b> Main stem and tributaries B at 95%ile</p>	<p><b>Upper</b> Main stem A to Waipapa, tributaries go up 1 band</p> <p><b>Middle</b> Main stem B, tributaries go up 1 band</p> <p><b>Waipa</b> Upper stem B, lower stem C, tributaries go up 1 band</p> <p><b>Lower Waikato</b> C in main stem and tributaries</p>	<p><b>Upper</b> A sites improve. B sites to A, C sites to B.</p> <p><b>Middle</b> B for median, A for max.</p> <p><b>Lower</b> B for median and max; Huntly moves to B for med and A for max.</p>	<p><b>TP</b> Maintain where already A, raise to B for rest of river.</p> <p><b>TN</b> Improve where already A, all sites to Waipapa to A, rest of river to B.</p> <p><b>Ammonium and nitrate</b> Improve where already A, other sites go up 1 band.</p>
2 <sup>nd</sup>	<p><b>Focus on raising to acceptable standard without trying to restore other sites or attributes</b></p> <p>Means: No degradation where currently A, B or C band. Focus on lifting any D to C; lift E. coli to above MAS for swimming throughout.</p> <p>[‘Protect’ + at least ‘restoring’ to reach minimum acceptable standard for all attributes]</p>	<p><b>No further degradation at any site, and minimum of:</b></p> <p><b>Upper</b> Raise all tributaries to B at 95%ile.</p> <p><b>Middle</b> Raise Horotiu and all tributaries to B at 95%ile.</p> <p><b>Lower</b> Raise main stem and all tributaries to B at 95%ile.</p> <p><b>Waipa</b> Raise main stem and all tributaries to B at 95%ile.</p>	<p><b>No further degradation at any site, and minimum of C throughout:</b></p> <p><b>Upper</b> Main stem B, tributaries C</p> <p><b>Middle</b> Main stem and tributaries C</p> <p><b>Waipa</b> Maintain where currently B or C and lift to C where currently D.</p> <p><b>Lower</b> Raise main stem and all tributaries to C</p>	<p><b>No further degradation at any site.</b></p>	<p><b>TP</b> Maintain where already an A B or C, lift Lower river to C.</p> <p><b>TN</b> No further degradation.</p> <p><b>Nitrate N</b> No further degradation</p> <p><b>Ammonia</b> No further degradation.</p>
3 <sup>rd</sup>	<p><b>Some general improvement in water quality for swimming, taking food and healthy biodiversity</b></p>	<p><b>Upper</b> Tributaries B at 95%ile</p> <p><b>Middle</b> Narrows stays at A 95%ile</p>	<p><b>No further degradation at any site, and minimum of:</b></p> <p><b>Upper</b> Main stem B,</p>	<p><b>Upper</b> B, with no further degradation of A sites</p> <p><b>Middle</b></p>	<p><b>TP</b> Maintain where already an A or B Lift C sites in Upper and Middle to B</p>

No	Narrative description	Attributes			
		E. coli	Clarity	Algae (Chlorophyll)	Nutrients
	<p>Means: Some improvement across all attributes. Main stem suitable for swimming in Upper and Middle river, and in parts of Waipa but not Lower river. Lower, middle and some Waipa river tributaries wadeable but may not reach swimmable (B at 95%ile).</p> <p>['Protect' + some 'restoring' but not fully swimmable]</p>	<p>Horotiu gets to B at 95%ile Tributaries B at median but may not be B at 95%ile</p> <p><b>Lower</b> Tributaries min B at med. Main stem may not be B 95%ile.</p> <p><b>Waipa</b> Tributaries A at median, some are B at 95%ile.</p>	<p>all tributaries C</p> <p><b>Middle</b> Main stem B, tributaries C</p> <p><b>Waipa and Lower</b> Main stem and tributaries C</p>	<p>B for median and maximum</p> <p><b>Lower</b> C but no degradation at Huntly (currently a B for max).</p>	<p>and lift Lower river to C.</p> <p><b>TN</b> No further degradation; lift to a B for Middle river.</p> <p><b>Nitrate N</b> Lift C sites to a B.</p> <p><b>Ammonia</b> Lift median to a B.</p>
4 <sup>th</sup>	<p><b>No further degradation in spite of lags.</b></p> <p>Means: No drop in current water quality, in spite of projected extra nitrogen load currently in groundwater. ['Protect' but not 'restore']</p>	<p><b>All sites</b> Current state maintained throughout with no further degradation.</p>			

## 7.1 Economic scenario modelling

Different targets and limits regarding the level of contaminants in waterways within this catchment will have diverse impacts on economic outcomes observed throughout the greater Waikato region. Accordingly, a central contribution of the TLG to the Healthy Rivers Wai Ora project was the development and utilisation of an economic model to integrate diverse information such that the impacts associated with alternative limits and targets can be predicted.

The Healthy Rivers Wai Ora optimisation model uses the approach that certain pollutant concentration targets are set at locations across the catchment, and the model is tasked with determining how selected mitigations can best be deployed to meet these targets at least cost. These mitigations include changes in farming practices, management of hillslope and riparian areas, land use changes and point source abatement.

**Table 8: Key output from the economic model: regional impacts of the stepping-stone scenarios on change in value added (an economic indicator similar to regional GDP).**

Steps towards Scenario 1	10%	25%	50%	100%
Change in Value Added \$m	-101m	-164m	-221m	-622m
Loss of Value Added (%)	-0.6%	-0.9%	-1.3%	-3.6%

## 7.2 How the integrated assessment was used

The Integrated Assessment (IA) was a key input into the project, providing environmental, social, cultural and economic analysis on the impacts of the modelled scenarios. The IA used a set of indicators (known as the Integrated Assessment framework) against which the effects of the scenario modelling were assessed. This information was used by the Collaborative Stakeholder Group (CSG) to inform discussion about potential policy approaches. It helped guide CSG on how the scenario modelling outputs could be used to inform policy and methods, and the scope and pace of change for implementation. The IA also gave CSG an insight into any unintended consequences and opportunities for co-benefit.

The environmental, social and economic indicators were developed through a series of CSG workshops from February to April 2015. These indicators incorporated the CSG's Policy Selection Criteria, the draft indicators identified at earlier CSG workshops, the Waikato Progress Indicators, and the indicators being used to develop the Waikato River Authority report card. The Mātauranga Māori (cultural) indicators were developed in a separate process that included a workshop with kaumātua for river iwi, and input through river iwi advisors.

The baseline report provides a reference from which to assess each of the indicators, based on the scenario modelling. A baseline of quantitative and qualitative data and trends were prepared for each of the indicators. Both published and unpublished sources were included to provide the most up-to-date information.

An expert panel was used to carry out the assessment, with support from a sub-group of CSG members. The purpose of the expert panel workshops was to bring together a range of expertise and knowledge to evaluate the results of the scenario modelling against the baseline information. The panel produced a narrative for each indicator and a trend, showing direction of change (either positive, negative or no change) and magnitude (i.e. a minor or more significant effect/change). The requirement was for the panel to use data where possible but due to timeframe constraints, to generally provide best professional judgement.

The IA comprises three documents; the baseline report, the integrated assessment for round one scenario modelling and the integrated assessment for steps to achieve scenario one (done as part of round two scenario modelling). A booklet summarising the IA was used for public engagement, and the full reports used for CSG deliberations.

### Evaluating the scenarios

Having received the results of all of the modelling and the Integrated Assessment, and given the significance of the economic and social impacts of the changes required to achieve Scenario 1, the CSG discussed whether Scenario 2 could be considered as achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, albeit to a lower level of 'restoration' than Scenario 1. The CSG remained committed to Scenario 1, rather than Scenario 2, considering that it gave effect to the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*

more fully by representing water quality restoration everywhere, even where minimum standards were already met. They also noted that an even higher standard of water quality could have been set, as represented by the 1863 scenario and the expressed desire for drinkable water quality in certain Iwi Management Plans. Therefore they saw Scenario 1 as being appropriate, given the range of views, and when seen in the 80 year timeframe for the restoration effort.

The CSG agreed an 80 year timeframe for full achievement of the attribute limits in Scenario 1, but with a set of timelines for achieving defined steps along the way (as described in section 10, Figure 6).

## **8 Summary of stakeholder engagement**

The CSG was the central point of engagement for the project with the wider community and had a central role to play in implementing the stakeholder engagement strategy.

There were two intensive engagement periods in March and April 2015, and October and November 2015. The intensive engagement periods each began with a large stakeholder forum. These were inclusive events involving a wide pool of stakeholders, and aimed at understanding the issues from all sides and generating workable solutions. There was a large volume of stakeholder feedback, which was often very detailed. Reports of the feedback from these engagement periods, including both analysed and verbatim feedback, were put on the public website so that stakeholders could see the compiled feedback.

The intensive engagement periods were held at times when the CSG wanted to 'check in' with the public on key matters they were progressing.

CSG members ran workshops, and communicated with the stakeholders they represent throughout the two years they have been working, including public engagement about the overall framework in October/November 2015. In February 2016, the CSG did a check-in with their sectors about the practicalities of some of the group's ideas.

Feedback from these engagement periods was used to confirm and refine the outputs of the CSG. As well as intensive engagement periods and sector workshops, the project had a website page, newsletters and media releases to update the community on progress.

## **9 Policy selection criteria**

The CSG developed a set of criteria they have used to help them select policy.

The policy selection criteria are filters the CSG have used to help select the policy options to incorporate into the plan change they are recommending. 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. More than 200 people were involved in discussion on the CSG's draft policy selection criteria at a stakeholder forum in October 2014.

The selection criteria are in addition to requirements under the Resource Management Act (section 32) for new proposals to be examined for their appropriateness in achieving the purpose of the RMA, and the policies and methods of those proposals to be examined for their efficiency, effectiveness and risk.

**Figure 5: Collaborative Stakeholder Group's policy selection criteria**

<p><b>Gives effect to Te Ture Whaimana/the Vision and Strategy</b></p> <p>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?</p> <p><b>RMA (including the NPS Freshwater Management)</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• comply with the RMA (including the purpose and principles of the Act)?</li> <li>• take account of existing policy frameworks?</li> <li>• achieve the range of values identified?</li> </ul>	
<p><b>Provides for aspirations of River iwi</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• provide for them to retain and use their taonga in accordance with their tikanga and kawa?</li> <li>• give effect to their environmental, economic, cultural and social relationships with land and water?</li> </ul>	<p><b>Gives positive social and community benefits</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• minimise social disruption and provide social benefit?</li> <li>• enhance people's use of the river?</li> <li>• take account of unique features and benefits?</li> <li>• result in outcomes people can identify with, own and feel proud of?</li> </ul>
<p><b>Acceptable to the wider community</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• achieve sound principles for allocation?</li> <li>• recognise efforts already made?</li> <li>• exhibit proportionality (those contributing to the problem contribute to the solution)?</li> </ul>	<p><b>Realistic to implement, monitor and enforce</b></p> <p>Is the policy:</p> <ul style="list-style-type: none"> <li>• able to be measured, monitored and reported?</li> <li>• implementable and technically feasible?</li> <li>• administratively efficient?</li> </ul>
<p><b>Optimises environmental, social and economic outcomes</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• aim for cost-effective solutions?</li> <li>• provide confidence and clarity for current and future investment?</li> <li>• provide realistic timeframes for change?</li> </ul>	<p><b>Allows for flexibility and intergenerational land use</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• foster innovation?</li> <li>• encourage positive actions being taken?</li> <li>• allow for change and review as new information and issues arise?</li> <li>• provide flexibility of future land use (including Treaty settlements land and multiple Māori owned land)?</li> <li>• take account of complexity and difference between farming systems and farm enterprises?</li> </ul>
<p><b>Achieves the restoration and protection of native habitats and biodiversity</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• support resilient freshwater ecosystems?</li> <li>• support interconnectedness and connectivity between land and water?</li> <li>• support healthy populations of indigenous plants and animals?</li> </ul>	<p><b>Supported by clear evidence</b></p> <p>Does the policy:</p> <ul style="list-style-type: none"> <li>• take an evidence-based and knowledge-based approach (including Mātauranga Māori)?</li> <li>• transparently show the costs for meeting the outcomes?</li> <li>• prioritise efforts to achieve catchment solutions?</li> <li>• set transparent limits and definitions?</li> </ul>

# Part C: Policy Framework Recommendations

Part C sets out the CSG's recommendations on the overall policy framework to guide the drafting of Plan Change 1 and the associated section 32 document that sets out alternatives, and their costs and benefits. Detailed drafting and some further refinements will be worked on by the CSG throughout March and April 2016.

