Waipaoa Catchment Planning Advisory Group – Hui 4

Date: 11 October 2023

Title of report: Water quality in the Waipaoa Catchment

Report no: 2

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Purpose of this report

This report provides information to the Advisory Group (the Group) on:

- how the National Objectives Framework (NOF) manages water quality
- what target attribute states are
- how to decide what target attribute states should be in the catchment
- the current state of water quality in the catchment
- which land uses are primarily involved in generating different water quality contaminants and how that impacts on freshwater values
- some of the types of actions that were included in the current Freshwater Plan and Waipaoa Catchment Plan and how effective they have been at improving water quality.

Outcomes sought

- Members of the Group understand the key water quality issues for the Waipaoa Catchment.
- Members become more familiar with the process of identifying the target attribute state for water quality attributes.

Getting ready for the hui

Please familiarise yourself with the terminology used in this report prior to the hui.

What is an attribute?

An attribute is something we measure to indicate the health of a waterbody or catchment and how well it might provide for the freshwater values found there. Different attributes provide measures for different values. For example, the attribute 'E. coli' provides a measure of how safe a stream or river is for swimming. Attributes can be numerical (like a concentration), a narrative (describing a characteristic), or both.

What is meant by 'baseline attribute state'?

Baseline attributes are a list of fields that have a predefined expected value.

***Baseline state**, in relation to an attribute, means the best state out of the following:*

(a) the state of the attribute on the date it is first identified by a regional council under clause 3.10(1)(b) or (c)

(b) the state of the attribute on the date on which a regional council set a freshwater objective for the attribute under the National Policy Statement for Freshwater Management 2014 (as amended in 2017)

(c) the state of the attribute on 7 September 2017.

What is a target attribute state?

A target attribute state is the state of the attribute that needs to be achieved to fulfil the associated objectives, outcomes, values and vision.

What are interim targets?

Interim is used to describe something that is intended to be used until something permanent is done or established.

Table of Contents

1 Introduction

This report outlines how water quality needs to be managed in a catchment plan under the National Objectives Framework (NOF) and what water quality attributes are. It introduces the ideas of **baseline attribute state, target attribute state, interim targets, plan methods and action plans.**

This report also summarises the state of the water quality by Freshwater Management Unit (FMU) for the catchment. Because there is an existing Waipaoa Catchment Plan, the report also provides information on how well things have gone in meeting the objectives and targets of the current Waipaoa Catchment Plan and the implications of that for the development of the new Waipaoa Catchment Plan.

This information will enable group members to start working on what might be target attribute states and the timeframes and priorities to achieve these. We will continue to work on these at a future hui.

2 How the NOF manages water

2.1 Water quality attributes[1]

Section 3.10 of the National Policy Statement for Freshwater Management (NPS-FM) sets out the requirements for water quality attributes under the NOF. It states:

(1) For each value that applies to an FMU or part of an FMU, the regional council:

> *(a) must use all the relevant attributes identified in Appendix 2A and 2B for the compulsory values listed (except where specifically provided otherwise); and*
>
> *(b) may identify other attributes for any compulsory value; and*
>
> *(c) must identify, where practicable, attributes for all other applicable values; and*
>
> *(d) if attributes cannot be identified for a value, or if attributes are insufficient to assess a value, must identify alternative criteria to assess whether the environmental outcome of the value is being achieved.*

(2) Any attribute identified by a regional council under subclause (1)(b) or (c) must be specific and, where practicable, be able to be assessed in numeric terms.

(3) Every regional council must identify the baseline state of each attribute.

(4) Attribute states and baseline states may be expressed in a way that accounts for natural variability and sampling error.

This tells us that for each value, we are required to identify attributes to measure the value. Attributes must be specific and should be assessed in numeric terms where practicable. The NPS-FM includes a list of attributes that we must use for two of four of its compulsory values: ecosystem health and human contact.

We may identify other attributes for measuring these values to align with the aspirations of tangata whenua and communities.

[1] An attribute is a thing we measure to indicate the health of a waterbody or catchment and how well it might provide for the freshwater values found there. Different attributes provide measures for different values. For example, measurements of the bacterium E. coli provide a measure of how safe a stream or river is for swimming.

The NPS-FM does not include any compulsory attributes for its other two compulsory values – mahinga kai and threatened species – so we'll need to identify these attributes.

If attributes can't be identified, or they are insufficient to assess a value, we are able to identify alternative criteria to assess whether the environmental outcome for a value is being achieved.

2.1.1 Compulsory attributes

As outlined above, the NOF sets required attributes in the NPS-FM appendices[2]. There are two types of attributes – attributes requiring limits on resource use and attributes requiring action plans.

Attributes requiring limits on resource use will usually be those that drive a regulatory response and rules in the draft Plan (Appendix 2A attributes).

Attributes requiring action plans will drive the content of the action plans (Appendix 2B attributes).

However, the Council can choose to use action plans as one of the tools to achieve targets set for both types of attributes.

2.1.2 Tairāwhiti-specific attributes

The NOF also allows for catchment–specific and/or region-specific attributes.

