Waipaoa Catchment Planning Advisory Group – Hui 8

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Title of report: Water Quantity in the Waipaoa Catchment – Minimum Flows and Allocation Blocks

Report no: 1

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Purpose of this report

This report discusses the methods for setting minimum flows and allocation blocks for the Waipaoa Catchment Plan. It puts forward a range of different scenarios for these for feedback and amendment by the group.

Outcomes sought

- Members of the Advisory Group input into the development of minimum flow and allocation block scenarios for further investigation and testing.
- Members expertise and knowledge helps build the collective understanding of issues relating to water quantity.

Getting ready for the hui

Please consider the questions in this report ahead of the next hui. This will aid the discussion at the hui.

Contents

1. Introduction

At Hui 7, staff introduced the current water quantity provisions for the Waipaoa Catchment, outlining the current Water Quantity Zones, approach to water quantity management and allocation limits.

The Waipaoa River and Makauri Aquifers were highlighted as the biggest sources of water for abstractive use, and it is noted that going forward, water storage will likely be required (amongst water saving initiatives), with options including managed aquifer recharge (MAR), dams, and/or re-use of water. These options are being considered through a separate project looking at regional water security and are outside of the scope of the Waipaoa Catchment Planning process.

Council staff then presented the findings of the 2023 NIWA report which outlined the flow requirements of Te Arai and Waipaoa Rivers and the WGA report which has been prepared to help manage our degrading groundwater resources and its interactions with surface ecosystems.

This report for Hui 8 discusses possible scenarios for setting minimum flows and allocation blocks for the Waipaoa Catchment Plan.

2. Water Quantity

In resource management, the term "water quantity" is used to describe the amount of water present in our freshwater bodies (both surface water and groundwater). Water quantity naturally varies with climate, land cover, the underlying geology and over time. However, water quantity is also influenced by human activities, such as abstracting water, changing land cover or damming waterbodies.

Under the National Policy Statement for Freshwater Management 2020 (NPS-FM), managing water quantity is important for achieving environmental outcomes and long-term visions. Council is required to set environmental flows and levels having regard to the foreseeable impacts of climate change alongside managing water abstraction within take limits.

Water quantity management often involves reference to several technical terms or concepts that are fundamental to understand how management regimes protect freshwater values.

Throughout this paper and water allocation conversations going forward, there are two commonly used metrics to familiarise yourselves with:

- Litres per second (L/s) which describes the rate at which water is being taken or is moving within a river system; and
- Cubic metres (m3) describe the total volume of water within a system.

3. Scene setting - the National Objectives Framework

This work is part of the second stage of implementing the National Objectives Framework (NOF).

Stage 1: Identifying aspirations and goals for freshwater

- Identifying freshwater values
- Defining Freshwater Management Units
- Setting environmental outcomes
- Identifying a Long-Term Vision

Stage 2: Identifying how and when to achieve those goals

- Understanding attributes and baseline states
- Setting targets and timeframes
- Setting limits, methods and actions – **we are here**
- Monitoring

4. Key Matters to inform flow and allocation block setting

Water quantity supports a range of freshwater values

In terms of economic benefits of consented water use, agriculture, forestry and fishing make up 14% of Tairāwhiti's GDP[1], contributing $380 million in 2020[2]. Industrial and commercial use of water (largely from the municipal supply) is also important to Tairāwhiti's economy as these organisations are large employers. In 2021, manufacturing represented 6.5% of regional GDP and this has been increasing over the past decade[3].

River flows are a "master variable" in ecosystem health due to the influence flow has over all aspects of river condition. Where river flows change, whether this is natural or human induced, there are consequential impacts in terms of the channel form, sediment transport, food resources and water quality, including nutrients, dissolved oxygen, and water temperature.

Changes in flows may also impact mana whenua freshwater values associated with mahinga kai, turanga waka, wāhi tapu sites or the mauri of the waterbody.

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[1] Gross Domestic Product (GDP) is the standard measure used to evaluate the economic health of a country.

[2] https://www.mbie.govt.nz/dmsdocument/17931-tairawhiti-region-handover-document

[3] Regional Economic Activity Web Tool

Social wellbeing is influenced by river flows in terms of the recreational and amenity values rivers provide. Lower flows, particularly in summer and degraded water quality affects our ability to swim safely.