Part C has two key parts.

The first is the CSG's recommendations about the project outcomes to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, which will become the water quality limits and objectives of Plan Change 1.

The second is the CSG's recommendations about the changes they expect to see on the land to start to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, which will become the policies, methods and rules of Plan Change 1. This is preceded by some background in Section 12 about the current policy and how Plan Change 1 will fit into the existing Regional Plan. Sections 13 to 18 set out the intent and application of the policies, methods and rules.

## 10 Project outcomes

During their initial workshops in 2014, the CSG drafted the following statement to sum up what they were aiming to achieve:

*To come up with limits, timelines and practical options for managing contaminants and discharges into the Waikato and Waipa catchments to ensure our rivers and lakes are safe to swim in and take food from, support healthy biodiversity and provide for social, economic and cultural wellbeing.*

The CSG's overall description of the project is:

- Achieve *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in 80 years – safe to swim in all seasons across a range of flows, safe to harvest kai for eating, able to support abundant and diverse freshwater fisheries, flora and fauna. Restored water quality is protected for future generations
- Restoration and protection achieved in a series of staged improvements over the next 80 years.
- The staging of actions to restore the Rivers must take into account contaminant load to come, before water quality improvements can be seen.

The overarching outcomes for the project are:

### **Outcome 1: Mana Atua – protecting and restoring intrinsic values**

Within a generation, the health and wellbeing of the rivers and other water bodies within the catchment is improved, to enhance natural qualities and sustain abundant indigenous and other valued species and their habitats.

### **Outcome 2: Mana Tangata – protecting and restoring tangata whenua values**

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

- tangata whenua connection with the rivers and other water bodies in the catchment is strengthened
- improvement in the rivers' water quality increases the spiritual and physical wellbeing of iwi and their tribal and cultural identity.

Note: There will be a CSG subgroup working on provisions to enable flexibility for the development of Māori owned land.

### **Outcome 3: Mana tangata – protecting and restoring human values**

The rivers continue to support a range of human uses for recreation, mahinga kai and fishing, electricity generation, primary production, water supply, commercial, municipal and industrial use, mitigating flood hazards, geothermal, wai tapu and transport and tauranga waka.

Note: For more details refer to the CSG full list of values and uses for the Waikato and Waipa Rivers.

## **11 Desired future state for water quality**

The desired future state of water quality in the Waikato and Waipa River catchments is full achievement of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*. CSG have worked with River iwi and the TLG to understand what this means for attribute states in a numerical sense. Reaching full achievement of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is an inter-generational goal the whole community needs to work towards. Achieving this goal involves a journey that requires preparation. The first stage of this journey will be Plan Change 1 to the Waikato Regional Plan in 2016.

Modelling results show that the steps get progressively harder, with innovation and considerable changes on the land needed to fully achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*.

Having received the results of all of the modelling and the Integrated Assessment, and given the significance of the economic and social impacts of the changes required to achieve Scenario 1, the CSG agreed to an 80 year timeframe for full achievement of the attribute limits in Scenario 1, but with a set of timelines for achieving defined steps along the way.

The CSG has developed a policy framework around achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in stages, within set periods of time, with the ultimate goal of achieving water quality consistent with the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in 80 years.

**Figure 6: A policy framework around achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* in stages**



The CSG has tasked the TLG to report back with a technically robust definition of how these steps are described and what interim targets could be included in the policy. This will consider the complications that arise due to the time lag between certain actions on the land and responses in the observed water quality. The most obvious of these relates to nitrogen, given the long travel times through the groundwater observed particularly in the Upper Waikato.

These principles are reflected below, both in the long term water quality outcomes and staged approach to achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*, as well as the long term numerical water quality limits.

The outcomes and objectives reflect the policy selection criteria which are relevant to setting objectives, which are:

- gives effect to Te Ture Whaimana/the Vision and Strategy
- RMA (including the NPS Freshwater Management)
- provides for aspirations of River iwi
- gives positive social and community benefits
- achieves the restoration and protection of native habitats and biodiversity

Both the outcomes and the objectives will form part of Plan Change 1 when formally notified.

## 12 Objectives

The NPS-FM 2014 requires councils to set freshwater objectives numerically for the attributes contained in the NPS-FM 2014 Appendix 2, numerically where practicable for other attributes that a council develops, otherwise in narrative terms. The *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* is the primary direction setting document for the Waikato River, and so while the NPS-FM 2014 process has been used, the requirements for improvements have been directed by the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*.

There are three groups of objectives that are likely to be part of Plan Change 1:

1. Objectives setting out long term numerical water quality  
The CSG, with the TLG's technical support, have developed a series of numerical objectives to be met in 80 years for river and lake water quality attributes. These are described below and listed in Appendix 4.
2. Objectives setting out short term narrative and numerical objectives to be met over the life of Plan Change 1. The TLG is in the process of advising the CSG about how to define these.
3. Objectives for specific topics, that may be defined as outcomes for the long or short term

These include narrative objectives for:

- avoiding increases in contaminants discharges
- Whangamarino wetland
- providing for the development of land returned under Te Tiriti O Waitangi settlements and multiple owned Māori land.
- transition to new approach towards allocation
- encouraging and incentivising early adoption
- link between Plan Change 1 and management of the built environment

## 12.1 Long term numerical river and lake water quality objectives

The numerical water quality objectives for the rivers reflect the following principles, which are important parts of the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* as applied to the Healthy Rivers Wai Ora context:

- Scenario 1, developed by the CSG and modelled by the TLG, gives effect to the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* by representing water quality restoration everywhere, even where minimum swimming standards were already met. This scenario requires water quality in different areas of the river to improve to reach different numeric attribute states, expressed as bands. This means all monitoring sites that are not already excellent need to improve.
- Overall, the rivers are degraded and should not have to receive any more degradation. This means no monitoring sites should degrade.
- Water quality is at different levels at different monitoring sites through the river catchments. Some parts of the rivers are currently of 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.

These principles are reflected in the attribute levels below in that:

- All monitoring sites which are of poorer water quality than the desired level expressed in Scenario 1 need to improve to the meet the numerical requirements of the desired band by 2096.
- Monitoring sites which are of higher water quality than the minimum level of the desired band must remain at their current state (2010-2014), even though that is of better quality than what is required for that FMU in Scenario 1.

Although the lakes were not part of the scenario modelling, the TLG utilised available current state data, NPS-FM 2014 attribute bands and the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* principles above to develop the following requirements for lake improvement:

- No monitoring sites shall decline.

- All monitoring sites shall meet minimum requirements as per NPS-FM 2014 by 2096.

These requirements reflect the type of lakes in the Waikato and Waipa catchments, and the variety of other factors which are all part of the inter-generational change to improve water quality in these ecosystems.

The CSG accepted the TLG guidance on this matter, with the proviso that in lakes where it is possible to achieve water quality higher than minimum requirements, this should be pursued.

See Appendix 4 for the long term numerical water quality limits for each FMU.

## **12.2 Short term numerical and narrative freshwater objectives**

The intent of short term objectives are to state the water quality outcomes the CSG expect to see in the 10 to 15 years after Plan Change 1 is publicly notified, so that the community can be confident that progress will be tracked.

Note: These short term objectives are under development by the CSG, guided by the TLG.

## **12.3 Objectives for specific topics**

The CSG are considering whether to include the following types of objectives.

### **12.3.1 Avoid increases in contaminant discharges**

The intent of the objective will be to avoid and reduce discharges through the management of land use and discharges for water quality outcomes.

### **12.3.2 Whangamarino wetland objectives**

The intent of the short and long term objectives for Whangamarino, with appropriate timeframes still to be defined by CSG, is to:

- halt and take action to reverse decline in water quality in the catchment of Whangamarino Wetland
- ensure no further loss or degradation of the remaining areas of high value bog ecosystems within Whangamarino Wetland.
- ensure that water quality in the rivers flowing through Whangamarino is restored
- ensure Whangamarino Wetland supports the full range of healthy, functioning wetland types and provides a source of traditional mahinga kai.

### **12.3.3 Narrative objective providing for the development of land returned under Te Tiriti O Waitangi settlements and multiple owned Māori land**

Note: There will be a CSG sub-group working on possible provisions to enable flexibility for the development of Māori Owned Land, including consideration of the associated objective, policies and methods. CSG will consider any recommendations from the sub-group in due course.

### **12.3.4 Transition towards property level allocation of contaminant discharges**

The intent of this objective will be clarity to readers that a future outcome is a property level allocation of contaminant discharges, with Plan Change 1 setting out a transition toward this.

### **12.3.5 Implementation of provisions to empower those who are proactive**

The intent of this objective will be:

- encouraging and motivating actions that go beyond compliance and early uptake of mitigations to reduce effects on water quality
- providing an enabling environment for those who respond proactively to future requirements.

### **12.3.6 Link between Plan Change 1 and management of the built environment**

Note: This short term objective is under development by the CSG.

## **13 Existing policy framework**

### **13.1 Regulating effects of discharges under the Resource Management Act**

In the current Waikato Regional Plan, diffuse or non-point source discharges of nitrogen and phosphorus, bacteria and sediment are largely managed through non-regulatory tools such as providing information, extension, and financial incentives. Regulatory exceptions to managing non-point source contaminant discharges have tended to focus on a defined set of land management practices, for example plantation forestry harvesting, disposal of dairy shed, chicken and piggery effluent, earthworks, cultivation and fertiliser application.

The presumption in section 15(1)(b) of the RMA requires that discharges to water, or to land where they may enter water, either require a resource consent or need to be explicitly permitted in a plan.

Plan Change 1 seeks to address this situation for the Waikato and Waipa catchments by controlling land use and its associated discharges through rules defining the activity status and conditions for non-point source discharges of nutrients, sediment and bacteria to land where they may reach water. These new rules will either specifically permit activities (such as the use of land for farming), or will require resource consent for the activity.

### **13.2 Plan Change 1 and how it will fit into the operative Waikato Regional Plan**

The change to the Waikato Regional Plan will require a standalone chapter. The RMA sets out the minimum aspects that must be included in a plan. These are objectives, policies and rules. Plan Change 1 will set these for nutrients (nitrogen and phosphorus), bacteria and sediment in the Waikato and Waipa River catchments.

In addition the plan change will include non-regulatory methods, and explanatory material such as introductory background information or explanations. Maps for catchment and sub-catchment boundaries will be included.

In order to comply with the NPS-FM 2014, the plan change will require:

- inclusion of limits and targets in water bodies.
- consequential changes to many parts of the plan.

As this project only encompasses nutrients, sediment and bacteria, the review of the entire Waikato Regional Plan will need to address other contaminants that are part of the National Objectives Framework of the NPS-FM 2014.

### **13.3 Consequential changes**

When only part of an RMA plan is reviewed, new provisions are added for some RMA topics or geographic areas. The new provisions sometimes impact on other parts of the plan, and minor changes to wording are needed to ensure the overall plan still works. Publicly notified RMA plan changes or variations contain a list of consequential changes to those parts of the plan that remain substantially intact.

### **13.4 Contents of Plan Change 1**

In summary, the following topics will be contained in Plan Change 1.

- Values
- Outcomes
  - These have been defined by the CSG as the overarching goals to achieve the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*
- Objectives
  - Objectives are written as outcome states required to enable regional values and priorities to be met.
  - Specific numerical objectives refer to each river reach or contaminant, and are written as specific, measurable, achievable and time-bound.
  - Narrative objectives refer to a description of what is to be achieved
- Policies
  - Policies are written as the course of action to achieve objectives.
- Methods
  - Methods are written to identify who will do what and by when.
  - Methods include non-regulatory methods and rules.

## **14 Overall policy approach**

In developing the overall policy approach the CSG made some key decisions. These are outlined in the section below.