Council's Science staff have looked in detail at the water quality of Tairāwhiti and the Waipaoa Catchment and have identified some region-specific attributes that they recommend are included in all draft catchment plans. These are:

- **Rapid habitat assessment** – this is an attribute that supports the Natural Form and Character value, as well as Ecosystem Health and Mahinga Kai. Council has reasonable records of this attribute for sites across the Waipaoa Catchment Plan area.
- **Heavy metals – zinc and copper** – these are attributes that primarily relate to urban activities and support Ecosystem Health and Mahinga Kai in urban waterways. Council has reasonable records of these attributes for sites within the Gisborne Urban Area.
- **Temperature** – this is an attribute that primarily relates to Ecosystem Health and Fish. It was included as an attribute in the operative Waipaoa Catchment Plan. While Council has some data in relation to temperature, it plans to undertake further monitoring over summer to build up a better picture of the state of temperature in smaller streams across the Waipaoa Catchment.

The above attributes are proposed as action planning attributes, not as limit setting attributes in the draft Plan.

Appendix 1 of this report outlines the NOF and Tairāwhiti-specific attributes and the types of values that have been identified so far that this attribute relates to. Many attributes link to aquatic ecosystem health – for example macroinvertebrate community index (MCI), dissolved oxygen, nitrate toxicity. You will see in the appendix, that things which relate to aquatic ecosystem health also relate to values such as mahinga kai.

[2] Values and attributes | Ministry for the Environment

Through the process of identifying values and environmental outcomes it may be that the attributes identified so far are not sufficient to enable an assessment of the success at achieving the environmental outcomes. The NOF allows for more attributes to be identified if necessary and this can be done through the catchment planning process.

Further in-depth data can be explored on the Land Air Water Aotearoa website (LAWA) – for example more information on monitored sites in the Waipaoa River catchment

2.2 NOF bands and baseline attribute states

2.2.1 Baseline attribute states

The NOF[3] requires that all attributes have a baseline state identified. The baseline state is defined as:

> ***baseline state**, in relation to an attribute, means the best state out of the following:*
>
> *(a) the state of the attribute on the date it is first identified by a regional council under clause 3.10(1)(b) or (c)*
>
> *(b) the state of the attribute on the date on which a regional council set a freshwater objective for the attribute under the National Policy Statement for Freshwater Management 2014 (as amended in 2017)*
>
> *(c) the state of the attribute on 7 September 2017*

Because there is an existing Waipaoa Catchment Plan, developed under the NPS-FM 2014 clause (b) of this definition applies for some of the attributes.

However, there are more attributes in the NPS-FM 2020 than the NPSFM 2014, which was used to develop the operative Waipaoa Catchment Plan. This means we have a mix of dates at which the Baseline Attribute State is set – some from the Waipaoa Catchment Plan and identified in 2015, and others based on the state on 7 September 2017.

To make things more complicated, the Council water quality data used for the current Waipaoa Catchment Plan wasn't as good as is it is now. This means for three attributes (Nitrate, E.coli and Ammonia) the 7 September 2017 state is proposed as the baseline state for the new Waipaoa Catchment Plan.

If you are interested in the detail of this, we can provide the Water Quality report and recommendations to support this decision for you.

2.2.2 Attribute bands and national bottom lines

The NOF uses a 'banding system' to communicate what the water quality measurements for different attributes mean and sets national bottom lines.

'A bands' and 'B bands' are identified for all attributes.

A band: If the attribute value falls within the 'A band', then on a comparison at a national level, this could be regarded as good water quality for that attribute.

[3] clause 3.10 (3)

B band: a 'B band' means that there is impact.

Other: for some attributes there are also 'C, D and E bands' – this reflects the degree to which water quality has degraded for some attributes, at a national level.

In Appendix 2 you will see how the banding system works in practice. A 'traffic light' system is used with A Band being green, B Band yellow, C Band orange, D band/below national bottom line red and E band bright red.

The NOF also sets national bottom lines for some attributes. If the water quality for that attribute falls below a national bottom line, then action **must** be taken by the Council to improve water quality for that attribute and target attribute states **must** be set to achieve the national bottom line. The below table illustrates the 'bottom line' for the required attributes:

Attribute	National bottom line
Attributes requiring limits on resource use	
Phytoplankton (lakes) mg chl-a/m^3	Annual Median **12** Annual Maximum **60**
Periphyton (rivers) mg chl-a/m^3	Exceeded in no more than 8% of samples **200**
Total Nitrogen (lakes) mg/m^3	Stratified and Brakish Lakes Annual Median **750** Polymictic Lakes Annual Median **800**
Total Phosphorus (lakes) mg/m^3	Annual Median **50**
Ammonia (toxicity) mg NH_4 -N/L	Annual Median **0.24** 95th Percentile **0.4**
Nitrate (toxicity) mg NO_3 -N/L	Annual Median **2.4** 95th Percentile **3.5**
Dissolved oxygen (rivers below point sources) mg/L	7 Day mean minimum summer **5.0** 1 day minimum summer **4.0**
Suspended fine sediment (rivers) Visual clarity in metres	Class 1 **1.34** Class 2 **0.61** Class 3 **2.22** Class 4 **0.98**
Cyanobacteria (lakes and lake fed rivers) Biovolume mm^3/L	80th Percentile **1.8 mm^3/L** biovolume equivalent of potentially toxic cyanobacteria OR **10 mm^3/L** total biovolume of all cyanobacteria
Attributes requiring action plans	
Submerged Plants (natives in lakes) Native condition index	% of maximum potential score **20%**
Submerged Plants (invasives in lakes) Invasic index	% of maximum potential score **90%**
Macroinvertebrates (wadeable rivers) MCI QMCI and ASPM	QMCI **4.5** MCI **90** ASPM **0.3**
Deposited Fie sediment (wadeable rivers) % fine sediment cover	Class 1 **21** Class 2 **29** Class 3 **27** Class 4 **27**
Dissolved oxygen (rivers) mg/L	7 Day mean minimum **5.0** 1 day minimum **4.0**

