Tairāwhiti Regional Freshwater Planning Advisory Group – Hui 7

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Title of report: Water quantity management - issues

Report no: 1

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Purpose of this report

This report provides information on the topic of water quantity within Tairāwhiti. It provides some context and background information to help the Advisory Group understand water quantity issues ahead of discussing frameworks for limit setting and allocation at future meetings.

This report addresses:

- the requirements of the National Policy Statement for Freshwater Management 2020 (NPS-FM) with respect to water quantity
- how water quantity is managed under the current Tairāwhiti Resource Management Plan (TRMP)
- a summary of why water quantity is important in Tairāwhiti
- information on future water demand and availability
- issues that may need to be addressed in the new freshwater planning provisions.

Outcomes sought

- Members of the Advisory Group understand the current water quantity framework, importance of water quantity to environmental, social, economic and cultural wellbeing, and how water supply and demand may change in the future.

- 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

1.1 Background

1.1. What do we mean by "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.

In Hui 7, 8 and 9 we will be discussing issues and options for water quantity management.

1.2. Requirements of the NPS-FM 2020

Under the National Policy Statement for Freshwater Management 2020 (NPS-FM), managing water quantity is important for achieving environmental outcomes and long-term visions.[1] Council is required to set environmental flows and levels having regard to the foreseeable impacts of climate change and manage water abstraction within take limits.

1.3. Common terminology

Water quantity management often involves reference to several technical terms or concepts that are fundamental to understand how management regimes protect freshwater values. The most common terms we will be using in our discussions are defined in **Appendix A**. These terms are:

- Environmental flows
- Environmental level
- Take limit
- Management flow
- Residual flow
- Mean annual low flow
- Freshwater management unit

2. Water quantity under the TRMP

2.1. Environmental flows and allocations (how much water can be taken and used)

The planning tools used to determine when, and the amount of water that can be taken out of a waterbody, typically differ between rivers/streams, lakes and aquifers. Different approaches are necessary to reflect how the waterbodies function.

The Tairāwhiti Resource Management Plan (TRMP) currently has two distinct approaches for environmental flow and take limits. Within the Waipaoa Catchment there are specific

[1] Long-term visions and environmental outcomes are required to be identified for each Freshwater Management Unit.

environmental flow and/or take limits set for the:

- Waipaoa River
- Te Arai River
- Makauri Aquifer
- Matokitoki Aquifer
- Te Hapara Sands Aquifer.

For the rest of the region, the TRMP defines a default methodology for determining the minimum flow and allocation limits. A default methodology applies in these areas as there has been a lack of information, but also demand for these water sources, to set specific limits.

For rivers and streams, the default environmental flow is no less than 90% of the Mean Annual Low Flow (MALF) and the total take limit is the greater of:

- 30% of the MALF (as calculated by Council using the most up to date data); or
- The amount of water allocated from the catchment on the date that the decision on the Freshwater Plan was released.

For groundwater sources, the TRMP defines the total take limit as 30% of the annual average rainfall recharge that does not directly contribute to a surface waterway. This means that 30% of annual rainfall that infiltrates into groundwater can be allocated for abstraction.

2.2. Consenting water takes (how available water is distributed)

The Resource Management Act (RMA) makes it illegal to take, use, dam or divert freshwater water unless the activity is allowed by a national environmental standard, rule in a regional plan or a resource consent. Some exceptions are provided for:

- The individual reasonable domestic needs or reasonable needs of a person's animals for drinking water provided that there are no adverse effects on the environment.
- Firefighting purposes.

Under the RMA, resources are allocated on a first in, first served basis. This means that freshwater in Tairāwhiti is allocated to individuals or organisations based on when they lodge resource consents.

The RMA also provides for those existing consent holders to have their permits renewed on expiry, subject to a resource consent process. This provides certainty of access to water for those existing users which is particularly important for business investment. However, in areas of high-water demand, this can make it challenging for new water users to get a water take consent. The RMA or the TRMP doesn't enable Council to prioritise who gets allocated water from a waterbody. This means that Council cannot give preference to potential or current water users that may have a lower environmental footprint or higher value use than other water users. Therefore, if sufficient water is available within the allocation limit and subject to assessments discussed further below, any person can receive a water permit.