### **14.1 Everyone needs to contribute**

Plan Change 1 will require everyone to contribute to taking action to meet desired community outcomes and values. Actions will not be the same for everyone. The overall policy approach acknowledges the differences between sectors and land in the catchment, and the policies and methods have been designed after consideration of what can be achieved by landholders and sectors in the first stage of achieving the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*.

## 14.2 Catchment-wide rules

Catchment-wide rules apply to practices, performance and or technologies that can be generally applied across catchment.

The CSG's overall policy approach will work in conjunction with existing catchment-wide rules including those that apply to the forestry sector. In addition, the CSG have developed new rules where there are practices and/or technologies that might lend themselves to rules generally applied in the Waikato and Waipa River catchments.

## 14.3 Staged approach

To recognise the scale of the effort needed to make enough change on the land to restore Waikato and Waipa Rivers water quality, the CSG has decided to take a staged approach. This means that successive regional plans from 2016 onwards will require changes on the land to reduce discharges of nitrogen, phosphorus, sediment and bacteria.

## 14.4 Property-level limits

Plan Change 1 will not contain rules that specify a numerical property level limit.

The CSG property limits/OVERSEER sub-group that met four times from September to November 2015 explored the idea of the plan change being able to set property-level limits. They looked at whether there was sufficient information to set different limits based on where a property is in the catchment, and concluded that this was a promising area to investigate and use in the next plan change.

Property-level modelling is one way to link actions required on the land to outcomes in the water. The CSG considered that of the four contaminants in their scope, nitrogen is the only one that can be readily modelled at a property scale and therefore could potentially be given a numerical property level limit (kilograms of nitrogen leached per year). However, the CSG considered that the models currently available do not account for the full range of mitigations that landholders could use to reduce nitrogen. The use of these models in a regulatory context is also complicated when new versions of the model are released, with different versions giving different results for the same input data.

There is also considerable technical uncertainty about the use of such farm-scale models as the OVERSEER nutrient management model to predict water quality changes that would result from property-scale reductions. For phosphorus this is due to site-specific flow paths and different degrees of connectivity of 'critical source areas' to waterways. For nitrogen, difficulties arise due to variable nitrogen lag times relating to groundwater storage and to spatially different attenuation factors between the land surface and the water.

The sub-group looking at this topic also considered that setting an accurate allocation of nitrogen at property level in order to meet a defined water quality limit would require a comprehensive benchmarked data set of current discharges within each sub-catchment. This could then be used to set numerical reductions at a property level. The group noted the intensive process used to benchmark properties in the Taupō catchment for Variation 5 and determined that this would be a considerable effort when extended to the entire Waikato and Waipa River catchments.

Cognisant of the technical limitations of the current OVERSEER model and the complexity with linking property-level limits to water quality targets in a river system, the CSG has concluded that all properties should make reductions in the short term, but

that setting a property-level number for nitrogen should be deferred until the next plan change, where there will be sufficient information available to allocate nitrogen. This will include property information about current nitrogen use as well as greater understanding about water quality effects of land use and activities in different parts of the catchment, which the TLG have described as spatial variability.

## 14.5 Property management (farm) plans

The approach for sediment, phosphorus and bacteria is to use the tailored property management planning approach to identify risk on a property and manage that risk.

The CSG wishes to see nitrogen reductions from landowners in each sector who are currently leaching very high amounts of nitrogen. The direction is for the highest nitrogen emitters to reduce (75<sup>th</sup> percentile on per sector basis, drystock sector will need to benchmark before this can be determined); those below the 75<sup>th</sup> percentile make some reductions that represent good management practices relating to the risk factors on their property.

Note: The quantum of reduction in contaminants other than nitrogen is more difficult to estimate at farm level, so clear guidance is needed as to appropriate levels of action that should be achieved through these property management plans in order to meet water quality targets. This guidance will be developed further by the CSG.

## 14.6 Approach to allocation

CSG has discussed allocation as the approach of setting how much contaminant may be discharged, in the form of a property level limit.

While other regional plans in New Zealand and Variation 5<sup>4</sup> to the Waikato Regional Plan have set initial allocation of nitrogen discharges, the CSG position is not to do so immediately.

Therefore the suggested direction is to write policies and methods in the plan change to signal the approach to future allocation, but to stop short of rules that give individual landholders the right to discharge certain amounts of contaminant in an allocation approach. Instead, rules will be put in place to constrain land use change and to benchmark current nitrogen discharges, while making initial reductions in discharges across all four contaminants through landholders and point-source discharges undertaking mitigations. Methods in Plan Change 1 will set out information and research needed in order to move to allocate contaminant discharges at a property level.

The principles for future allocation agreed by CSG are:

1. More intensive land use should occur on land best suited to this ('land suitability') and land unsuited to current use needs to change, with an acknowledgement that some land uses have high discharges but are small in total area and important to the regional community.
2. Some allowance to enable development of Māori land.
3. Minimise social disruption in transition and least cost overall.
4. Future allocation decisions should take advantage of new data and knowledge. To ensure this occurs, collect information and undertake research to support this, including information about spatial variability and the effect of contaminant discharges in different parts of the catchment that will assist in defining 'land suitability'.

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<sup>4</sup> Waikato Regional Council's "Variation No. 5 - Lake Taupō Catchment" to the Waikato Regional Plan was proposed in 2005, and became operative on Thursday, 7 July 2011. The variation allocates nitrogen at a property level in rules. Farming practices require consents, with the consent granting the landowner a total amount of nitrogen allowed to be leached from the property. The landowner can choose to permanently or temporarily transfer (trade) some or all of the nitrogen with another consent holder in the catchment.

## 14.7 Providing the platform for further change

Plan Change 1 can be seen as the start of far-reaching changes in how land is managed to achieve restoration of the Waikato and Waipa Rivers and their catchments. Significant effort will be required in the next ten years to support this. This includes:

- collecting information through benchmarking nitrogen, and
- collecting information on biophysical aspects of properties, current land uses and practices in landholder property plans, and
- developing the infrastructure and accounting frameworks for the catchment to operate under an allocated regime in the future.

## 15 Policies

Policies are the course of action that achieves the desired future outcomes in the plan change objectives and limits.

The following topics are covered in the policies. They are listed below in groups where there will be overarching guidance on a topic that requires further detail about the course of action needed:

- Staged approach
  - Preparing for future allocation decision
  - Benchmarking nitrogen discharges
- Avoiding increases in discharges
  - Managing water quality effects of land use change
  - Managing water quality effects of the built environment
- Making reductions
  - Those above the 75<sup>th</sup> percentile (highest dischargers of N) to reduce
  - Actions in property management plans
- Providing for the development of land returned under Te Tiriti O Waitangi settlements and multiple owned Māori land
- Managing point sources
- Providing for the values of Whangamarino Wetland
- Managing effects on lakes
- Undertaking property management plans
  - Prioritisation of when and where implementation occurs
  - Guidance on actions expected in property management plans
  - Subcatchment planning and coordinated actions

The following descriptions outline the CSG intent of each policy.

### 15.1 Policy on staged approach

Establish and review limits and targets and methods of achievement:

- Successive regional plans will require reductions in discharges, via new policies and rules that require staged reductions in point source and non-point source discharges of nitrogen, phosphorus, sediment and *E. coli*.
- Recognition of the need to review and continue to work towards 80 year limits.

- Monitoring and review of water quality and mitigations and activities on the land to meet water quality outcomes.

## 15.2 Policy on preparing for allocation decision in next plan change

The policy intent is to set out what will be considered in the next plan change where individual rights to discharge contaminants in the form of a property level limit will be allocated and new rules put in place. The policy would be based on the CSG's principles for future allocation (Section 14.6 above).

Move towards setting property level limits for contaminants:

- Recognising that to provide confidence to landholders and the community that reduction will be made, it is anticipated that property-level limits shall be used as a method to manage discharges and land use in the future.
- Collect information, and develop processes to assist with setting property-level limits in the future (implementing benchmarking for nitrogen accounting purposes).
- Identify required research to support the development of policy to set property level limits including:
  - the quantum of contaminants that may be allocated to landholders at a subcatchment and FMU scale, in order to meet the targets at each stage
  - how to categorise and define 'land suitability' for intensive use, in relation to the four contaminants that are the subject of Plan Change 1.
- Identifying required research to support the implementation of property-level limits including:
  - the potential for measuring sediment and *E. coli* from individual properties
  - support tools to manage limit setting, and measure individual properties' contributions.

## 15.3 Policy on benchmarking nitrogen for accounting purposes and to identify highest emitters for reductions now

The policy intent is that individual properties must go through a process to find out how much nitrogen they are currently leaching from their property (called nitrogen benchmarking). The policy intent is twofold:

1. Establish a record of current practices and property-level discharges that can be used to relate to subcatchment loads (freshwater accounting) that can help derive an appropriate subcatchment or FMU allocation.
2. Ensure properties that are operating above the 75th percentile make reductions in discharges of nitrogen.

Waikato Regional Council will work with industry, and landholders to develop protocols for collecting information of appropriate standard and detail on current activities and use of the land.

## 15.4 Policy on avoiding increases in discharges

The policy intent is to stop a net increase in discharges in the whole catchment, including from the built environment.

## **15.5 Policy on restricting major land use change**

Policy intent is to avoid increases in discharges through strong guidance and rules to restrict land use change. This includes:

- an approach that identifies and restricts the potential changes to those land uses that are most likely to increase discharges.

## **15.6 Policy on making reductions**

The policy intent is to set out the course of action for ensuring there will be a reduction in discharges in the life of Plan Change 1.

Discharges of sediment, bacteria, phosphorus and nitrogen will be reduced by ensuring that:

- mitigations are undertaken by point sources and non-point sources
- properties in high priority areas of the catchment are operating under property management plans, including undertaking mitigation actions to reduce discharges and meet timelines
- stock (except for sheep and goats) are excluded from rivers, streams, drains, wetland and lakes.

The policy will include direction about actions in property management plans and nitrogen reductions required of farms and vegetable growers who are leaching above the 75th percentile of their sector.

## **15.7 Policy on flexibility for development of land returned under Te Tiriti O Waitangi settlements and multiple owned Māori land**

- Enabling provision to allow for flexibility for the development of Māori Owned Land.

## **15.8 Policy on point sources**

In the context that there will be catchment wide targets for water quality that will apply to both non-point and point discharges:

- Provide for point source discharges associated with industry and infrastructure and their economic and social benefits.
- Specifically refer to the maintenance of regionally significant industry and community wastewater systems as being of particular value regionally.
- At each renewal of their consent(s), industries will investigate and where practicable adopt the most up-to-date technologies for contaminant reduction specific to their individual circumstances; and via the consents process (which canvases all issues including the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*) the outcome can be expected to be “best practicable option” for those particular circumstances.
- Once best practice is achieved consent terms of 25 years or more may be appropriate, particularly where very large capital investment is made (large infrastructure).
- The intention is not to review consent conditions when the plan change is notified, but to allow existing consents to run their term (accepting that the council can exercise its discretion to review individual consents under s128 where performance is poor or standards manifestly unreasonable).
- It is up to individual applicants to put their case at the time of consent application for production increases or to cater for population increases needed

during the consent term; these will be assessed during the consent process against the overall targets and limits for their specific catchment area and their environmental effects in that site.

## **15.9 Policy on criteria for assessing point sources consent applications**

When assessing resource consent applications and setting resource consent conditions for point source discharges, the council will consider the following:

- Take into account the ability to offset load by allowing reductions to be undertaken elsewhere (subject to any specified limitations applicable to offsets) where, after best practicable option has been considered, effects cannot otherwise be directly avoided, remedied or mitigated.
- Take account of past, current and proposed contaminant concentration and/or load reductions that resource users have committed to (in the context of the obligations imposed by the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*).
- Recognise the relative contribution of point and non-point source discharges to overall loadings in the catchment with the expectation that any reductions required at the time of consenting will be proportional to their relative contaminant load.
- Recognise the relative cost effectiveness of potential future reductions for point and non-point sources.

## **15.10 Policy on subcatchment planning and co-ordinating actions**

Support the uptake of large scale mitigation based on subcatchment and catchment priorities

- Assistance and funding provided for mitigations (within or across properties) that are of sufficient scale to provide broader water quality benefits and increase the rate of uptake of these mitigations.