Lake bottom dissolved oxygen (lakes) mg/L	Annual minimum **0.5**
E. coli (primary contact sites) 95th percentile of *E.coli*/100mL	540

2.3 Target attribute states

Section 3.11 of the NOF requires us to set target attribute states as part of the catchment plan process. Target attribute states must be set for **all** attributes (whether they are for action planning or limits on resource use) and must have a location where they are monitored. The target attribute state **must** be set **at or above** the baseline state for that attribute.

If the baseline state is below the national bottom line, then the target attribute state **must** be set **at or above** the national bottom line.

Section 3.32 of the NOF does recognise that there are times when meeting a national bottom line may not be achievable due to a naturally occurring process.

Target attribute states must set a time for which they will be achieved – and if this is more than 10 years, then interim targets must be set.

Critically**, the target attribute states must be set to achieve the environmental outcomes.**

3. Water quality and baseline attribute states in the Waipaoa Catchment

This section summarises the water quality and the baseline attribute states for some key attributes within a FMU context.

This is largely what the water quality was like in **September 2017**. Appendix 2 contains summary tables of the baseline attribute state for all the attributes, colour coded by band for ease of viewing.

Appendix 3 provides a map of the water quality sites within the Waipaoa Catchment which are discussed by FMU below.

3.1 Waipaoa Hill Country FMU

Council maintains four long-term water quality monitoring sites in this FMU – on the Wharekopae, Mangatu, Waikohu and Waingaromia rivers. Council also monitors 13 aquatic ecosystem health sites within this FMU.

A reference (unmodified) site has recently been added to this FMU at Waihirere Domain. This gives us a better picture of what the water quality would be like if there was no impact from human activities.

The water quality is slightly different at each of the sites, however in summary the baseline attribute state is:

Attribute	Baseline state
Ammonia toxicity	A or B band depending on location
Nitrate toxicity	A band

Dissolved reactive phosphorus	C band except the Wharekopae River is below the national bottom line
E.coli	A, B, C or D band. The Wharekopae River is below the national bottom line
Macroinvertebrates	Mainly C or D band. 9 of the 17 sites are below the national bottom line Reference site – Waihirere Domain is in the B band
Suspended fine sediment	D band and below the national bottom line at all sites except at Waihirere Domain which is in the B band

3.2 Tūranga Flats FMU

Council has five long-term water quality monitoring sites in this FMU – on the Waipaoa River (3 sites), Whakaahu Stream and Taruheru River. Council also has one additional site it monitors the aquatic ecosystem health at within this FMU. While located in the Waipaoa Hill Country FMU, the reference site at Waihirere Domain is also a useful comparator for this FMU as it is the headwaters of the Taruheru River.

The water quality is slightly different at each of the sites, however in summary the baseline attribute state is:

Attribute	Baseline state
Ammonia toxicity	A or B band depending on location except the Taruheru River is in the C band
Nitrate toxicity	A band except the Taruheru River is in the C Band
Dissolved reactive phosphorus	C band except the Taruheru River and Whakaahu Stream are in the D band and below the national bottom line
E.coli	In the D or E band
Macroinvertebrates	D band - all sites below the national bottom line
Suspended fine sediment	D band – all sites below the national bottom line

3.3 Te Arai Te Uru FMU

Council has one long-term water quality monitoring site in this FMU – at Pykes Weir on Te Arai Te Uru. Council also has five sites it monitors for aquatic ecosystem health within this FMU, one of which in Waterworks Bush which is a reference site.

The baseline state is:

Attribute	Baseline state
Ammonia toxicity	B band
Nitrate toxicity	A band
Dissolved reactive phosphorus	B band
E.coli	D band

Macroinvertebrates	D band and below the national bottom line except for reference site at Waterworks Bush which is in the B Band
Suspended fine sediment	A band

3.4 Gisborne Urban FMU

Council has nine long-term monitoring sites within this FMU – three on the Taruheru River, two on the Waikanae Stream, two on the Tūranganui River, one on Sistersons Drain and one on Awapuni Drain.