However, the TRMP does prioritise the taking and use of water for the Gisborne municipal water supply during low flows. This means the drinking water plants can continue taking water even when the relevant waterbodies have lower flows than the environmental flows set. When a waterbody has a lower flow than the environmental flow any other user would have to cease taking water. However, this does not mean they can exceed their allocation.

Where allocations are full or exceeded, waiting lists are established. Again, there is no prioritisation of need or specific uses. If water becomes available, the first person on the waiting

list can receive the available allocation if they are granted a water permit.

Water permits issued under the TRMP are assessed based on several criteria including (but not limited to):

- if the amount of water sought is reasonable for the proposed use
- the efficiency of the water use
- water metering requirements
- if there will be any impacts on other water users
- if fish will be prevented from entering the intake or if there will be any other impacts on biodiversity such as significant spawning sites
- if and how the take will reduce and cease at low flows
- if there will be any adverse effects on tangata whenua values.

Reasonable use

Council assesses whether the amount of water a person seeks is reasonable to ensure that allocated water is used rather than being held and unused by a consent holder. Unused allocation "ties up" the resource and avoids water being accessed by other potential water users. This is also referred to as "paper allocation".

To determine if a requested rate or volume of water is reasonable, different approaches are taken depending on the proposed use for the water. The TRMP does not set out these approaches, instead they have been developed through implementation.

For determining whether a proposed take for irrigation is reasonable, Council uses an assessment tool that calculates the estimated water demand based on a 1 in 10-year drought for different crop types on the Poverty Bay flats. This tool considers soil type, annual average rainfall and evapotranspiration.

Water meter records show that this method is generally overestimating the amount of water that is actually used but this is because it is based on water needs for drought. In areas of high-water demand, this can mean that new water uses are not possible even though the levels of actual water use are below the take limits.

For other uses, industry best practice is assessed where information is available. When consents are renewed, there is an opportunity to revise allocations based on actual water use records.

Water use efficiency

The NPS-FM requires regional councils to decide how to improve and maximise the efficiency of water allocation. The current TRMP doesn't provide much guidance on how to improve and maximise efficiency, although efficiency of water use is a consideration for assessing resource consents.

Currently, water permits are assessed for the efficiency of the type of irrigation method. Consent conditions imposed require equipment to be operating at greater than 80% efficiency (i.e from the point of abstracting water to where it is applied, there should be no more than 20% losses).

Water metering

National water metering regulations require that water takes over 5 litres per second are measured. The TRMP reflects these requirements and consent applications are assessed on the location and type of measurement proposed.

Impact on other water users

Abstracting water can impact on other water users by affecting their ability to operate their takes and if an applicant is seeking more water than what is available. During the consent process, there is the consideration of the distance between abstraction points to address these potential issues and a requirement to comply with flow and allocation limits.

Preventing fish entering an intake

Water takes from rivers and streams can affect aquatic ecosystems. Pumping water into an irrigation system can result in fish being killed or injured in equipment. Where relevant, water users are required to install a fish screen to avoid these effects.

Compliance with environmental flows

Almost all takes will propose to comply with the environmental flow when taking water from a river or stream. There are however different ways in which a water abstractor may reduce their take as flows in a river drop towards the environmental flow. Some water permits include conditions that require abstraction rates to reduce before the environmental flow is reached. These are known as partial restrictions and for example require abstractors to cut their rates of take by 50% before the environmental flow is triggered.

Effects on mana whenua values

Water abstraction can impact on cultural values if there is insufficient water retained in a waterbody or if an activity occurs at a significant site. Council assesses each consent application to determine if a take will affect a culturally significant site and ensures compliance with flow and allocation limits to manage these potential effects.

2.3. Duration of consents

Water permits are usually granted for five years. Short consent durations allow Council to reconsider permits on their renewal and determine if reductions in allocated rates or volumes are required where over-allocation has occurred. Some permits have been granted longer durations[2] where adequate storage is provided and there is a proven history of reasonable and efficient use.