## **15.11 Policy on lakes**

Apply the policy package to the lakes FMUs, and address any additional requirements for lakes through the prioritisation process and methods.

Note: detailed content to come.

## **15.12 Policy on wetlands**

Focus on the prevention of sediment and nutrient losses to water that may impact on Whangamarino Wetland, particularly during times of high water flows and flood management.

Note: content to come. Will include reference to actions on the land around the wetland that will assist to protect the values of the wetland.

## **15.13 Policy to guide actions in property plans**

That there will be clear guidance for the development of property plans including around actions and timeframes:

- including setback considerations carefully worded to ensure 5m cultivation and 3m stock setbacks, sunset clause for existing fences linked to stock exclusion dates

## **15.14 Policy on prioritised and focused implementation**

Take a prioritised approach to manage land and water resources in the Waikato and Waipa River catchments based on the reduction in contaminant required in the water by:

- focusing efforts first in subcatchments where there is a large gap between desired and current water quality
- focusing on key property or activity risk factors
- permitting activities on land that are likely to result in low levels of contaminants entering water bodies, and activities on land where landholders are undertaking listed mitigations that are likely to manage their contaminant losses without need for a consent.

## 16 Rules overview

The rules below have further detail to be defined, for example the type of activity status where consent is required, dates and definitions are yet to be confirmed. However, indicative wording providing is to show the intent of the rule.

### 16.1 Stock entry into water

The aim of this policy option is to manage the effects of non-point source discharges from stock entry into water by restricting entry of dairy cattle, beef cattle, horses, farmed deer or farmed pigs onto the bed of a lake, wetland, constructed wetland, perennial river or stream or drain. The decision has been made to focus on excluding stock from perennial waterways in this rule, and to deal with intermittent waterways via property plans. Sheep and goats are not included as it is considered that they do not have the same affinity for water and therefore pose less risk than listed stock types.

This rule restricts entry of stock into lakes, wetlands, constructed wetlands, perennial rivers or drains; there is not a specific requirement to have infrastructure that prevents entry. Land owners may need to build such infrastructure to be in compliance with this approach, but no prescription in the rules is provided to landholders on how. For example, the rule does not need to spell out fencing standards, because land owners may be compliant if there is a natural physical barrier between stock and water, such as a rock bluff.

#### Rule 1a, 1b & 1c

**Rule 1a:** Entry of dairy cattle, beef cattle, horses, farmed deer or farmed pigs onto bed of lake, wetland, constructed wetland, perennial rivers or drain, on land <15° slope excluded by 2020

**Rule 1b:** Entry of dairy cattle, beef cattle, horses, farmed deer or farmed pigs onto bed of lake, wetland, constructed wetland, perennial rivers or drain, on land that is <25° slope excluded by 2025

**Rule 1c:** Entry of dairy cattle, beef cattle, horses, farmed deer or farmed pigs onto bed of lake, wetland, constructed wetland, perennial or drain, on land that is >25° slope needs a consent by 2025

#### Notes:

- CSG has not yet considered rule 1b within an overall timeline for requiring property management plans and benchmarking.
- Need to define methodology for determining slope, which the property plan sub-group is considering.
- Where multiple consents are required, CSG does not wish to see 'bundling' where all consents are dealt with at the most restrictive activity status. Consideration is being given to the development of a rule to address this situation.

### 16.2 (Interim) Land use change

The aim of this approach to managing discharges is to call a temporary halt to the large land use changes that are occurring in the catchment, and therefore the associated increases in discharges. The rule focuses on changes from trees to livestock or from

drystock to dairy. These changes in land use would become a non-complying activity. It also seeks to contain commercial vegetable production to its current scale..

This approach is described as interim and the intent is that this non-complying rule would be removed from the Waikato Regional Plan/replaced when future plan changes set property level numerical limits and discharge allocations. The 2016 plan change can include policy direction that this rule is to be reviewed when the allocation and property limits are written into the plan and made operative.

The CSG considered that this rule would be clearer than a rule based on any general trend in intensification. This approach can be in place from plan notification and does not require benchmarking through OVERSEER. The focus is to capture major land use change, while the other policy approaches are being rolled out.

This rule will have strong policy direction associated with it, to guide when it would be appropriate for a consent to be granted to allow land use change to occur.

### Rule 2a & 2b

**Rule 2a:** The change of land use from:

- a) indigenous vegetation or plantation production forestry to animal farming or cropping; or
  - b) drystock to dairy (milking platform)
- is a **non-complying** activity from date of notification until 10 years after Plan Change 1 is made operative.

**Rule 2b:** Commercial vegetable production net land area in the catchment is capped at current hectares and is a **controlled** activity from date of notification until 10 years after Plan Change 1 is made operative (bearing in mind rotational history).

## 16.3 Property management plans

Two options were considered for the use of property management plans under a regulatory regime: property management plans with consent (controlled activity) or property management plans through an industry assurance scheme.

Note this topic is under active consideration. The CSG is still considering where some landholders or some industries could either be under a permitted or consented regime but the industry body would assist the landholder and auditing would be required in either situation.

### Property management plan requiring a resource consent

This option would involve the requirement for landholders to include a property management plan as part of a resource consent application for the use of land for farming activities, beyond a threshold defined as 'low intensity'. Activities as set out in the property management plan are tailored to each specific property, pinpointing risk areas or practices in order to reduce discharges. The property plan will set out their specific actions to reduce discharges of nitrogen, phosphorus, bacteria and sediment. Landholders would be audited and required to keep records to show actions they have undertaken in the property management plan and supply these as part of the audit process.

### Property management plan under a permitted activity

This regulatory option would involve the requirement for landholders to be compliant with a Permitted activity via a certified plan provider in a scheme run by industry bodies (e.g. primary producer representative organisations). Landholders manage their property in accordance with the activities and mitigations as set out in the property

management plan which are tailored to each specific property, pinpointing risk areas or practices in order to reduce discharges. The property plan will set out their specific actions to reduce discharges of nitrogen, phosphorus, bacteria and sediment. Landholders would be audited by their scheme and the council, and required to keep records showing actions they have undertaken in the property management plan and supply these as part of the audit process.

### Rule 3, 4, 5 and 6

#### **Rule 3: Low intensity**

The use of land for farming is a **permitted** activity subject to the following conditions:

- ≤4.1 ha (10 acres or less) in size or
- ≤8 stock units/ha on grazed land (with a schedule / list of how many and type of animals this equates to, to assist plan users) or
- ≤75kg N applied/ha/yr on non-grazed land
- not commercial vegetable production.

#### **Rule 4: 'Off the shelf' property management plan**

The use of land for farming is a **permitted** activity subject to the following conditions:

- No more than x proportion of the productive area of the property is ≥ x° slope (to be defined by CSG – could be the same slope as in stock exclusion rule)
- Less than xx kg/ha N leached by sector, by FMU (75th percentile concept)
- No grazed winter forage crops
- No lakes, wetlands, constructed wetlands or perennial rivers or 5m cultivation setback and 3m grazing setback from lakes, wetlands, constructed wetlands and perennial rivers
- not commercial vegetable production.

**Rule 5:** Tailored property management plan is a **consented** activity. The consent will be granted, with conditions on the duration of the consent, the actions to be undertaken by the landholders, with dates for completion for each action. Consents will not be publicly notified.

**Rule 6:** Property plan developed as part of a WRC-certified industry assurance scheme is a **permitted** activity

Note this approach will be finetuned after further work at CSG property planning sub-group in March.

## **Prioritisation**

The following section outlines CSG's approach to the timing of implementation. It is under active consideration by CSG, who are considering the technical and practical implications of where to implement property management plans first.

In the long term to meet the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* by 2096, all properties above the low intensity threshold will have to have some sort of property management plan, whether that be tailored for their property or 'off the shelf' (specifying set management practices).

## Top priority subcatchments for implementation effort

(Prioritised based on the size of the gap<sup>5</sup> between existing and desired water quality in the water body)

A coordinated subcatchment approach to property planning is preferred in the implementation of this approach in these catchments.

By 2019, these catchments will be done: x,y.z.

By 2022, these catchments will be done: ..

Note: The horticulture industry may take a cross-industry approach, in parallel to this.

## 16.4 Nitrogen benchmarking

### Rule 7

**Rule 7:** The use of land for farming is a **permitted** activity with conditions requiring owner to supply WRC with benchmarked nitrogen outputs using OVERSEER

- Pastoral farms are benchmarked on choice of past 2 years, 2014-2015 or 2015-2016 (link to 75%ile rule).
- Commercial vegetable production to allow for the normal cycle of crop rotations, reflecting the past 10-12 years activity.

Note: There will be industry and council agreed protocols developed on how to benchmark landholders.

The intent of this rule is to gather information, submit records and have ongoing monitoring. Clear protocols are to be developed on what information will be collected and how it will be stored across the different farming sectors.

## 17 Changes to existing Waikato Regional Plan rules

The CSG is mindful of the complexity of fitting Plan Change 1 into the existing regional plan, and will be working on this topic through April and May 2016.

Plan Change 1 will contain some new rules to manage contaminant discharges. The operative Waikato Regional Plan already contains some provisions that manage the effects of discharges from particular activities. Some of these will be amended and some will remain in place.

When making changes to the current Waikato Regional Plan the following principles have been identified by the CSG:

1. Do not duplicate what is in the current Waikato Regional Plan, or other RMA documents, such as the Proposed Waikato Regional Policy Statement.
2. 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.

<sup>5</sup> where the load to be removed from the land coming is high (mapped areas) based on reduction in load of contaminant required in the receiving water/s or water bodies

3. Ensure that existing rules do not cut across the intent or application of the new rules. For example, ensure that the regional plan enables landholders to put in and maintain mitigations such as constructed wetlands, and silt/sediment traps.

## 18 Methods to support regulatory requirements

The following methods are included to give an idea of the breadth of actions needed to implement the policies. Some methods below set out processes and responsibilities for the council and other agencies. A consideration will be whether each method is achievable. What is proposed should not be beyond the capability of the council (or other persons that it affects) to implement. Achievement of the method should also be measurable, so that those implementing or monitoring the plan know whether its use has been successful.

A selection of these non-regulatory methods will be in Plan Change 1, to support the policies by setting out how they will be implemented.

As with other aspects in Part C of this report, the CSG will continue to work on the detail and linkages between objectives, policies, methods and rules.

### Working with others

Waikato Regional Council will:

- work with other parties to coordinate priorities, funding and physical works to assist in giving effect to the *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato* for the Waikato and Waipa Rivers. These parties include, but are not limited to, Waikato River iwi partners, Waikato River Authority, Waikato River Restoration Strategy partners, Department of Conservation, territorial authorities, industry and sector bodies.

### Subcatchment scale planning

Waikato Regional Council will:

- Work with other organisations to develop subcatchment scale plans to coordinate the reductions required at a property and subcatchment scale.
- Facilitate the implementation of subcatchment and catchment scale works to reduce nitrogen, phosphorus, sediment and *E. coli* such as, but not limited to, riparian management, constructed wetlands, sediment traps and sediment detention bunds.

### Lakes

Waikato Regional Council, working with others, will:

- Build on the Shallow Lakes Management Plan<sup>6</sup> by developing lake-by-lake implementation plans and investigate lake-specific options to improve water quality, ecosystem health and manage pest species. In many instances, this will require an adaptive management approach.
- Work towards managing the presence of pest weeds and fish in the shallow lakes and connected lowland rivers area.

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<sup>6</sup> The Shallow Lakes Management Plan draws together information about the shallow lakes of the Waikato region, the policy framework for their management, and the associated management challenges and opportunities.

**Volume 1** identifies objectives and high level management actions to address the key management issues for the lakes, with a specific focus on matters that WRC has responsibility for (i.e. water quality, lake water levels and biodiversity values). **Volume 2** is a complementary resource statement that summarises available information and knowledge for shallow lakes in the Waikato region and proposes key management actions for individual shallow lakes at a greater level of detail. This plan has a term of 10 years, and will be reviewed after 3 years (in 2018).

- Support research and testing of restoration tools and options to maintain and enhance the health of shallow lakes (e.g. lake modelling, lake bed sediment treatments, constructed wetlands, floating wetlands, silt traps, pest fish management, and farm system management tools).
- Develop and disseminate best practice guidelines for reducing sediment, nutrient, and pathogens.
- Support research into methods for attenuating non-point pollution.
- Support lake restoration programmes including but not limited to advice, funding, and project management. Restoration programmes may have a wider scope than water quality, including hydrological restoration, revegetation and biodiversity restoration.

