Waimatā – Pakarae Catchment Advisory Group – Hui 7

Date: 5 November 2024

Subject: Water Quantity – Flow setting

1. Purpose

This report introduces the topic of water quantity management in the Waimatā-Pakarae catchment area. It sets out:

- key concepts and statutory requirements regarding water quantity management
- how water quantity is currently managed
- data on flow levels, and
- projections for future water supply and demand.

Staff will introduce this topic in Hui 7, and a Council Hydrologist will present on flow levels in the catchment area.

2. Background

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, we will be discussing the topic of water quantity management in the Waimatā-Pakarae catchment area.

Water quantity is linked to 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 nutrient levels, dissolved oxygen and water temperature.[1]

[1] 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.

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. 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.

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

Throughout this paper and water allocation conversations going forward, a commonly used metric is litres per second (L/s) which describes the rate at which water is being taken or is moving within a river system.

3. How is water used in the Waimatā-Pakarae catchment area?

Consented water takes

There are currently four consented water takes in the Waimatā-Pakarae catchment area. A map of the locations of these water takes is provided in **Figure 1**.

- There is one consented take from the Pakarae to take at 47 L/s for irrigation purposes. Conditions of this existing consent require a low flow monitoring program for the gauging site at Pakarae Bridge. The Pakarae River is fully allocated.
- The Tangamatai Stream, which is a tributary of the Pouawa River, has a water take on it of 1.9l/s for the irrigation of kiwifruit. There is no Mean Annual Low Flow (MALF) available for this stream. A consent condition of this water take is to undertake hydrological monitoring including low flow measurements.

- There is currently one consented take from the Waimatā river. This consent is granted to take at a rate of 5 L/s for the irrigation of pasture.
- There is a water take on the Tatapouri Spring at a rate of 0.35 L/s for water supply to Tatapouri Campground. Consent conditions require monitoring of the water level of a wetland at the take site.