2.4. Transfers

The RMA provides a pathway for transferring water permits from one site to another once granted if there are rules in the regional plan which authorise the transfer, or if a transfer permit is granted (s136).

The TRMP provides for transfers (but all transfers require consent) to improve and maximise the efficient allocation and use of water. Transfers are supported where:

- The transfer of water occurs in the same water quantity zone (i.e. it is in the same allocation block).
- There is no increase in allocation.
- For over-allocated zones, there is no increase in water allocated beyond that assessed

[2] In accordance with TRMP C6.1.1 - Policy 10.

under the reasonable use test for the current water use.

- The transferee's [3] take and use is assessed against the water permit criteria (as discussed above).

3. Importance of water quantity in Tairāwhiti

3.1. Use of water

The majority of consented water abstraction in Tairāwhiti occurs within the Waipaoa catchment with only a handful of permits granted in other catchments. The number of water permits issued and their uses, permitted activities and municipal and community water supplies are described below.

3.2. Water permits in the Waipaoa Catchment

Within the Waipaoa Catchment, most of the water is taken from surface water sources as shown in Figure 1. Most permits issued within the Waipaoa catchment are for abstraction from the Waipaoa River (A- and B-block allocation).[4] The Matokitoki, Te Hapara Sands and Makauri are groundwater sources.

The A-block, that is the block of water closest to the environmental flow, has higher reliability in terms of access and use of water. The water in this block is more likely to be available for a longer period of time, especially when the demand is highest during summer (December-February). B-block water relies on higher flows, with water in this block less likely to be available in the peak water demand period and consequently is less reliable. This is seen with Waipaoa A-block and Te Arai A-block takes being higher than their B-block counterparts (**Figure 1**).

[3] The person to who the water is being transferred to.

[4] Note this includes takes from the Shallow Fluvial Deposits and Waipaoa Gravel Aquifer

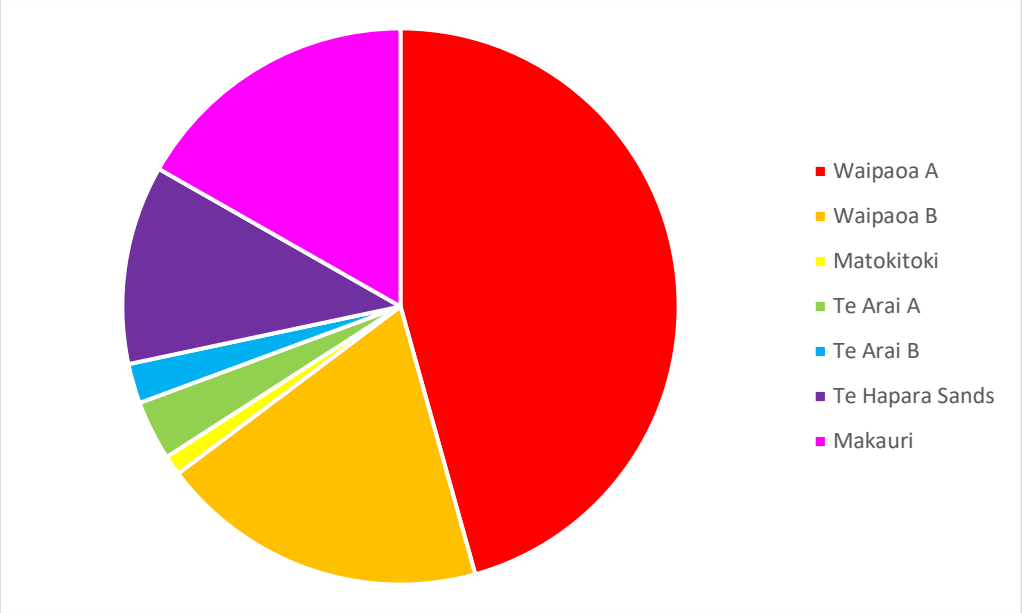

Figure 1: Proportion of water takes from Waipaoa catchment by water source.