## **Wetlands**

Waikato Regional Council, working with others, will:

- Provide significant additional support and resourcing for the protection and restoration of wetlands.
- Through property management plan development processes, identify and where it is practicable to do so include as a mitigation action:
  - existing natural wetland ecosystem areas, and
  - areas suitable to be restored back to supporting a natural wetland ecosystem, and
  - areas suitable to be developed into a constructed wetland.
- Assess and determine effective and efficient placement of constructed wetlands at a subcatchment scale to improve water quality.
- Seek better knowledge and understanding of the costs and benefits of changes to wetland ecosystems to support future decision making.
- Analyse and document the linkages between wetlands and the opportunities to improve people's livelihoods.
- Support research that addresses the management needs of wetlands, including development of techniques to monitor ecological change and forecasting evolution of wetland characteristics under the pressure of present uses.

## **Whangamarino Wetland**

Waikato Regional Council, working with others, will:

- Raise the profile and promote the significance of Whangamarino Wetland as a RAMSAR wetland of international importance.
- Develop a catchment plan for Whangamarino Wetland and Lake Waikare.
- Through the review of the Waikato Regional Plan identify and protect characteristics of the wetland outside the scope of Healthy Rivers Wai Ora e.g. biodiversity.

## **Drains**

Waikato Regional Council will work with landholders to:

- Integrate the regulatory requirements to fence waterways with drainage scheme management.

## **Industry<sup>7</sup> assurance scheme accreditation**

Waikato Regional Council, working with industry, will:

- Develop parameters and minimum requirements for an accreditation process for an industry assurance scheme for industry bodies to be able to develop, certify and monitor property management plans that reduce the risk of discharges of nitrogen, phosphorus, sediment and *E. coli* at a property scale.

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<sup>7</sup> Industry is used to describe primary producer representative organisations such as Beef and Lamb, HortNZ, DairyNZ etc.

- Develop parameters and minimum requirements for the development of a certification process for professionals to be able to develop, certify and monitor property management plans that reduce the risk of discharges of nitrogen, phosphorus, sediment and *E. coli* at a property scale.
- Assist the wider primary industry service providers to ensure advisors have the correct training and skills.

### **Agreement and oversight to run industry assurance scheme**

Waikato Regional Council, working with industry, will:

- Develop and implement the industry assurance scheme processes through formal agreements between council and the industry bodies providing oversight and management of the industry assurance schemes. The formalised agreements will include, but are not limited to, information sharing, reporting on scheme implementation, aggregate reporting of scheme contribution to improvements in water quality and consistency across the various schemes.
- Provide a consistent approach towards property management plan development and implementation across industry assurance schemes and consenting processes.

### **Managing the effects of urban development**

Waikato Regional Council will:

- Continue to work with territorial authorities to implement the Waikato Regional Policy Statement set of principles that guide future development of the built environment which anticipates and addresses cumulative effects over the long term.

### **Development of an allocation framework**

Waikato Regional Council will:

- Develop a property level (*nitrogen*) allocation framework based on the allocation principles contained in Policy X.
- Make a change to the Waikato Regional Plan to allocate contaminants (*or nitrogen*) at a property level using the information gathered and based on the allocation principles contained in Policy X.
- Take into account new data, knowledge and technology relevant to this approach.
- Gather information and science required to build a system for allocating property level reduction requirements and associated accounting.

### **Technical information needs to support future allocation framework**

*This topic is still under active consideration by CSG.*

*TLG to provide input on information needs e.g. lag information on lakes, attenuation, underlying land, research on land suitability.*

### **Environmental monitoring and accounting framework**

Waikato Regional Council will:

- Continue gathering water quality monitoring data from the existing river monitoring network.
- Continue analysing water quality monitoring data and reporting on river water quality state and trends, including monitoring and reporting on progress towards the 80 year water quality objectives of Plan Change 1.
- Continue monitoring and reporting on Macro-invertebrate Community Index as part of State of the Environment monitoring.
- Establish a monitoring network for the four lake freshwater management units to establish baseline data of current state and trend analysis, and monitor progress towards the 80 year water quality objectives of Plan Change 1.

## **Funding and implementation**

Waikato Regional Council will:

- Provide staff resource and leadership within the organisation for the implementation of Plan Change 1 and associated recommendations.
- Seek to secure funding for the implementation of Plan Change 1 and associated recommendations through the annual plan and long term plan processes.
- Consider, subject to Waikato Regional Council's Revenue and Financing Policy, charging rates to raise funds to support implementation of Plan Change 1, namely:
  - Special projects which include actions that are part of a coordinated subcatchment planning process and provide a public benefit should be funded by a rate specific to the Waikato and Waipa River catchments. Examples of such actions include constructed wetlands, lakes restoration and land retirement.
  - Waikato Regional Council costs to implement Plan Change 1 that can be extended to serve the entire region should be funded by a region-wide rate. Examples of such actions include but are not limited to collecting baseline data, establishing a property management plan accreditation scheme and council resource needs.
  - For the avoidance of doubt, funds gathered from these rates are not intended to be used for on-farm mitigation of effects, which are regulatory requirements under the property management plan or catchment wide rules, other than as specified above, or to any associated administration costs of resource consents.

## **Monitoring and evaluation of the implementation of Plan Change 1**

Waikato Regional Council will:

- Review and report on the progress towards and achievement of the 80 year water quality objectives of Plan Change 1.
- Research and identify methods to measure actions at a subcatchment and property level scale and their contribution to reductions in contaminants.
- Monitor the achievement of the values and uses for the Waikato and Waipa Rivers by measuring social indicators and behaviour change.
- Collate data on the number of resource consents issued, property management plans completed, compliance with the actions listed in a property management plan and progress towards benchmarking individual landholder leaching.
- Work with industry to collate information on the functioning and success of any certified industry scheme.

# **19 Implementation resources and costs**

The section below outlines some of the implementation resources required to implement the policy mix, primarily on the implementation cost for the council<sup>8</sup>. This is in addition the current rules in the Waikato Regional Plan, which will remain in place.

The specific implementation resourcing and costs to implement Plan Change 1 are highly dependent on the final detail of the policy framework, which is still under development. Implementation planning and estimates of likely implementation costs will be developed and refined alongside the drafting of the final rule wording, and drafting of the property management plan process. Consequently, it is too early to provide

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<sup>8</sup> And rate payers

meaningful cost or resourcing requirement estimates. However, despite this, it is possible to give some general guidance around the implementation implications of the current policy mix.

The regulatory implementation activities (and therefore costs) will be highly dependent on:

1. The size and the number of catchments identified by the TLG and confirmed by CSG as a priority for implementation.
2. Final decisions about the staging of when various rules become operative.
3. The deadline for when compliance with the catchment-wide rules is required.
4. The number of properties that are authorised by each rule.
5. Finalising the understanding of the role that iwi partners and industry may play in implementing the various policy instruments.

The use of property management plans to manage land use will almost certainly require the council to adopt new implementation approaches to maximise implementation efficiency. It is expected that this approach will inevitably require much more 'one on one' interaction with the landholders, to ensure the landholders understand their land management obligations, and to provide confidence to the general public that these land management obligations are being met. Irrespective of whether this implementation is done by council staff or accredited third parties, the pool of people with the expertise able to deliver property plans is limited. Training and development of plan developers will be required. The availability of knowledgeable and experienced people to deliver property management plans will limit the rate at which property management plans can be produced.

It is expected that implementation will require new technology infrastructure, systems and processes to be developed. One concept currently being explored is the use of a user portal to allow self-submission of data by farmers, and to allow sharing of information between implementation agencies. Existing databases will need to be adjusted to capture the required data, and there may be some corresponding system changes to account for managing land use on a property basis, rather than on a consent basis. It is expected that there may be a capital cost and lead time required to develop, test and finalise the systems and infrastructure to achieve this, but doing so is essential in order to effectively manage land use on the scale proposed. Council staff are in the process of examining the options for developing and implementing this approach.

The plan change includes the ability for farmers to develop, certify and monitor property plans using a certified plan developer, under industry accredited schemes. This will require the development of a certification and accreditation process for both plan developers, and industry schemes, along with an appropriate audit process administered by the council to provide confidence in the achievements of the industry programmes.

The management of nitrogen will require many properties to be benchmarked prior to nitrogen being allocated in a future plan change. The council has experience of benchmarking in the Lake Taupō Variation, and the learning from this project will be helpful in planning the implementation of benchmarking in the rest of the region. Benchmarking in Lake Taupō was a complex, time consuming and expensive process, not least because the council was developing its systems and processes around the use of models, data storage, data verification and similar issues. While many farms have already had OVERSEER modelling undertaken (especially dairy farms), there is still work to be done to ensure data quality, and therefore the reliability of nitrogen leaching estimates before these data can be relied upon for benchmarking purposes.

Council staff are in the process of gathering specific information about property numbers, property sizes, and land uses within each of the subcatchments. This information will be critical to being able to make informed estimates about the number

of properties to which each rule applies, and to giving an indication of resources required to implement each rule.

More detail, including costs and benefits, will be outlined in the Section 32 evaluation of the overall approach that will be accompanying the plan change document. Under section 32(3)(b) of the Resource Management Act, an evaluation must examine whether, having regard to their efficiency and effectiveness, the policies and methods are the most appropriate for achieving the objectives. The evaluation must take into account the benefits and costs of policies and methods, and the risk of acting or not acting if there is uncertain or insufficient information.

It is noted that the plan promotes a number of non-regulatory methods which will incur costs, but that these also are not able to be effectively costed until more detail on the final wording of these approaches.

## 20 Other options considered

CSG have considered a number of alternative policy approaches for non-point discharges to achieving the water quality outcomes and objectives. The options which have not been developed to form part of the freshwater management regime, and the reasons why, are summarised in the table below.

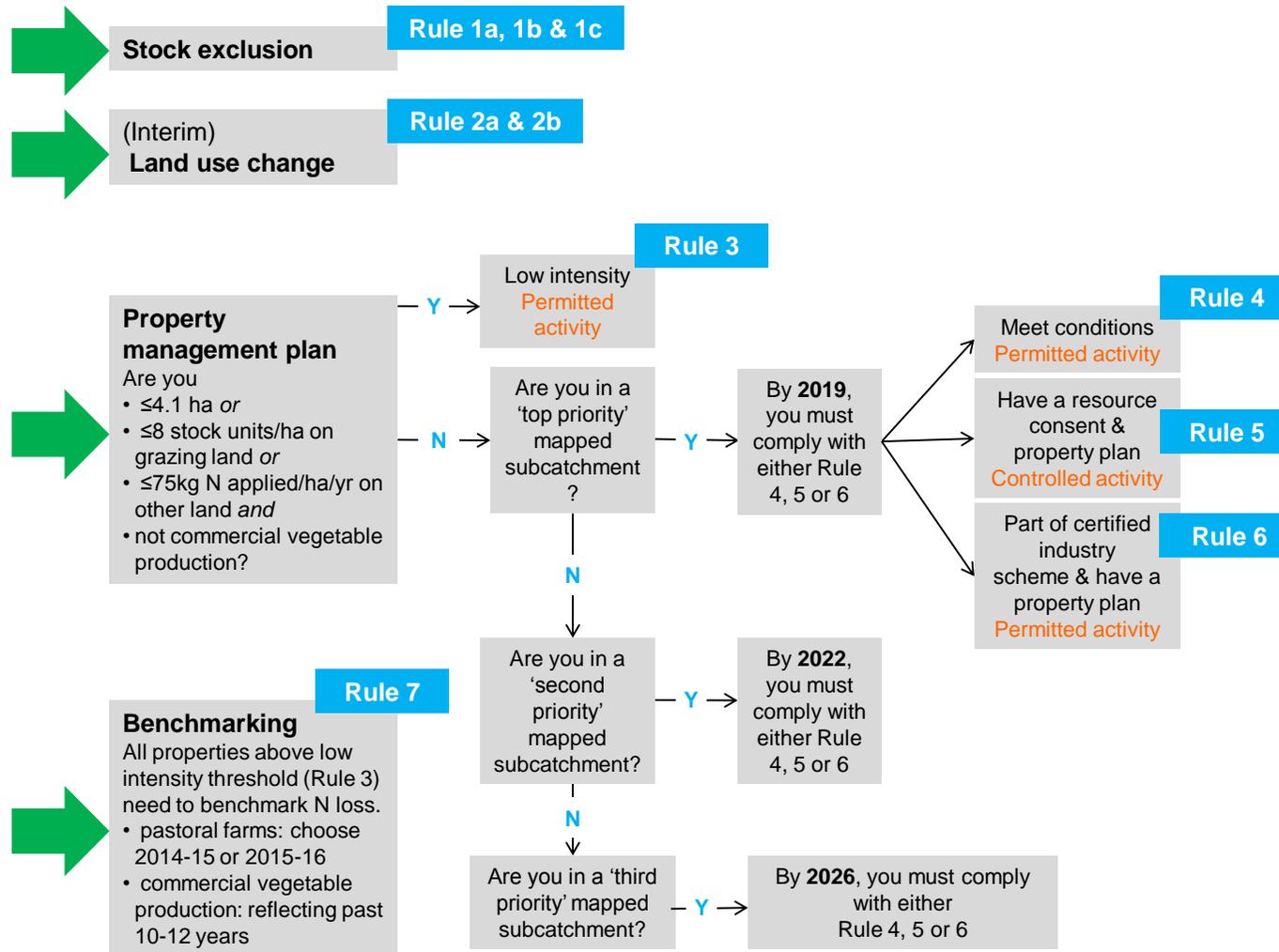
**Table 9: Policy options considered for part of the freshwater management regime, and reasons why they were not selected**