Groundwater levels are similarly a critical component for ecosystem health. Many of our streams, springs and wetlands are dependent on inflows from underlying groundwater to maintain their health, particularly providing baseflows during dry periods. This is crucial to provide a consistent source of water to maintain habitats.

NPS-FM Requirements

The NPS-FM 2020 has a significantly different emphasis to the 2014 version that informed the development of the operative Waipaoa Catchment Plan. Te Mana o Te Wai and the hierarchy of obligations place a different emphasis on waterbodies, with the health of the waterbody taking priority. Alongside this, Te Mana o te Wai places a greater priority on the health needs of people (such as drinking water) than the commercial use of water.

These matters all come into play when considering how to set minimum flows and allocation blocks for the Waipaoa Catchment Plan because:

For the Waipaoa and Te Arai Rivers

- Ecological health is generally poor and below national bottom lines.
- Both rivers are significant sources of municipal drinking (and other) water for Gisborne City.
- The two rivers are essentially fully allocated under the operative Waipaoa Catchment Plan limits.

For the Aquifers

- A 3m decline and further saline intrusion of the Makauri Aquifer is expected based on the status quo.
- Connection of the shallower aquifers to the Waipaoa River means the status quo will cause a decrease in the Waipaoa River summer base flow and 20cm decline in wetland water levels.
- Currently both the Makauri Aquifer and Matokitoki Aquifer have reduction targets for 2025. The latest round of consent renewals saw all users reduced by roughly 5%. Based on this rate of reduction there would be no reduction in actual use for the Makauri Aquifer until 2095.
- In order to stabilise the aquifer levels there needs to be a 15% cut in actual use compared with 2020 by 2045.

In setting new minimum flows and allocation blocks we will need to consider what levels will provide for the hierarchy of values in Te Mana o Te Wai, but also if the flows are greater than the current, and the allocation blocks smaller or different to the current framework, how we transition, and in what timeframes, to the new system.

5. Scenarios for river minimum flows

The work undertaken by NIWA which was reported and discussed at the previous hui provides some useful key information, but only three options for minimum flows were looked at for the Waipaoa River and Te Arai River. There was limited consideration around the size of allocation blocks, and no work done on "B block" or higher flow allocations.

Table 1: NIWA Options and Assessment Outcomes for Minimum Flows

	Option 3 (status quo)	**Option 2 (Observed MALF)**	**Option 1 (instream values)**
Waipaoa @ Kanakanaia	1,300 (moderate)	2,550 (moderate-high)	3,000 (high)
Te Arai @ Reays Bridge	60 (low-moderate)	60 (low-moderate)	150 (high)
			Option 1 (instream values; naturalised MALF default)
Te Arai @ Water Works			36 (high)

The Council hydrology team has looked at the irrigation reliability for these three options. It is evident that for the Waipaoa River, both Option 2 (Observed MALF) and Option 1 (In stream Values) would have a low degree of reliability, and that water storage would be required to sustain a horticulture use supported by irrigation. While some consents do include some water storage, these are a minority, and the amount of storage for even these growers is unlikely to support the level of unreliability that these options would create.

The Council hydrology team has also assessed irrigation reliability for some other, intermediate options between the 1,300l/s current minimum flow and the NIWA Option 2 for the Waipaoa River. All these irrigation reliability scenarios are set out in the table below:

Table 2: Minimum Flow Scenarios and Irrigation Reliability Waipaoa River.

Scenario	Water take limit (l/s)	Description	% of time cutoffs in place (2003-2022)	Historical flow record (2003-2023) (20 years)		
				Number of hydrological years flow has fallen below this limit	Duration in days of low flows per hydrological year (excluding years with no cutoff limits in place)	Average duration in days per hydrological year of low flows (including years with no cutoff limits in place)
1	**1300**	Status quo – A Block	0.1	3	2-4	0.4
2	**1733**	Table 2, Option 3, with 433 l/s cap (NIWA, 2023)	1.7	7	5-33	6
3	**2000**	80% of Mean Annual Low Flow is 2040 l/s; this has been rounded	3.2	8	1-61	11
4	**2550**	Mean Annual Low Flow (NIWA, 2023)	6.7	12	3-105	23
5	**3000**	High instream values (NIWA, 2023)	9.3	15	3-114	32
6	**4000**	Option 1 (high instream values), with 1000 l/s cap (equivalent to B Block) (NIWA, 2023)	16.6	18	1-144	57

This table is provisional and the flow data is based on hydrological years (from 1 July to 30 June).