Figure 2 also shows the volume of water consented for abstraction from each source per year, with the most water taken from the Waipaoa River. It should be noted that this figure appears to show a significant proportion of water is taken from the Waipaoa A block; however, this will drop once consents in process are granted, which will include rates of take that better reflect actual use.

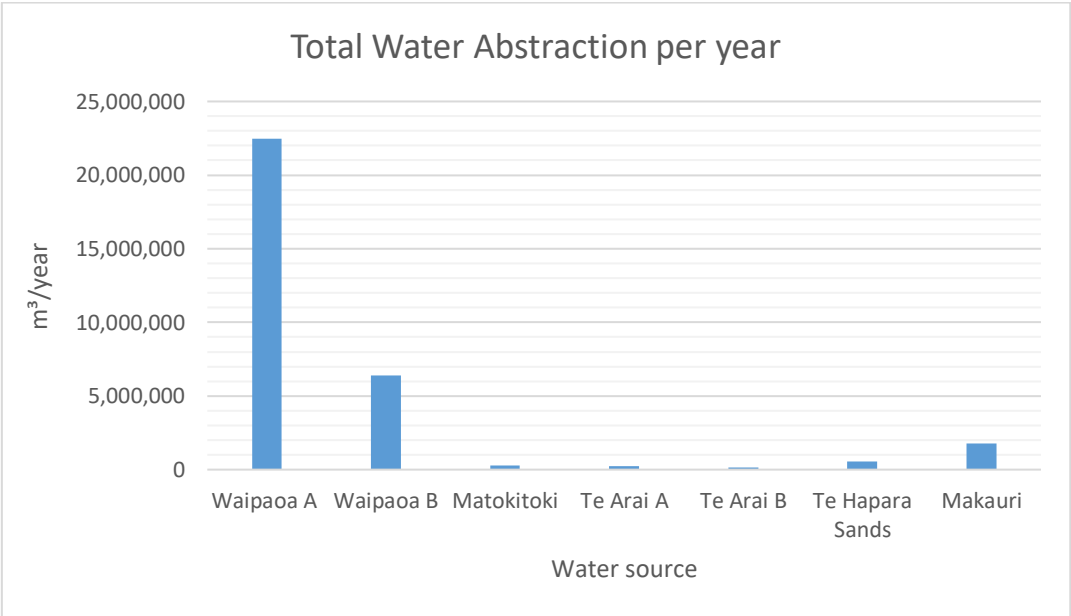

Figure 2: Annual volume of water consented for abstraction from Waipaoa catchment by water source.

Water abstracted is mainly used for irrigation purposes followed by municipal/community water supply. Of the 173 permits issued in the Waipaoa Catchment, 165 permits are used for irrigation.

Gisborne water supply

The main Gisborne municipal water supply is sourced from two sources - the Mangapoike dams and the Te Arai Bush Catchment. Untreated water from these sources is treated at the Waingake Water Treatment Plant before being piped into the city's reticulation network. A secondary treatment plant and supply is sourced from the Waipaoa River which is used as a back-up supply during peak water demand and in emergency situations. **Figure 3** below demonstrates annual water usage in Gisborne City from 2014 to 2020. Data from 2021 to 2023 shows a significant reduction in water use due to the effects of Cyclone Gabrielle. The data is not shown here as it does not reflect "business as usual".