Method	Practicality and effectiveness of options
In stream sediment standard for non-point discharges	<p>This method provides useful guidance to setting conditions and limits for resource consents. It would be expected that implementation of this method would make a positive difference to in-stream water quality. However, realising this requires that the in-stream sediment can be attributed back to a particular property. Unless the property occupies the whole subcatchment area above where the in-stream measurement occurs, it is very difficult to attribute to one landowner.</p> <p>If an in-stream suspended sediment standard is used solely as the means of achieving water quality outcomes this method is therefore not considered an effective way to regulate the effects of land use.</p>
Property limit	<p>With this approach there is a constraint on the total amount of discharges. This means restrictions on changing to an enterprise that produces more discharges and intensification within existing enterprises and/or new entrants.</p> <p>This potentially gives more certainty for the community that the desired reduction in discharges to meet catchment limits and targets will be achieved as there is some confidence over discharges levels from land.</p> <p>The number of consents and landholders involved and record keeping would make this a large undertaking in the Waikato and Waipa River catchments.</p> <p>The key constraint to this approach is having appropriate models or a suitable proxy in setting the property limit. These are currently not considered sufficiently robust for phosphorus, sediment or bacteria. The available modelling tools for N do not capture all of the mitigation activities that landholders could use to reduce discharges, so reliance on a model like this does not incentivise the use of these mitigations.</p>

Method	Practicality and effectiveness of options
	<p>With a model such as OVERSEER new versions are released, and when the model changes but the actions used on farm have not changed, different versions of the model give different results.</p>
<p>Property limit Olsen P</p>	<p>Whilst it is considered that there is a relationship between higher Olsen P level and greater phosphorus loss, an approach based on Olsen P may not target the greatest risk e.g. target high fertiliser use on high erosion prone land. This approach would need to be supported by complementary policies regarding sediment and phosphorous mitigations. The potential for counter-productive outcomes in the response of landholders to this approach is likely to be high.</p> <p>Therefore it was determined that practically the effectiveness of a property limit based on Olsen P would be limited overall, relative to the costs of implementation of this type of approach.</p>
<p>Tax on inputs</p>	<p>A tax on inputs, specifically fertiliser, was considered. The option proposed was a tax on fertiliser inputs that would be applied at a Waikato and Waipa River catchments scale.</p> <p>Feasibility considerations were:</p> <ul style="list-style-type: none"> <li>• It is difficult to set the tax at the right rate to achieve the desired outcomes (e.g. if there are reductions in use of fertiliser).</li> <li>• It is difficult to determine how effective the tax on fertiliser would be e.g. different effects in different areas and this might not align with where reduction may have most effect.</li> <li>• Landholders could take other actions/substitute inputs that result in other discharges.</li> <li>• Ideally all sources of input nitrogen and phosphorus would be taxed, not just fertiliser.</li> <li>• It would be difficult to levy the tax at a property level.</li> <li>• The tax level would need to be adjusted each year.</li> <li>• It is unclear if it is possible to administer a tax at a catchment level.</li> </ul> <p>This policy approach for the management of the contaminants in the Waikato and Waipa river catchments was therefore not supported.</p>
<p>Cap and trade</p>	<p>A property level policy approach sets a standard that specifies a set of conditions or limit that must be achieved, the aim being that individual source limits, in aggregate, will contribute to the water quality threshold not being exceeded.</p> <p>Examples where this policy has been used e.g. for the Lake Taupō Nitrogen trading scheme, has worked to limit the nitrogen leaving agricultural land. The trading system has provided flexibility for landholders and has decreased the cost of achieving the community's environmental goal.</p> <p>This option would provide more certainty for the community that the desired reduction in discharges to meet community set catchment limits and targets will be achieved through this policy approach, as there is some confidence over discharge levels.</p> <p>This option could provide more flexibility to sectors who wish to intensify by participating in the market.</p> <p>This method was not progressed for similar reasons as a property limit approach, but may facilitate flexibility in any future allocation</p>

Method	Practicality and effectiveness of options
	scheme.
<p>Catchment wide rule/s</p> <p>– 5m setback required from all landholders in all parts of the catchment</p>	<p>There was consideration of having a rule that all landholders had to comply with across the catchment that set a catchment-wide rule for a setback of 5 metres from water bodies.</p> <p>For the four contaminants, the major benefits of streambank fencing are derived through the act of stock exclusion from the stream and stream bank. The width of the setback is of secondary importance. Whilst there is technical evidence to support a catchment-wide rule related to stock exclusion, this does not support the need for the same setback distance applied across all properties.</p> <p>Therefore it was decided that the policy to encourage landholders to have 5m setbacks from waterways was considered more suited to be incorporated into the property plan approach, where there is the discretion to apply larger or smaller setback distances based on the farm’s particular situation and risk.</p>
<p>Rule regulation of intensification</p>	<p>Proposed as an interim policy, the aim of this policy is to manage non-point source discharges increasing from intensification of farming activities. This regulation states that a 10% increase in nitrogen in a year triggers the need for a resource consent.</p> <p>This could be considered to be endorsing a ‘pollute up to’ approach, and means that it may not even be possible to ‘hold the line’ on discharges. As such this is inconsistent with the <i>Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato</i> which requires betterment in the river over time.</p> <p>There is a need for relevant baseline data against which to measure any change. This implies a significant need for regulatory infrastructure (i.e. benchmarking, monitoring, information gathering and analysis) that would take time to gather and the landholder would be unclear if they comply until they run the model.</p> <p>There are also issues with seasonal variation that creates natural fluctuations in production and therefore discharges.</p>

# 21 Decision tree - new rules for non-point discharges



# Part D: References, Glossary and Appendices

## 22 References

Te Ture Whaimana o Te Awa o Waikato – the Vision and Strategy for the Waikato River

National Policy Statement for Fresh water Management 2014. Publication reference number: ME 1155

### Reports to HEALTHY RIVERS WAI ORA Committee

Collaborative Stakeholder Group’s Preferred Option – Freshwater Management Units  
Files: 03 04 14, 23 10 09 (Doc # 3405766)

Collaborative Stakeholder Group’s Policy Selection Criteria  
Files: 03 04 14, 23 10 09 (Doc # 3405797)

Collaborative Stakeholder Group’s Preferred Options for the first round of Limit and Scenario Modelling  
Files: 03 04 14, 23 10 09 (Doc # 3405808)

Collaborative Stakeholder Group Progress Report – Intensive Engagement Period 1  
Files: 03 04 14, 23 10 09 (Doc # 3405141, 3410308)

Collaborative Stakeholder Group's suite of numeric attributes  
Files: 03 04 14, 23 10 09 (Doc # 3405803)

Collaborative Stakeholder Group’s Values and Uses for the Waikato and Waipa Rivers  
Files: 03 04 14, 23 10 09 (Doc # 3487796)

Collaborative Stakeholder Group’s Preferred Option for Lakes Freshwater Management Unit  
Files: 03 04 14, 23 10 09 (Doc # 3490360)

## 23 Glossary

<b>Attribute</b>	Attributes are measurable characteristics of fresh water, including physical, chemical and biological properties, which support particular values. For example, water’s clarity is an attribute that supports the value of human recreation. Attributes are part of the process for setting freshwater objectives and limits set out in central government’s <i>National Policy Statement for Freshwater Management 2014</i> .
<b>Attribute state</b>	Is the level to which an attribute is to be managed for those attributes specified in Appendix 2 of the <i>National Policy Statement for Freshwater Management 2014</i> .
<b>Best Practicable Option</b>	To prevent or minimise any actual or likely adverse effect on the environment of the discharge and other discharges (if any) made by the person from the same site or source.
<b>Controlled</b>	A resource consent is required for the activity and the consent

<b>activity</b>	authority must grant a resource consent. The consent authority's power to impose conditions on the resource consent is restricted to the matters over which control is reserved; and the activity must comply with the requirements, conditions, and permissions, if any, specified in the Act, regulations, plan, or proposed plan.
<b>Fresh Water Management Unit ( FMU)</b>	Central government's <i>National Policy Statement for Freshwater Management 2014</i> directs regional councils to identify areas called 'freshwater management units' (FMUs).  An FMU can be a water body, multiple water bodies or any part of a water body determined to be the appropriate scale for setting freshwater objectives and limits. The definition of FMUs is intentionally flexible so councils can determine the spatial scale best suited to managing fresh water in the specific circumstances of their region.
<b>Minimum acceptable state</b>	The minimum level, specified in Appendix 2 of the <i>National Policy Statement for Freshwater Management 2014</i> , at which a freshwater objective may be set in a regional plan in order to provide for the associated national value.
<b>National bottom line</b>	The minimum acceptable state for the compulsory values as specified in Appendix 2 of the <i>National Policy Statement for Freshwater Management 2014</i> .
<b>Non-Complying activity</b>	Requires resource consent. May be granted, subject to gateway test which is that the adverse effects of the activity on the environment will be minor or the application is for an activity that will not be controlled to the objectives and policies of a relevant plan or proposed plan. May impose consent conditions. Full discretion.
<b>Permitted activity</b>	No resources consent required. Must comply with conditions in the plan.
<b>Prohibited activity</b>	Consents cannot be applied for.

## 24 Appendices

### Appendix 1: *Vision and Strategy for the Waikato River/Te Ture Whaimana o Te Awa o Waikato*

#### 1. Vision

- (1) Tooku awa koiora me oona pikonga he kura tangihia o te maataamuri. The river of life, each curve more beautiful than the last.
- (2) 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.
- (3) In order to realise the vision, the following objectives will be pursued:
  - (a) the restoration and protection of the health and wellbeing of the Waikato River:
  - (b) the restoration and protection of the relationships of Waikato-Tainui with the Waikato River, including their economic, social, cultural, and spiritual relationships:

- (c) the restoration and protection of the relationships of Waikato River iwi according to their tikanga and kawa with the Waikato River, including their economic, social, cultural, and spiritual relationships:
- (d) the restoration and protection of the relationships of the Waikato Region's communities with the Waikato River, including their economic, social, cultural, and spiritual relationships:
- (e) the integrated, holistic, and coordinated approach to management of the natural, physical, cultural, and historic resources of the Waikato River:
- (f) the adoption of a precautionary approach towards decisions that may result in significant adverse effects on the Waikato River and, in particular, those effects that threaten serious or irreversible damage to the Waikato River:
- (g) the recognition and avoidance of adverse cumulative effects, and potential cumulative effects, of activities undertaken both on the Waikato River and within the catchment on the health and wellbeing of the Waikato River:
- (h) the recognition that the Waikato River is degraded and should not be required to absorb further degradation as a result of human activities:
- (i) the protection and enhancement of significant sites, fisheries, flora, and fauna:
- (j) the recognition that the strategic importance of the Waikato River to New Zealand's social, cultural, environmental, and economic wellbeing requires the restoration and protection of the health and wellbeing of the Waikato River:
- (k) the restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length:
- (l) the promotion of improved access to the Waikato River to better enable sporting, recreational, and cultural opportunities:
- (m) the application to the above of both maatauranga Maaori and the latest available scientific methods.