The water quality is slightly different at each of the sites, however in summary the baseline attribute state is:

Attribute	Baseline state
Ammonia toxicity	Mainly in the B band
Nitrate toxicity	A or B band
Dissolved reactive phosphorus	Mainly D band – most sites below national bottom line
E.coli	Mainly D band, however median levels at some sites are in the A band possibly due to clean seawater coming into the estuarine system
Macroinvertebrates	Not monitored at these sites – all are estuarine
Suspended fine sediment	D band

4 Setting target attribute states

We are required to set target attribute states that enable the environmental outcomes for the catchment and FMUs to be achieved – but it needs to be recognised that for many attributes, it will take time to turn things around. This means we will need to set interim (10-year) targets to allow for this.

The timeframes set for target attribute states should also reflect the priority of different attributes. It may be for example that in different FMUs there are different priorities, and this will impact on the timeframes to achieve different attribute states.

In setting the target attribute states, it is important to understand the implications for land use. To help understand this, some examples of the implications for percentage (%) reductions of contaminants required to move attribute bands are given below.

Taruheru River – Tūranga Flats FMU

Attribute	Baseline state	% Reduction required if move to C band	% Reduction required if move to B band	% Reduction required if move to A band
Nitrate toxicity – 95th percentile	C band 4.29 g/m^3	N/A	18%	65%
Dissolved reactive phosphorus – median	D band 0.12 g/m^3	83%	91%	94%

E.coli – 95th percentile	D band 1115 cfu/100mL	83%	86%	92%
Suspended sediment -median	D band 0.46m	33%	65%	102%

Wharekopae River – Waipaoa Hill Country FMU

Attribute	Baseline state	% Reduction required if move to C band	% Reduction required if move to B band	% Reduction required if move to A band
Dissolved reactive phosphorus – median	D band 0.026 g/m^3	5%	47%	68%
E.coli – median	E band 385 cfu/100mL	21%	61%	61%
Macroinvertebrates - QMCI	D band	N/A (met 2022)	20%	41%
Suspended sediment - median	D band 0.76m	76%	104%	134%

As you can see from the tables, where water quality attributes are very poor – it will require substantial change in many instances to turn this around and see improvements in water quality. While the target attribute state must be set to deliver on the environmental outcomes, the pace at which this is done will have a significant bearing on how this is achieved.

There are no 'silver bullets' to improving water quality. We will require a range of tools and actions to achieve the desired outcome.

5. Management tools

The principal methods in the Waipaoa Catchment Plan to address water quality problems are:

- A requirement for Farm Environment Plans from intensive stock grazing, vegetable growing and arable cropping land uses.
- A staged introduction in restrictions on stock access to waterways for intensive livestock uses.
- Requirements for setbacks from rivers for vegetable and arable cropping,
- The use of non-regulatory projects to support sub-catchment approaches to improving water quality.

A review of how well the current catchment plan is working has identified that many of these measures were only partly implemented or not implemented. There was a heavy reliance on farm planning combined with the non-regulatory projects to achieve the desired outcomes. Of the non-regulatory projects, only the Wharekopae River restoration (aimed at improving E.coli levels at Rere Falls and Rockslide) was fully funded.

The first five years of this project are now complete, and an analysis of the impacts on water quality has been undertaken. Overall, 18% of the catchment above the Rere Rockslide was fenced from stock, and other measures such as stock water reticulation were undertaken.

The post-intervention timeframe has been reasonably limited; however, there is no statistically significant trend of improvement at the Rere Falls and Rockslide. There is a statistically

significant trend in improvement at the Rangimoe monitoring site for the Wharekopae River – but this trend is similar to that observed throughout the Waipaoa Hill Country monitoring sites (where there is a long-term trend of improvement) and cannot be attributed to the project.

A key conclusion from this is that the reliance on permitted activity standards is not achieving the turnaround needed in water quality – and indeed many attributes show trends of degradation.

The implications of this are that when considering target attribute states and timeframes to achieve them, the greater the improvement in water quality and the shorter the timeframe, the more significant the changes to land use and activities will need to be.

6. Next steps

Hui 4 and 5 will focus on identifying the priorities for improvement in water quality and what the timeframes should be for these improvements. The Group will also start to look at what actions are required to achieve those improvements, including potential rules.

In parallel with this, there is further science work being undertaken looking at the nutrient levels in the Taruheru Catchment. The research is looking at what the drivers of these levels are and what some possible remedies could be.

As this further science work becomes available, this will be presented to the Group to inform discussion.

Appendix 1: Attributes and what values they relate to

Attributes	NPS-FM value that it relates to
National Objectives Framework attributes - attributes requiring limits on resource use	
Phytoplankton trophic state (lakes only)	• Ecosystem health • Mahinga kai • Threatened species • Natural form and character
Periphyton trophic state	• Ecosystem health • Mahinga kai • Threatened species • Natural form and character
Nitrate toxicity	• Ecosystem health • Mahinga kai • Threatened species • Drinking water supply
Ammonia toxicity	• Ecosystem health • Mahinga kai
Total nitrogen (Lakes only)	• Ecosystem health
Total phosphorus (Lakes only)	• Ecosystem health
Dissolved oxygen (below discharge points)	• Ecosystem health • Mahinga kai • Threatened species
E.coli	• Drinking water • Animal drinking water • Human contact – swimming • Mahinga Kai • Fishing • Transport and Tauranga Waka • Irrigation and Food Production
Cyanobacteria (lakes and lake fed rivers)	• Human contact – swimming • Drinking water • Mahinga Kai • Transport and tauranga waka • Animal drinking water
National Objectives Framework attributes - attributes requiring action plans	
Submerged native plants (lakes only)	• Ecosystem health • Mahinga kai • Threatened species
Submerged invasive plants (lakes only)	• Ecosystem health • Mahinga kai • Threatened species • Human contact – swimming • Transport and tauranga waka • Natural form and character
Fish (wadeable rivers)	• Ecosystem health • Mahinga kai • Threatened species • Fishing
Macroinvertebrates	• Ecosystem health • Mahinga kai • Threatened species • Fishing
Deposited fine sediment	• Ecosystem health • Mahinga kai • Threatened species • Fishing • Human contact – swimming