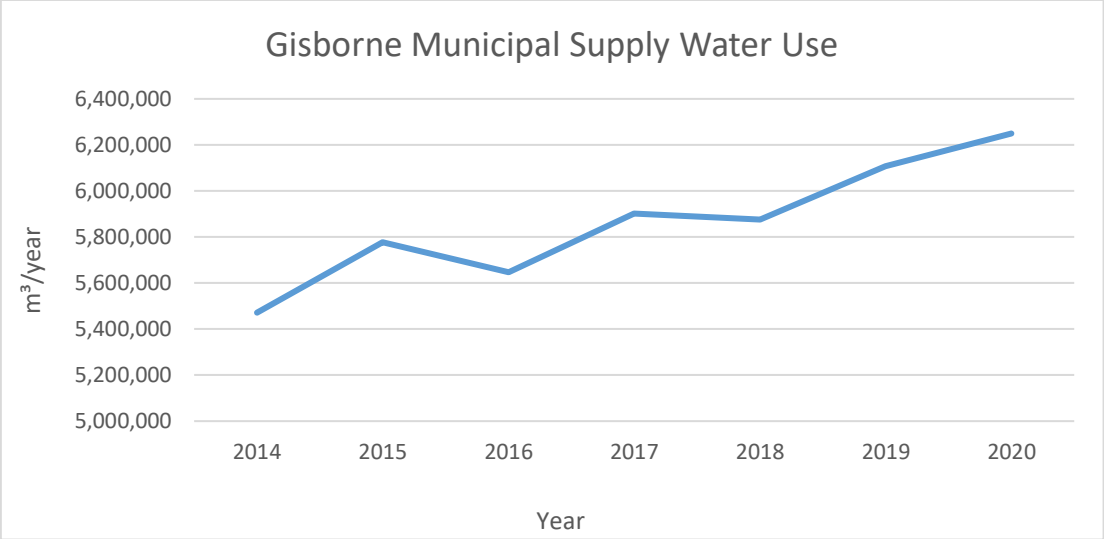

Figure 3: Volume of water supplied to Gisborne city per year.

3.3. Water permits throughout the rest of the region

Throughout the rest of the region there are only 14 water permits issued to abstract water[5]. This includes takes from the following waterbodies:

- Karakatuwhero River (1)
- Tangamatai Stream (1)
- Waimata (1)
- Mangaheia (1)
- Maraetaha (2)
- Tatapouri Spring (1)
- Kaitawa Spring (1)
- Taruheru River (1)
- Te Kumi Spring (1)
- Pakarae River (1)
- Groundwater (3).

These takes are for several uses, primarily irrigation of fruit/vegetables but also industrial use,

[5] As of February 2024.

domestic supply, a campground and stock drinking water.

Based on the default minimum flow and allocation methodology, one or two of these streams may be over-allocated. Further work is required to determine which waterbodies are over-allocated using this default methodology as part of the TRMP review.

3.4. Permitted abstractions

Some abstractions from surface water and groundwater are permitted under rules of the TRMP which means they can occur without resource consent. There is limited information on the rates and volumes of water taken as permitted activities or the use of that water, although most can be expected to be for potable supply or stock drinking water.

Best estimates for the average daily demand for private domestic water takes in each major catchment is identified in **Figure 4**. Unsurprisingly, it is shown that demand for domestic water supply is greater outside of the Waipaoa catchment which reflects the lack of reticulated community drinking water supplies. The sources for these private supplies are not known but will be a variety of sources including rainfall, groundwater, springs and surface water.

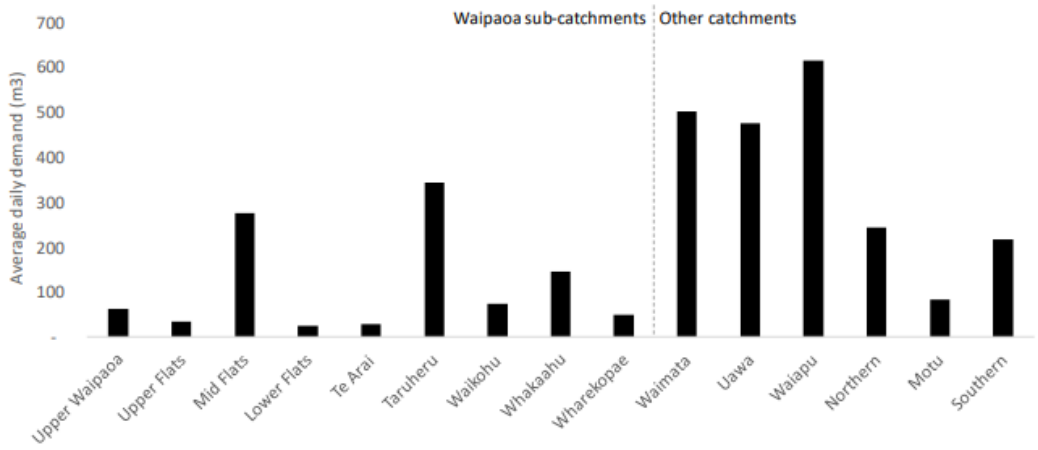

Figure 4: Average daily demand associated with private unmetered domestic uses (Source: Alexander et al.[6])

In terms of volumes used for stock drinking water, **Figure 5** provides an estimate of daily average demand in the different major catchments within Tairāwhiti.