## 2. Strategy

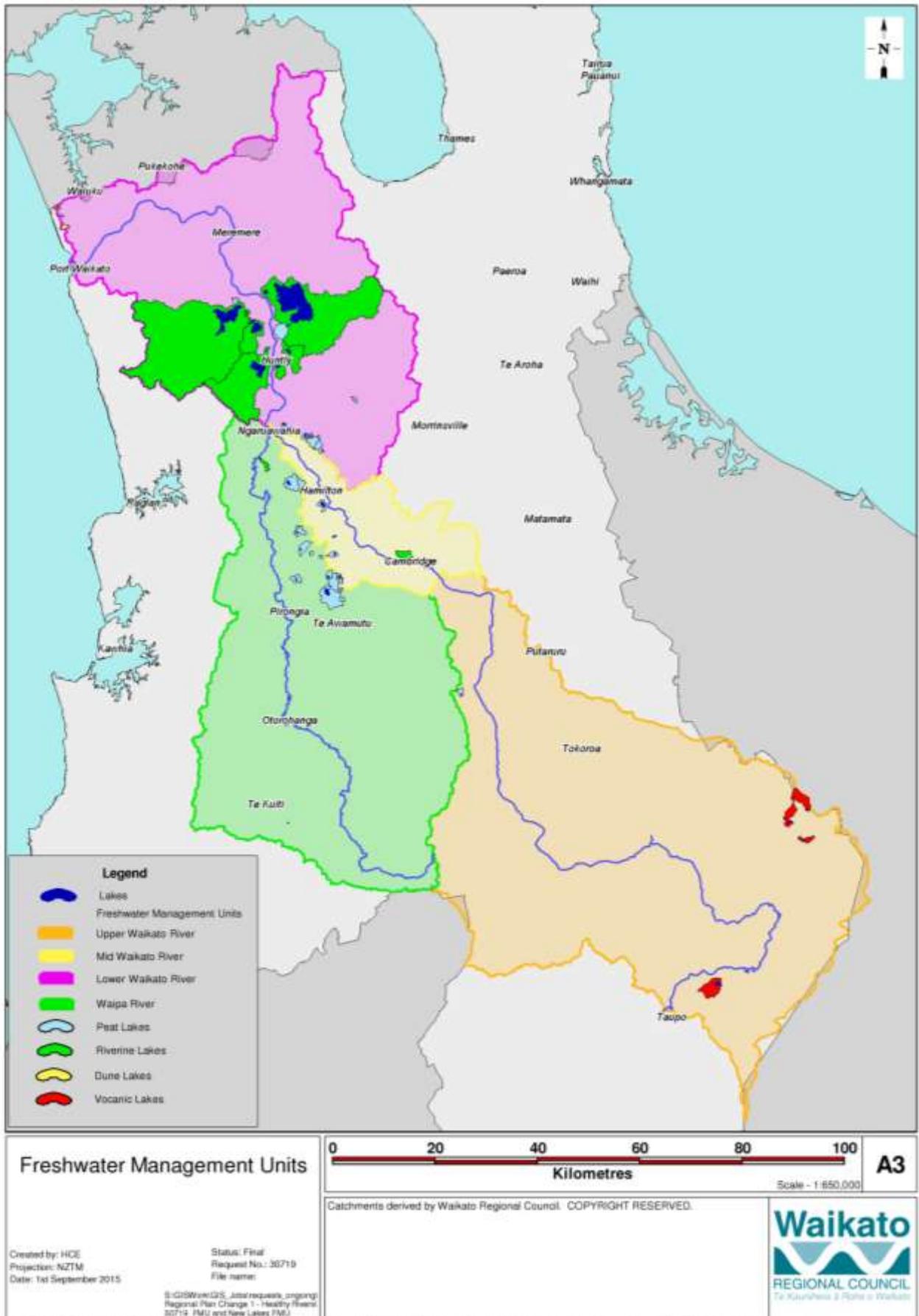
To achieve the vision, the following strategies will be followed:

- (a) ensure that the highest level of recognition is given to the restoration and protection of the Waikato River:
- (b) establish what the current health status of the Waikato River is by utilising maatauranga Maaori and the latest available scientific methods:
- (c) develop targets for improving the health and wellbeing of the Waikato River by utilising maatauranga Maaori and the latest available scientific methods:
- (d) develop and implement a programme of action to achieve the targets for improving the health and wellbeing of the Waikato River:
- (e) develop and share local, national, and international expertise, including indigenous expertise, on rivers and activities within their catchments that may be applied to the restoration and protection of the health and wellbeing of the Waikato River:
- (f) recognise and protect waahi tapu and sites of significance to Waikato-Tainui and other Waikato River iwi (where they do decide) to promote their cultural, spiritual, and historic relationship with the Waikato River:
- (g) recognise and protect appropriate sites associated with the Waikato River that are of significance to the Waikato regional community:
- (h) actively promote and foster public knowledge and understanding of the health and wellbeing of the Waikato River among all sectors of the Waikato regional community:
- (i) encourage and foster a "whole of river" approach to the restoration and protection of the Waikato River, including the development, recognition, and promotion of best practice methods for restoring and protecting the health and wellbeing of the Waikato River:
- (j) establish new, and enhance existing, relationships between Waikato-Tainui, other Waikato River iwi (where they so decide), and stakeholders with an

interest in advancing, restoring, and protecting the health and wellbeing of the Waikato River:

- (k) ensure that cumulative adverse effects on the Waikato River of activities are appropriately managed in statutory planning documents at the time of their review:
- (l) ensure appropriate public access to the Waikato River while protecting and enhancing the health and wellbeing of the Waikato River.

## Appendix 2: Detailed map of freshwater management units



## Appendix 3: Attribute state band thresholds

Table 10: Attribute states band thresholds

Attribute unit	Attribute state and numeric*	Attribute state and numeric*			
		A	B	C	D
<i>E. coli</i> ( <i>E.coli</i> /100mL)	95 <sup>th</sup> percentile	≤260	>260 and ≤540	>540 and ≤ <b>1000</b>	>1000
Clarity (m)	Black disk	≥3	<3 and ≥ 1.6	<1.6 and ≥1	<1.0
Cyanobacteria (planktonic)					
Phytoplankton (mg/m <sup>3</sup> )	Annual median	≤2	>2 and ≤5	>5 and ≤ <b>12</b>	>12
	Annual maximum	≤10	>10 and ≤25	>25 and ≤ <b>60</b>	>60
Total Nitrogen (mg/m <sup>3</sup> )	Annual median Seasonally stratified	≤160	>160 and ≤ 350	>350 and ≤ <b>750</b>	>750
	Annual median Polymictic	≤300	>300 and ≤500	>500 and ≤ <b>800</b>	>800
Total Phosphorus (mg/m <sup>3</sup> )	Annual median	≤10	>10 and ≤20	>20 and ≤ <b>50</b>	>50
Nitrate (mg NO <sub>3</sub> -N/L <sup>3</sup> )	Annual median	≤1.0	>1.0 and ≤2.4	>2.4 and ≤ <b>6.9</b>	>6.9
	Annual 95 <sup>th</sup> percentile	≤1.5	>1.5 and ≤3.5	>3.5 and ≤ <b>9.8</b>	>9.8
Ammonia (mg NH <sub>4</sub> -N/L <sup>3</sup> )	Annual median	≤0.03	>0.03 and ≤0.24	>0.24 and ≤ <b>1.30</b>	>1.30
	Annual maximum	≤0.05	>0.05 and ≤0.40	>0.40 and ≤ <b>2.20</b>	>2.20
<i>E. coli</i> ( <i>E.coli</i> /100mL)	95 <sup>th</sup> percentile	≤260	>260 and ≤540	>540 and ≤ <b>1000</b>	>1000
Cyanobacteria (planktonic) (Biovolume mm <sup>3</sup> /L)	80 <sup>th</sup> percentile	≤0.5	N/A	>0.5 and ≤ <b>1.8</b> potentially toxic cyanobacteria OR >0.5 and ≤ <b>10</b> total biovolume all cyanobacteria	>1.8 potentially toxic cyanobacteria OR >10 total biovolume all cyanobacteria

\*The number in bold is the national bottom line; for *E.coli* the minimum acceptable state for activities involving full immersion is 540 *E.coli*/100mL.

## Appendix 4: Long term numerical water quality limits for the Waikato and Waipa River catchment

### Objective 1: Restoration and protection of water quality in the Upper Waikato River Freshwater Management Unit

Point and non-point source discharges to land and water are managed so that water quality in the Upper Waikato River is protected and restored by 2096, as indicated by the following numeric attribute states:

Site	Median Chlorophyll a (mg/m <sup>3</sup> )			Maximum Chlorophyll a (mg/m <sup>3</sup> )			Median Total Nitrogen (mg/m <sup>3</sup> )			Median Total Phosphorus (mg/m <sup>3</sup> )		
	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		√	A	10		A		√	A		√
Waikato River Ohakuri Tailrace Br	A	2		A	10		A	160		B		√
Waikato River Whakamaru Tailrace	A	2		A	10		A	160		B		√
Waikato River Waipapa Tailrace	A	2		A	10		A	160		B	10	

Site	Median Nitrate (mg NO <sub>3</sub> -N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> -N/L)			Median Ammonia (mg NH <sub>4</sub> -N/L)			Maximum Ammonia (mg NH <sub>4</sub> -N/L)			95 <sup>th</sup> percentile E. coli (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		√	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		√	-	-	-
Waiotapu Stm Homestead Rd	A	1.0		A	1.5		A	0.03		A	0.05		B		√	-	-	-

Site	Median Nitrate (mg NO <sub>3</sub> <sup>-</sup> N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> <sup>-</sup> N/L)			Median Ammonia (mg NH <sub>4</sub> <sup>-</sup> N/L)			Maximum Ammonia (mg NH <sub>4</sub> <sup>-</sup> N/L)			95 <sup>th</sup> percentile E. coli (E. coli/100mL)			Clarity (metres)		
Br																		
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	
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	1.0	
Tahunaatara Stm Ohakuri Rd	A		√	A		√	A		√	A		√	B	540		B	1.6	
Mangaharake 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	
Mangamingi Stm Paraonui Rd Br	B	2.4		A	1.5		A	0.03		A	0.05		B	540		C	1.0	
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	Median Chlorophyll a (mg/m3)	Maximum Chlorophyll a (mg/m3)	Median Total Nitrogen (mg/m3)	Median Total Phosphorus (mg/m3)	Median Nitrate (mg/l)	95th percentile Nitrate (mg/l)	Median ammonia (mg/l)	Maximum ammonia (mg/l)	95th percentile Ecoli (Ecoli/100 ml)	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

## Objective 2: Restoration and protection of water quality in the Middle Waikato River Freshwater Management Unit

Point and non-point source discharges to land and water are managed so that water quality in the Middle Waikato River is protected and restored by 2096, as indicated by the following numeric attribute states:

Site	Median Chlorophyll a (mg/m <sup>3</sup> )			Maximum Chlorophyll a (mg/m <sup>3</sup> )			Median Total Nitrogen (mg/m <sup>3</sup> )			Median Total Phosphorus (mg/m <sup>3</sup> )		
	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		A	10		B	350		B	20	
Waikato River Horotiu Br	B	5		A	10		B	350		B	20	