The Council hydrology team has also looked at some intermediate options between the current 60 l/s minimum flow and the NIWA Option 1 for Te Arai River. These are set out in Table 3 below.

Table 3: Minimum Flow Scenarios and Irrigation Reliability Te Arai River.

Scenario	Water take limit (l/s)	Description	% of time cutoffs in place (1984-2022)	Historical flow record (1984-2023) (39 years)		
				Number of hydrological years flow has fallen below this limit	Range of days cutoffs in place (excludes years with no cutoff limits in place)	Average duration (days) of cutoffs per hydrological year (includes years with no cutoff limits in place)
1	**60**	Status quo (A Block) – observed MALF	7	29	1-107	24
2	**100**	Options 3 & 2 (with 20 l/s cap) (NIWA, 2023)	15	37	2-152	54
3	**150**	High instream values (NIWA, 2023)	22	39	3-180	81
4	**220**	Status quo (B Block)	30	39	4-206	108

This table is provisional and the flow data is based on hydrological years (from 1 July to 30 June).

5. Scenarios for Aquifers

The scenarios in Table 4 below are based on the work completed by WGA, which was presented and discussed in the previous hui.

Table 4: Scenarios for aquifers and the impacts.

	Impacts on actual use	Impacts on saline intrusion	Impacts on water levels /river flows
Scenario 1: 5% reduction in allocation every 5 years – all aquifers	Cuts in actual use from 2095	Further saline intrusion from west - may make the aquifer unusable before actual use cuts commence	3m drop in groundwater levels Makauri Aquifer, reduction in Waipaoa River minimum flows
Scenario 2: Allocation cut to Actual Use 2030, 5% cut in actual use every 5 years to 2045	15% cut in actual use achieved by 2045	Saline intrusion continues but slows from 2030	Groundwater levels continue to reduce but at a slower rate from 2030
Scenario 3: Allocation cut to Actual use 2030, Managed Aquifer Recharge used to offset need for 15% cut – in place by 2035	No requirement to cut actual use as this is offset by MAR	Saline intrusion stabilises from 2035. Depending on number of MAR wells and location, could reverse intrusion trend	Groundwater levels continue to reduce to 2035. Depending on number of MAR wells could reverse groundwater level decline.

6. Timeframe and Approach to Reductions

Because there are multiple water sources across the catchment where significant change is being looked at, the approach taken in terms of the timeframes for any change, and how they are paced in terms of scale of reductions is key.

One thing to think about is whether we take a parallel approach to the speed of improvements in the rivers and groundwater sources, or whether we should prioritise some water sources over others.

Something that could also be explored is additional allocation blocks. Currently the Waipaoa Catchment Plan has a higher flow allocation (B Block) which is intended to support water storage. In some parts of New Zealand C blocks for very high flow water harvesting are also included, and this may be appropriate for the Waipaoa River in particular.

Questions for the Advisory Group

- What timeframes should we be planning for? Should we prioritise improving minimum flows ahead of groundwater levels or vice versa? What priority should we place on the smaller aquifers such as Te Hapara Sands and Waipaoa Gravels?
- What pace might any transition take? Is it better, for example to give people 10 years and then a big cut, or take a more incremental approach?
- Should the river and groundwater allocation regime place any priority on supporting high flow harvesting and storage?

7. Next Steps

This hui will help the catchment planning team frame up the scenarios for further investigation. There are two key areas where this further investigation will be done. Firstly, the Council is assembling a technical expert panel who we will be liaising with and asking for their technical assessment/expert opinion of the scenarios and the implications of them.

Secondly, we plan to undertake a Quadruple Bottom Line (QBL) analysis of the scenarios so that the environmental, economic, social, and cultural implications of the different approaches are well understood.

In the Regional Freshwater Plan Advisory Group there is work being undertaken looking at water demand through a regional water assessment, and allocation options. Once that work has progressed then this will be brought through to look at how this might work within the Waipaoa Catchment.