[6] Alexander, J; Calder-Steele, N; Dark, A. (2023). Gisborne Regional Water Assessment. Gisborne District Council, Aqualinc Report RD23011-1. Aqualinc Research Ltd.

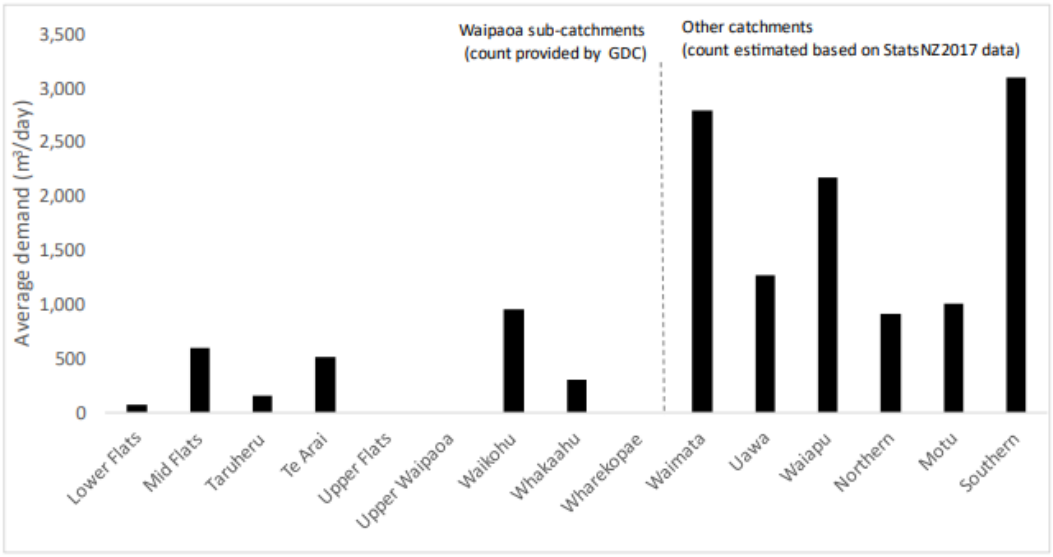

Figure 5: Average daily demand for stock water, grouped by sub-catchment (Source: Alexander et al.)

3.5. Community water supply

Several smaller communities also have community water supply takes. This includes water supplied to Whatatutu which is taken from the Waipaoa River, Te Karaka which is from both groundwater and the Waipaoa River and Waituhi Village which is also from the Waipaoa River. Further up the coast, many community supplies rely on rainwater but there are others that take from groundwater, springs and streams. Many of these supplies, do not hold water permits, some may be permitted but others likely require consent.

3.6. Economic benefits of water use

In terms of economic benefits of consented water use, agriculture, forestry and fishing make up 14% of Tairāwhiti's GDP[7], contributing $380 million in 2020.[8] 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.[9]

3.7. Water quantity supports other freshwater values

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.[10]

[7] Gross Domestic Product (GDP) is the standard measure used to evaluate the economic health of a country.
[8] https://www.mbie.govt.nz/dmsdocument/17931-tairawhiti-region-handover-document
[9] Regional Economic Activity Web Tool
[10] Booker, D, Franklin, P and Stoffels, R. (2022). A proposed framework for managing river flows to support implementation of the NPS-FM. Ministry for the Environment.

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.

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 aquatic 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.

4. Future water supply and demand

4.1. Regional water supply and demand

Council has established a water security programme to ensure alignment and coordination across the organisation to deliver sustainable water management outcomes[11]. The aims of the programme are to:

1. better understand how much water we have
2. identify how much water we need (for potable supply and ideally for other uses such as irrigation)
3. identify the gap between how much we have and how much we would like
4. increase our resilience by developing options to meet demand.