Site	Median Nitrate (mg NO <sub>3</sub> -N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> -N/L)			Median Ammonia (mg NH <sub>4</sub> -N/L)			Maximum Ammonia (mg NH <sub>4</sub> -N/L)			95 <sup>th</sup> percentile E. coli (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 Narrows Boat Ramp	A		√	A		√	A		√	A		√	A	260		B		√
Waikato River Horotiu Br	A		√	A		√	A		√	A		√	B	540		B	1.6	
Karapiro Stm Hickey Rd Bridge	A		√	A	1.5		A		√	A		√	B	540		C	1.0	
Mangawhero Stm Cambridge-Ohaupo Rd	A	1.0		A	1.5		A	0.03		A	0.05		B	540		C	1.0	
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 Peacockes Rd	A		√	A	1.5		A	0.03		A	0.05		B	540		C	1.0	
Waitawhiriwhiri Stm Edgumbe Street	A		√	A	1.5	√	B	0.24		A	0.05		B	540		C	1.0	
Kirikiroa 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	Station	Median Chlorophyll a (mg/m3)	Maximum Chlorophyll a (mg/m3)	Median Total Nitrogen (mg/m3)	Median Total Phosphorus (mg/m3)	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)
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	Hickey Rd Bridge			860	86	0.520	1.710	0.008	0.031	4960	0.93
Mangawhero Stm	Cambridge-Ohaupo Rd			2930	210	2.100	2.600	0.042	0.074	3185	0.25
Mangaonua Stm	Hoeka Rd			1905	54	1.505	1.920	0.037	0.052	7020	0.94
Mangaone Stm	Annebrooke Rd Br			3060	118	2.600	3.100	0.009	0.020	2220	0.97
Mangakotukutuku Stm	Peacockes Rd			1875	415	0.800	1.820	0.082	0.141	12600	0.41
Waitawhiriwhiri Stm	Edgecumbe Street			2110	91	0.880	1.240	0.258	0.347	6520	0.38
Kirikiroa Stm	Tauhara Dr			1490	63	0.815	1.580	0.103	0.198	2300	0.40

### Objective 3: Restoration and protection of water quality in the Lower Waikato River Freshwater Management Unit

Point and non-point source discharges to land and water are managed so that water quality in the Lower Waikato River is protected and restored by 2096, as indicated by the following numeric attribute states:

Site	Median Chlorophyll a (mg/m3)			Maximum Chlorophyll a (mg/m3)			Median Total Nitrogen (mg/m <sup>3</sup> )			Median Total Phosphorus (mg/m <sup>3</sup> )		
	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		A	10		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	

Site	Median Nitrate (mg NO <sub>3</sub> -N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> -N/L)			Median Ammonia (mg NH <sub>4</sub> -N/L)			Maximum Ammonia (mg NH <sub>4</sub> -N/L)			95 <sup>th</sup> percentile E. coli (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 Huntly-Tainui Br	A		√	A		√	A		√	A		√	B	540		C		1.0
Waikato River Mercer Br	A		√	A		√	A		√	A		√	B	540		-	-	-
Waikato River Tuakau Br	A		√	A		√	A		√	A		√	B	540		C		1.0
Komakorau Stm Henry Rd	A	1.0		B	3.5		B	0.24		B	0.40		B	540		C	1.0	
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		√	A	0.05		B	540		C	1.0	
Matahuru Stm Waiterimu Road Below Confluence	A		√	A	1.5		A		√	A	0.05		B	540		C	1.0	
Whangape Stm Rangiriri-Glen Murray	A		√	A		√	A		√	A	0.05		B	540		C	1.0	

Site	Median Nitrate (mg NO <sub>3</sub> <sup>-</sup> N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> <sup>-</sup> N/L)			Median Ammonia (mg NH <sub>4</sub> <sup>-</sup> N/L)			Maximum Ammonia (mg NH <sub>4</sub> <sup>-</sup> N/L)			95 <sup>th</sup> percentile E. coli (E. coli/100mL)			Clarity (metres)		
Rd			√	A		√	A		√	A		√	B	540		C	1.0	
Waerenga Stm SH2 Maramarua	A		√	A	1.5		A		√	A	0.05		B	540		C	1.0	
Whangamarino River Jefferies Rd Br	A		√	A		√	A		√	A		√	B	540		C	1.0	
Mangatangi River SH2 Maramarua	A		√	A		√	A		√	A		√	B	540		C	1.0	
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) Otatau 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	Station	Median Chlorophyll a (mg/m3)	Maximum Chlorophyll a (mg/m3)	Median Total Nitrogen (mg/m3)	Median Total Phosphorus (mg/m3)	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)
Waikato River	Huntly-Tainui Br	6	19	585	45	0.365	0.900	0.005	0.015	2100	0.87
Waikato River	Mercer Br	10.5	30	662	52	0.365	0.870	0.003	0.010	1600	•
Waikato River	Tuakau Br	12	38	595	53	0.325	0.880	0.003	0.008	1700	0.61
Komakorau Stm	Henry Rd			2900	90	1.310	4.500	0.251	0.421	3800	0.17
Mangawara Stm	Rutherford Rd Br			1890	210	0.765	2.900	0.111	0.185	5445	0.25

Awaroa Stm (Rotowaro)	Sansons Br @ Rotowaro-Huntly Rd		990	12	0.700	1.190	0.021	0.093	1940	0.81
Matahuru Stm	Waiterimu Road Below Confluence		1310	98	0.715	1.710	0.016	0.060	6770	0.31
Whangape Stm	Rangiriri-Glen Murray Rd		2116	122	0.004	0.690	0.006	0.143	589	0.17
Waerenga Stm	Taniwha Rd		1115	46	0.820	1.410	0.005	0.022	5605	0.84
Whangamarino River	Jefferies Rd Br		1085	89	0.625	1.880	0.011	0.055	5175	0.51
Mangatangi River	SH2 Maramarua		493	72	0.110	1.120	0.005	0.038	6125	0.54
Mangatawhiri River	Lyons Rd At Buckingham Br		181	23	0.013	0.370	0.003	0.011	5615	1.63
Whangamarino River	Island Block Rd		1831	152	0.075	0.700	0.012	0.158	668	0.20
Whakapipi Stm	SH22 Br		3875	51	3.500	5.300	0.006	0.084	1910	1.10
Ohaeroa Stm	SH22 Br		1825	26	1.525	1.840	0.003	0.015	5125	0.81
Opuatia Stm	Ponganui Rd		1070	31	0.740	1.060	0.005	0.016	3160	0.53
Awaroa River (Waiuku)	Otaua Rd Br opp Moseley Rd		2095	47	1.410	2.400	0.021	0.144	1070	0.37

#### Objective 4: Restoration and protection of water quality in the Waipa River Freshwater Management Unit

Point and non-point source discharges to land and water are managed so that water quality in the Waipa River is protected and restored by 2096, as indicated by the following numeric attribute states:

Site	Median Nitrate (mg NO <sub>3</sub> -N/L)			95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> -N/L)			Median Ammonia (mg NH <sub>4</sub> -N/L)			Maximum Ammonia (mg NH <sub>4</sub> -N/L)			95 <sup>th</sup> percentile E. coli (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-Ngutunui Rd Br	A		√	A		√	A		√	A		√	B	540		C	1.0	
Waipa River Whatawhata Bridge	A		√	A		√	A		√	A		√	B	540		C	1.0	
Ohoite Stm Whatawhata/Horotiu Rd	A		√	A		√	A		√	A	0.03		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	0.03		B	540		C	1.0	
Mangaohoi Stm South Branch Maru Rd	A		√	A		√	A		√	A		√	B	540		B	1.6	
Mangauika Stm Te Awamutu Borough W/S Intake	A		√	A		√	A		√	A		√	B	540		A		√
Puniu River Bartons	A		√	A		√	A		√	A		√	B	540		C	1.0	

Site	Median Nitrate (mg NO <sub>3</sub> -N/L)		95 <sup>th</sup> percentile Nitrate (mg NO <sub>3</sub> -N/L)		Median Ammonia (mg NH <sub>4</sub> -N/L)		Maximum Ammonia (mg NH <sub>4</sub> -N/L)		95 <sup>th</sup> percentile E. coli (E. coli/100mL)		Clarity (metres)	
Corner Rd Br												
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	Station	Median Chlorophyll a (mg/m3)	Maximum Chlorophyll a (mg/m3)	Median Total Nitrogen (mg/m3)	Median Total Phosphorus (mg/m3)	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	Mangaokewa Rd			85	16	0.380	0.600	0.003	0.017	2625	1.51
Waipa River	Otewa			366	20	0.228	0.502	0.003	0.008	2203	2.13
Waipa River	SH3 Otorohanga			600	23	0.370	1.050	0.004	0.020	3595	1.11
Waipa River	Pirongia-Ngutunui Rd Br			860	49	0.565	1.270	0.008	0.023	4875	0.63
Waipa River	Whatawhata Bridge			911	71	0.673	1.319	0.009	0.026	4003	0.59
Ohote Stm	Whatawhata/Horotiu Rd			1320	76	0.495	1.370	0.023	0.053	2320	0.55
Kaniwhaniwha Stm	Wright Rd			590	29	0.350	0.890	0.007	0.022	2070	0.87
Mangapiko Stm	Bowman Rd			2095	240	1.410	2.600	0.022	0.079	7800	0.60
Mangaohoi Stm	South Branch Maru Rd			365	53	0.230	0.390	0.003	0.008	987	1.56
Mangauika Stm	Te Awamutu Borough W/S Intake			275	8	0.210	0.280	0.002	0.003	1060	3.33
Puniu River	Bartons Corner Rd Br			910	48	0.650	1.280	0.007	0.029	3040	0.94
Mangatutu Stm	Walker Rd Br			510	20	0.380	0.880	0.003	0.012	760	1.53
Waitomo Stm	SH31 Otorohanga			755	31	0.520	0.830	0.008	0.025	1555	0.59
Mangapu River	Otorohanga			1235	60	0.860	1.360	0.015	0.058	4700	0.61
Waitomo Stm	Tumutumu Rd			765	22	0.630	0.800	0.004	0.013	2430	1.00
Mangaokewa Stm	Lawrence Street Br			780	36	0.530	0.980	0.004	0.013	6855	1.41

## Objective 5: Restoration and protection of water quality in the Dune, Lowland Riverine, Volcanic and Peat Lakes Freshwater Management Units

Point and non-point source discharges to land and water are managed so that water quality in the Dune, Lowland Riverine, Volcanic and Peat Lakes is protected and restored by 2096, as indicated by the following numeric attribute states:

Lake FMU	Median Chlorophyll a (mg/m <sup>3</sup> )		Maximum Chlorophyll a (mg/m <sup>3</sup> )		Medial total Nitrogen (mg/m <sup>3</sup> )		Medial total Phosphorus (mg/m <sup>3</sup> )		95 <sup>th</sup> percentile E.coli (E.coli/100ml)		80 <sup>th</sup> percentile cyanobacteria (biovolume mm <sup>3</sup> /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 <sup>+</sup>	C	1
Riverine	C	12	C	60	C	800	C	50	B	540	C	1.8 <sup>+</sup>	C	1
Volcanic	C	12	C	60	C	750	C	50	B	540	C	1.8 <sup>+</sup>	C	1
Peat	C	12	C	60	C	750	C	50	B	540	C	1.8 <sup>+</sup>	C	1

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

+1.8mm<sup>3</sup>/L biovolume equivalent of potentially toxic cyanobacteria or 10mm<sup>3</sup>/L total biovolume of all cyanobacteria

### Current state data for monitored lakes

Lake	FMU	Median Chlorophyll a (mg/m <sup>3</sup> )	Maximum Chlorophyll a (mg/m <sup>3</sup> )	Medial total Nitrogen (mg/m <sup>3</sup> )	Medial total Phosphorus (mg/m <sup>3</sup> )	95 <sup>th</sup> percentile E.coli (E.coli/100ml)	80 <sup>th</sup> percentile cyanobacteria (biovolume mm <sup>3</sup> /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
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	

Lake	FMU	Median Chlorophyll a (mg/m <sup>3</sup> )	Maximum Chlorophyll a (mg/m <sup>3</sup> )	Medial total Nitrogen (mg/m <sup>3</sup> )	Medial total Phosphorus (mg/m <sup>3</sup> )	95 <sup>th</sup> percentile E.coli (E.coli/100ml)	80 <sup>th</sup> percentile cyanobacteria (biovolume mm <sup>3</sup> /L)
Milicich	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
Tutaeinanga	Volcanic	15	180	1600	160	0.02	
Ngahewa	Volcanic	32	100	950	140	0.01	