	• Natural form and character
Dissolved reactive phosphorus	• Ecosystem health
Dissolved oxygen	• Ecosystem health • Mahinga kai • Threatened species • Fishing
Ecosystem metabolism	• Ecosystem health • Mahinga kai • Threatened species • Fishing
Suspended fine sediment	• Ecosystem health • Mahinga kai • Threatened species • Fishing • Human contact – swimming • Natural form and character • Irrigation and food production • Animal drinking water
E.coli (primary contact sites)	• Human contact – swimming • Transport and tauranga waka • Mahinga kai • Fishing
Tairāwhiti – specific attributes – action planning only	
Temperature	• Ecosystem health • Mahinga kai • Threatened species
Rapid Habitat Assessment	• Ecosystem health • Mahinga kai • Threatened species • Natural form and character
Heavy metals – zinc and copper (urban areas only)	• Ecosystem health • Mahinga kai • Threatened species

Appendix 2: Summary baseline attribute state

A band	B band	C band	D & E bands

Waipaoa Hill Country FMU		
Attribute	**Monitoring sites**	**Baseline attribute band**
Limit setting attributes		
Ammonia (toxicity) (mg/L)	Wharekopae at Rangimoe Mangatu at Omapere Stn Waingaromia at Terrace Stn Waikohu at Mahaki Stn	Median B, 95th Percentile B Median A, 95th Percentile B Median A, 95th Percentile B Median A, 95th Percentile B
Nitrate (toxicity)	Wharekopae at Rangimoe Mangatu at Omapere Waingaromia at Terrace Waikohu at Mangatu	Median A, 95th Percentile A
Suspended fine sediment (visual clarity in metres)	Wharekopae at Rangimoe Mangatu at Omapere Waingaromia at Terrace Waikohu at Mangatu	Median D
	Waihirere at Domain (Reference site)	Median A
Escherichia coli (E.coli) (cfu/100mL)	Wharekopae at Rangimoe Mangatu at Omapere Waingaromia at Terrace Waikohu at Mangatu	E (Median 385, 95th Percentile 5950) D (Median 97, 95th Percentile 2050) D (Median 115 95th Percentile 1350) D (Median 125, 95th Percentile 5050)
Phytoplankton trophic state	Lake Repongare proposed site	D. Supertrophic – based on Lakes 380
Periphyton trophic state	Lake Repongare proposed site	D. Supertrophic – based on Lakes 380
Total nitrogen	Lake Repongare proposed site	D – based on Lakes 380
Total phosphorus	Lake Repongare proposed site	D– based on Lakes 380
Dissolved oxygen (below point source discharge)	None currently identified	
Cyanobacteria (lake fed rivers)	None currently identified	
Action Planning Attributes		
Fish (Fish index of Biotic Integrity)	Wharekopae at Rangimoe Mangatu at Omapere Waingaromia at Terrace Waikohu at Mangatu	Will be calculated based on eDNA testing this summer
Macro- invertebrates	Parihohonu Stream at SH2 Overbridge	MCI B, QMCI B, ASPM B
	Mangatu Trib Mangatu at Omapere Waikohu at Oliver Rd Waikohu at Mangatu Mangoai St at Mangoai Rd Waihuka at No 2 Bridge Waihirere Stream at Domain (Reference Site)	MCI B, QMCI C, ASPM B MCI C, QMCI C, ASPM B MCI B, QMCI C, ASPM B MCI B, QMCI C, ASPM B MCI C, QMCI C, ASPM B MCI C, QMCI C, ASPM B MCI B, QMCI C, ASPM B
	Waipaoa at Armstrong Road Waingaromia at Terrace Waikihu Trib at Whakarau Road	MCI C, QMCI D, ASPM D MCI D, QMCI D, ASPM D MCI D, QMCI D, ASPM D