Council recently commissioned technical research to understand current and future water supply, demand and availability[12]. The research focused on three key questions:

- How much water is available?
- How much water is used (and for what uses)?
- What is the future projected water usage?

The key findings of this research were:

- That an annual volume of approximately 33 million cubic metres is consented for abstraction and approximately 90% of this is allocated from surface water.[13]
- That most surface and groundwater usage occur in the Waipaoa catchment, with water takes accounting for approximately 90% of the region's consented volume. This includes all reticulated municipal drinking water supply. While the wider catchment is used for sheep and beef farming, the Turanga/Poverty Bay flats are used for intensive arable farming, market gardening, horticulture and viticulture with irrigation playing a key role in productivity.
- Irrigation demand for existing irrigated areas, which represents the highest proportion

[11] Gisborne District Council Paper 23-303 Direction on Council's Future Role in Terms of Managing Water Demand and Supply. https://www.gdc.govt.nz/__data/assets/pdf_file/0026/66239/Agenda-Council-14-December-2023.pdf

[12] Water Management Report: Gisborne Regional Water Assessment, authored by Aqualinc, dated 21 September 2023

[13] As above, consent renewals will see the proportion of surface water allocation decrease.

of total water demands in most catchments, is projected to increase under future climates. The annual volumes required for irrigation may increase by up to 15% by mid-century.

- Daily time series analysis in the Waipaoa Catchment (which has sufficient data for this type of analysis to be feasible) shows that the supply deficit in the Waipaoa catchment is projected to worsen over time.
- The groundwater resource is currently in a state of decline in the areas where it is used most intensively. This situation is likely to continue without specific interventions. Groundwater availability is likely to reduce under future climate projections.
- Projected changes to the seasonality of rainfall may create challenges for the impounded reservoirs. In terms of water supply resilience, the back-up municipal supply from the Waipaoa River is likely to come under increased pressure in the future as the climate changes.

These findings reinforce the pressures on the region's freshwater resources now and the projected pressures we will face in the future.

4.2. Waipaoa surface water and groundwater technical advice

Council recently commissioned technical advice on environmental flow options for the Waipaoa River to support instream values and the sustainability of existing levels of abstraction from groundwater.[14],[15]

The advice suggests that to give effect to the NPS-FM and Te Mana o te Wai, it is likely that:

- the environmental flow limits for the Waipaoa River and Te Arai will need to increase; and
- changes to the current groundwater management framework are likely necessary to prevent the long-term decline of groundwater levels.

Of importance to this group, any increase in the environmental flow limits will likely impact the reliability of water supply for existing water users. There may also be changes to take limits, particularly for water abstracted from groundwater which can result in over-allocation, or further over-allocation. As a consequence, cuts to individual water permit allocations may be required.

5. Issues

Based on the information above, several issues have been identified for discussion with the Advisory Group. This is not an exhaustive list but a starting point to identify what we should focus our attention on. Your views on these issues and any other issues that you consider relevant will be sought in the hui.

5.1. First in, first served allocation can be viewed as inefficient

The current approach to allocating water under the TRMP has created inequities between

[14] Flow requirements of the Te Arai and Waipaoa Rivers, authored by NIWA, dated November 2023
[15] Poverty Bay Flats Groundwater Modelling Programme Summary Report, prepared by WGA, dated 2023

existing and potential water users, particularly in over-allocated catchments.

As there is no prioritisation of uses and over-allocation of some water sources, no new players can gain a permit to take water unless they can find a permit to transfer. This is the case even when a new use could provide a much more significant economic benefit for the region over an existing use or where a new use will have a much lesser environmental effect. Therefore, this may not be an efficient use of water.

5.2. Complexity of transitioning from the current approach to a new one

Adopting a new approach to allocating freshwater in the new TRMP would be complex, particularly where it is sought to provide water to new users. Depending on the scale and timeframe for redistributing water, the level of impact on some existing users could be significant. In over-allocated catchments, water permits for new users cannot be granted until over-allocation is phased out.

If water needs to be redistributed between existing users or from existing users to new users, there would be several implementation challenges including determining how much water is to be removed from users, the impacted users and who new water is to be allocated to.

5.3. Giving effect to Te Mana o te Wai

The existing flow, level and allocation limits for the Waipaoa Catchment and the default methodology for determining them in the TRMP must be reviewed and revised (where necessary) to ensure that they give effect to Te Mana o te Wai.

It is expected that some changes to these limits will be needed. This may mean that the reliability of water from different sources reduces, for example if the minimum flow level is raised. The level of over-allocation may also increase if the allocation amount available from a water source is cut.

5.4. Allocated volumes of water are maximum volumes required for a use and actual use is typically much lower.

Methods for assessing reasonable volumes of water required for a specified use, particularly irrigation for crops are based on the maximum required in dry weather conditions, or the maximum that would be used. As these "worse-case" conditions do not frequently occur, many water permit holders are only using a portion of their allocated water each year. This means there is "available' water being held by permit holders that cannot be accessed. By allocating water to users based on a drought scenario, the actual water use in non-drought years is much lower and this could disincentivise water use efficiency as water users use more water than is required to avoid losing it at consent renewal.

5.5. Perceived ownership of water

The TRMP provides for the transfer of water permits. The transfer of water permits can provide benefits of increasing the efficiency of water use by permit holders maximising their efficient use and freeing up allocation that can be transferred to another party.

However, it is this transfer that has led to water being "purchased", with those able to afford to pay for water, being able to gain new water permits. This side steps those on the waiting lists in over-allocated catchments and commoditises water allocation.

5.6. Climate change impact on water demand and supply

Climate change projections for Tairāwhiti indicate that rainfall is expected to reduce and mean annual low flows will decrease in most catchments. Based on the water demand and availability research, this means less water will be available for allocation and demand for water will increase.

Questions for the Advisory Group

- Do you have any feedback on the issues identified?
- Are there any other issues from your perspective with current water quantity management?
- Do you have any specific comments on the minimum flow and allocation framework?

6. Conclusion and next steps

This report has presented the information necessary to understand what water quantity management is and the context for addressing issues in the revised freshwater planning provisions. At the next meeting, hui 8, we will be discussing options for allocation. This will include expanding on challenges with the current allocation framework and possible alternative frameworks that could be adopted.

7. Appendix A – Glossary

Environmental flows (or minimum flows):

The National Policy Statement for Freshwater Management (NPS-FM 2020) refers to environmental flow which is not defined. The TRMP refers to minimum flow which is defined as "*the minimum level at which a freshwater objective may be set to provide for the associated national value*".

This definition is not particularly informative, instead a more simplistic meaning is set out below.

> *"The environmental flow is the flow rate in a river or stream used as a trigger to suspend most water abstraction. Some uses may continue on a restricted basis, but these are generally limited to meeting human health needs. The environmental flow is set to protect particular values, most commonly aquatic habitat to protect ecosystem health. The flow in a river or stream may naturally drop below the environmental flow following the restriction / suspension of consented abstractions."*

Environmental level

An environmental level is similar to an environmental flow but is typically applied to an aquifer or lake. It is a water level set below which water takes must cease or reduce. Again, an environmental level is set to manage particular values of the aquifer or lake.

Take limit

This is the maximum rate or volume of water that may be abstracted from a water source (river, stream or aquifer). The total allocation is available for water users to apply to take for abstractive uses.

Management flow

The management flow is the environmental flow plus the take limit. Once a river flow hits the management flow, water abstractors will likely need to begin to reduce their abstraction rates.

Residual flow

The residual flow is the amount of water that must be left in the river at the point where water is taken.

Mean Annual Low Flow (MALF)

The MALF is a statistic that describes the average amount of water in a river during times of low flow. It is calculated by averaging the lowest flow for each year across all recorded years.[16]

Freshwater Management Unit (FMU)

FMU is defined in the NPS-FM 2020 as "*means all or any part of a water body or water bodies,*

[16] LAWA https://www.lawa.org.nz/learn/glossary/m/mean-annual-low-flow-malf/

and their related catchments, that a regional council determines under clause 3.8 is an appropriate unit for freshwater management and accounting purposes.