Waipaoa Hill Country FMU		
Attribute	**Monitoring sites**	**Baseline attribute band**
	Waikohu River at No 3 Bridge Kurunui Stream at Holdsworth Bridge Wharekopae above Falls Wharekopae at Rangimoe Waikakariki Trib at Quarry	MCI D, QMCI D, ASPM D MCI D, QMCI D, ASPM D MCI C, QMCI D, ASPM C MCI C, QMCI D, ASPM C MCI D, QMCI D, ASPM D
Deposited Fine Sediment (percentage cover)	Waipaoa at Armstrong Road	C band
	Parihihonou Str at SH2 Overbridge Waikohu at Oliver Rd Waihuka River at No3 Br Mangaoai Str at Mangaoai Rd Wharekopae above Falls Waikohu at Mahaki Waingaromia at Terrace Wharekopae at Rangimoe Mangatu at Omapere Waihirere Str at Domain (**reference site**)	D band
Dissolved Reactive Phosphorus	Wharekopae at Rangimoe	Median D, 95th Percentile C
	Mangatu at Omapere Waingaromia at Terrace Waikohu at Mangatu	Median A, 95th Percentile B Median A, 95th Percentile B Median B 95th Percentile B
	Waihirere at Domain	
Escherichia coli (E.coli/100 mL) (Primary contact sites during the bathing season)	Wharekopae River at Rere Rockslide Wharekopae River at Rere Falls	Poor – below National Bottom Line Poor – below National Bottom Line
	Urukokomuka Stream	**Not known – insufficient sampling**
Ecosystem Metabolism (g O2/m2/day)	**Sites yet to be confirmed**	
Dissolved oxygen (mg/L)	Waingaromia at Terrace Station	B band
Submerged Plants – natives (Native Condition Index)	Lake Repongare proposed site	
Submerged plants – invasive species (Invasive Impact Index)	Lake Repongare proposed site	
Lake Bottom Dissolved Oxygen (mg/L)	Lake Repongare proposed site	
Rapid Habitat Assessment	Waihirere Str at Domain (reference site)	Median 85
	Mangatu Trib Mangatu at Omapere Waikohu at Oliver Rd Waikohu at Mahaki Waipaoa at Armstrong Road Waingaromia at Terrace Wharekopae above Falls Wharekopae at Rangimoe Mangaoai Str at Mangaoai Rd	Median 71 Median 60 Median 61 Median 66 Median 53 Median 52 Median 67 Median 53 Median 67
	Waihuka at No 2 Bridge Waikohu Trib at Whakarau Road Kurunui Stream at Holdsworth Bridge Parihihonou Str at SH2 Overbridge Waikakariki Trib at Quarry Waihuka River at No3 Br	Median 50 Median 26 Median 35 Median 25 Median 43 Median 45

Waipaoa Hill Country FMU		
Attribute	**Monitoring sites**	**Baseline attribute band**
Temperature	To be confirmed	

Tūranga Flats FMU		
Attribute	**Monitoring Sites**	**Baseline Attribute Band**
Limit Setting Attributes		
Ammonia (toxicity) (mg/L)	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br. Waipaoa River at Railway Br. Whakaahu Stream at Brunton Rd	Median A, 95th Percentile B Median B, 95th Percentile B Median B, 95th Percentile A Median A, 95th Percentile B
	Taruheru River at Tuckers Rd	Median B, 95th Percentile C
Nitrate (toxicity)	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br. Waipaoa River at Railway Br. Whakaahu Stream at Brunton Rd	Median A, 95th Percentile A
	Taruheru River at Tuckers Rd	Median A, 95th Percentile C
Suspended fine sediment (visual clarity in metres).	Whakaahu Stream at Brunton Rd	C Band
	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br. Waipaoa River at Railway Br. Taruheru River at Tuckers Rd	D Band
Escherichia coli (E.coli) (cfu/100mL)	Waipaoa River at Kanakanaia Whakaahu Stream at Brunton Rd	D (Median 152, 95th Percentile 3610) D (Median 71, 95th Percentile 6525)
	Waipaoa River at Matawhero Br. Taruheru River at Tuckers Rd	E (Median 575, 95th Percentile 19,700) E (Median 1115, 95th Percentile 7360)
Dissolved oxygen (below point source discharge)	None currently identified	
Action Planning Attributes		
Fish (Fish index of Biotic Integrity)	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br. Whakaahu Stream at Brunton Rd Taruheru River at Tuckers Rd	Will be calculated based on eDNA testing this summer
Macro- invertebrates	Waipaoa River at Kanakanaia Waipaoa Trib at Lavenham-Humphrey Rd Waipaoa River at Matawhero Br. Whakaahu Stream at Brunton Rd Taruheru River at Tuckers Rd Waipaoa Trib at Pipiwhakao Road	MCI D, QMCI D, ASPM D MCI D, QMCI D, ASPM D
Deposited Fine Sediment (percentage cover)	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br.	D band
Dissolved Reactive Phosphorus	Waipaoa River at Kanakanaia Waipaoa River at Matawhero Br. Waipaoa River at Railway Br.	Median C, 95th Percentile B Median C, 95th Percentile C Median C, 95th Percentile C
	Whakaahu Stream at Brunton Rd Taruheru River at Tuckers Rd	Median D, 95th Percentile D
Escherichia coli (E.coli/100 mL) (Primary contact sites during the bathing season)	Waipaoa River at Kanakanaia Whakaahu Stream at Brunton Rd	Median D, 95th Percentile D Median A, 95th Percentile D
	Waipaoa River at Matawhero Br.	Median E, 95th Percentile D

Tūranga Flats FMU		
Attribute	**Monitoring Sites**	**Baseline Attribute Band**
	Taruheru River at Tuckers Rd	
Ecosystem Metabolism (g O2/m2/day)	Sites yet to be confirmed	
Dissolved oxygen (mg/L)	Sites yet to be confirmed	
Rapid Habitat Assessement	Taruheru River at Tuckers Road Waipaoa Trib at Pipiwhakao Road Waipaoa River at Kanakanaia Waipaoa Trib at Lavenham-Humphrey Rd Whakaahu St at Brunton Rd	Median 33 Median 29 Median 47 Median 45 Median 36
Temperature	Sites yet to be confirmed	

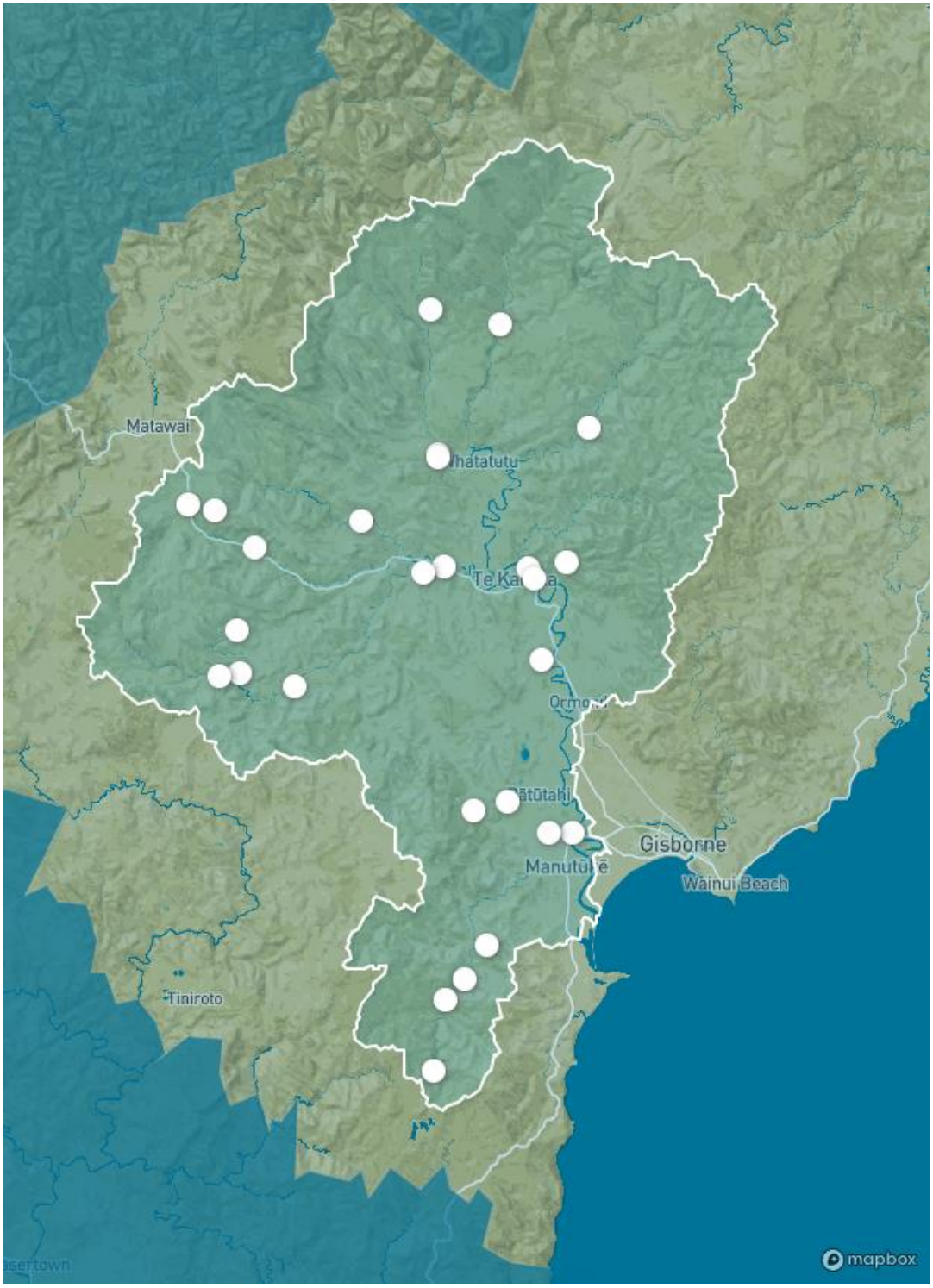
Te Arai Te Uru FMU		
Attribute	**Monitoring Sites**	**Baseline Attribute Band**
Limit Setting Attributes		
Ammonia (toxicity) (mg/L)	Te Arai at Pykes Weir	Median B, 95th Percentile B
Nitrate (toxicity)	Te Arai at Pykes Weir	Median A, 95th Percentile A
Suspended fine sediment (visual clarity in metres).	Te Arai at Pykes Weir	A band
Escherichia coli (E.coli) (cfu/100mL)	Te Arai at Pykes Weir	D (Median 200, 95th Percentile 1900)
Dissolved oxygen (below point source discharge)	None currently identified	
Action Planning Attributes		
Fish (Fish index of Biotic Integrity)	Te Arai at Pykes Weir	Will be calculated based on eDNA testing this summer
Macro- invertebrates (QMCI and MCI)	Te Arai at Pykes Weir	
Macroinvertebrates (ASPM)	Te Arai River bush intake above weir (reference site)	MCI B, QMCI B, ASPM B
	Te Arai at Pykes Weir Te Arai Trib at Waugh Rd Te Arai Trib at Waignake Road Te Arai River at Waignake	MCI D, QMCI D, ASPM D MCI D, QMCI D, ASPM D MCI C, QMCI D, ASPM C MCI C, QMCI D, ASPM C
Deposited Fine Sediment (percentage cover)	Te Arai at Pykes Weir	
Dissolved Reactive Phosphorus	Te Arai at Pykes Weir	Median A, 95th Percentile B
Escherichia coli (E.coli/100 mL) (Primary contact sites during the bathing season)	None currently identified	
Ecosystem Metabolism (g O2/m2/day)	Te Arai at Pykes Weir	
Dissolved oxygen (mg/L)	Te Arai at Pykes Weir	
Rapid Habitat Assessment	Te Arai River bush intake above weir	Median 79
	Te Arai at Pykes Weir Te Arai Trib at Waignake Road Te Arai River at Waingake	Median 55 Median 53 Median 54
	Te Arai Trib at Waugh Rd	Median 29

Temperature	To be confirmed	

Gisborne Urban FMU		
Attribute	**Monitoring Sites**	**Baseline Attribute Band**
Limit Setting Attributes		
Ammonia (toxicity) (mg/L)	Taruheru at Lytton Rd Taruheru at Peel St Waikanae at Grey St Taruheru at Wi Pere Tūranganui at Gladstone Rd	Median B, 95th Percentile B Median B, 95th Percentile B Median B, 95th Percentile B Median B, 95th Percentile B Median B, 95th Percentile B
	Waikanae at Stanley Rd Sisterson Drain at Wetland Inflow Awapuni Drain u/s of Rayonair	Median B, 95th Percentile C Median B, 95th Percentile C Median B, 95th Percentile C
Nitrate (toxicity)	Waikanae at Stanley Rd Waikanae at Grey St Tūranganui at Gladstone Rd Awapuni Drain u/s of Rayonair	Median A, 95th Percentile A
	Taruheru at Lytton Rd Taruheru at Peel St Taruheru at Wi Pere Sisterson Drain at Wetland Inflow	Median A, 95th Percentile B
Suspended fine sediment (visual clarity in metres).	Taruheru at Lytton Rd Taruheru at Peel St Taruheru at Wi Pere Waikanae at Stanley Rd Waikanae at Grey St Tūranganui at Gladstone Rd Awapuni Drain u/s of Rayonair Sisterson Drain at Wetland Inflow	D band
Escherichia coli (E.coli) (cfu/100mL)	Waikanae at Grey St Tūranganui at Gladstone Rd Taruheru at Wi Pere Taruheru at Peel St Awapuni Drain u/s of Rayonair Sisterson Drain at Wetland Inflow	D (Median 103, 95th Percentile 1,970) D (Median 103, 95th Percentile 1,970) D (Median 130, 95th Percentile 6,120) D (Median 82, 95th Percentile 1,232) D (Median 160, 95th Percentile 8,445) D (Median 210, 95th Percentile 15,350)
	Waikanae at Stanley Rd Taruheru at Lytton Rd	E (Median 600, 95th Percentile 7,550) E (Median 500, 95th Percentile 5525)
Dissolved oxygen	None currently identified	
Action Planning Attributes		
Fish (Fish index of Biotic Integrity)	Waikanae at Stanley Rd Awapuni Drain u/s of Rayonair Taruheru at Lytton Rd Sisterson Drain at Wetland Inflow	Will be calculated based on eDNA testing this summer
Macro- invertebrates	No sites currently identified – all large rivers are estuarine	N/A
Deposited Fine Sediment (percentage cover)	No sites currently identified – all large rivers are soft bottomed	N/A
Dissolved Reactive Phosphorus	Waikanae at Grey St Tūranganui at Gladstone Rd	Median C, 95th Percentile D

Gisborne Urban FMU		
Attribute	**Monitoring Sites**	**Baseline Attribute Band**
	Waikanae at Stanley Rd Awapuni Drain u/s of Rayonair Taruheru at Lytton Rd Taruheru at Peel St Taruheru at Wi Pere Sisterson Drain at Wetland Inflow	Median D, 95th Percentile D
Escherichia coli (E.coli/100 mL) (Primary contact sites during the bathing season)	Tūranganui River at Gladstone Road Bridge	Not calculated
Ecosystem Metabolism (g O2/m2/day)	Sites yet to be confirmed	
Dissolved oxygen (mg/L)	Sites yet to be confirmed	
Copper ug/L	Sites yet to be confirmed	
Zinc ug/L	Sites yet to be confirmed	
Temperature	Sites yet to be confirmed	

Appendix 3: Monitoring sites



Source: LAWA.org.nz