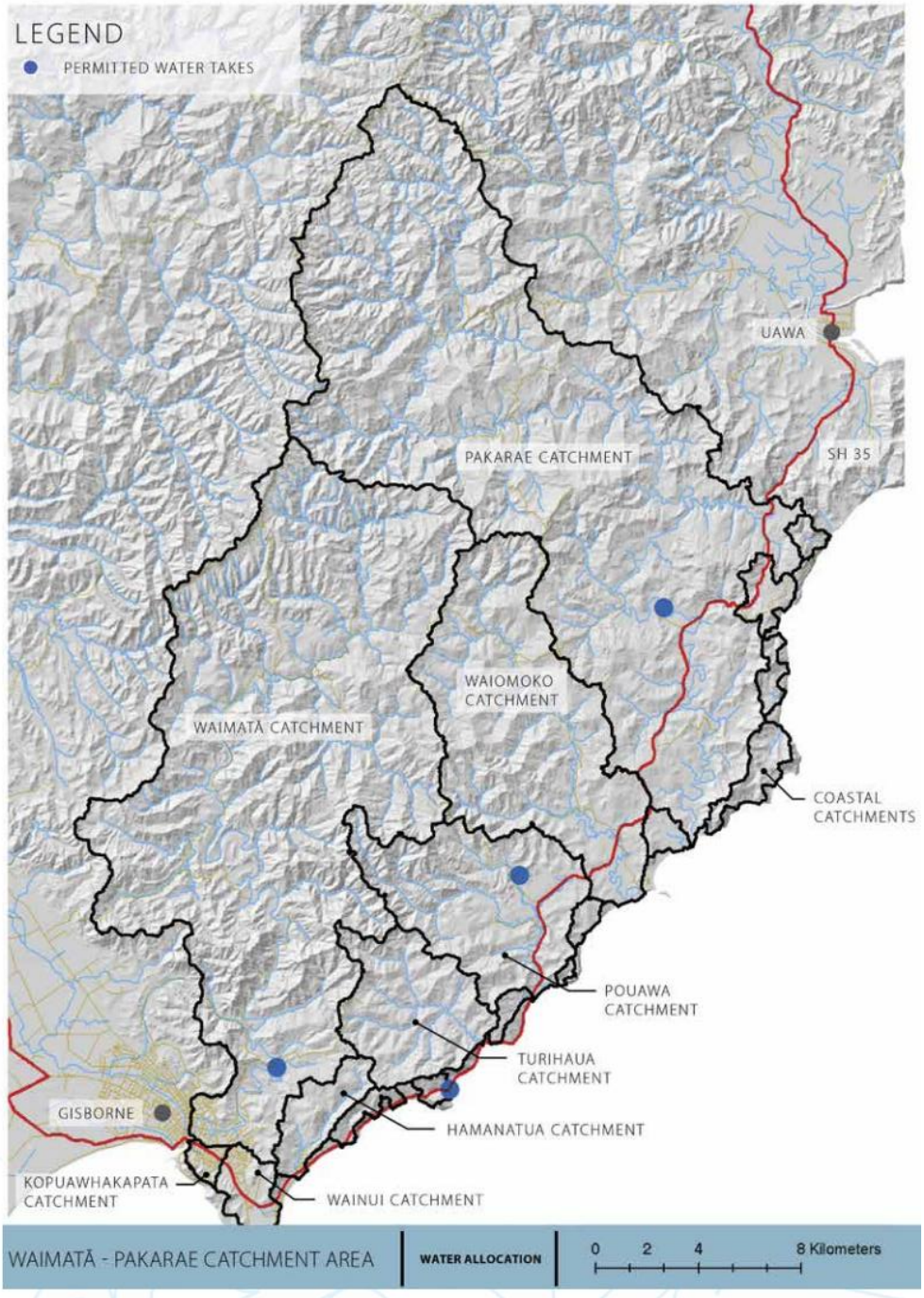

Figure 1: Consented water takes in the Waimatā-Pakarae catchment area

Permitted abstractions

Some small abstractions from surface water and groundwater are permitted under rules of the Tairāwhiti Resource Management Plan (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/domestic 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 2**, based on an estimate of 250 L/person/day in unreticulated areas. 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.

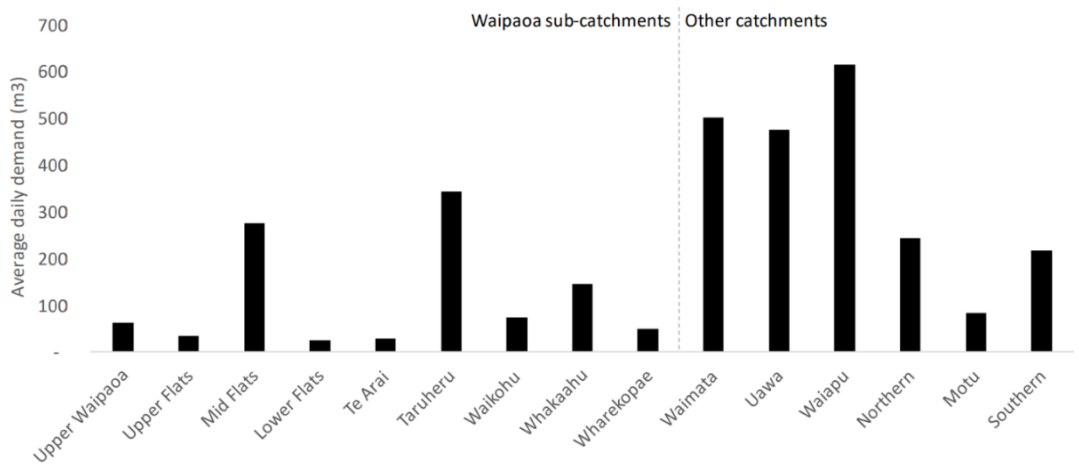

Figure 2: Average daily demand associated with private unmetered domestic uses (Source: Alexander et al.)

In terms of volumes used for stock drinking water, **Figure 3** provides a conservative estimate of daily average demand in the different major catchments within Tairāwhiti.

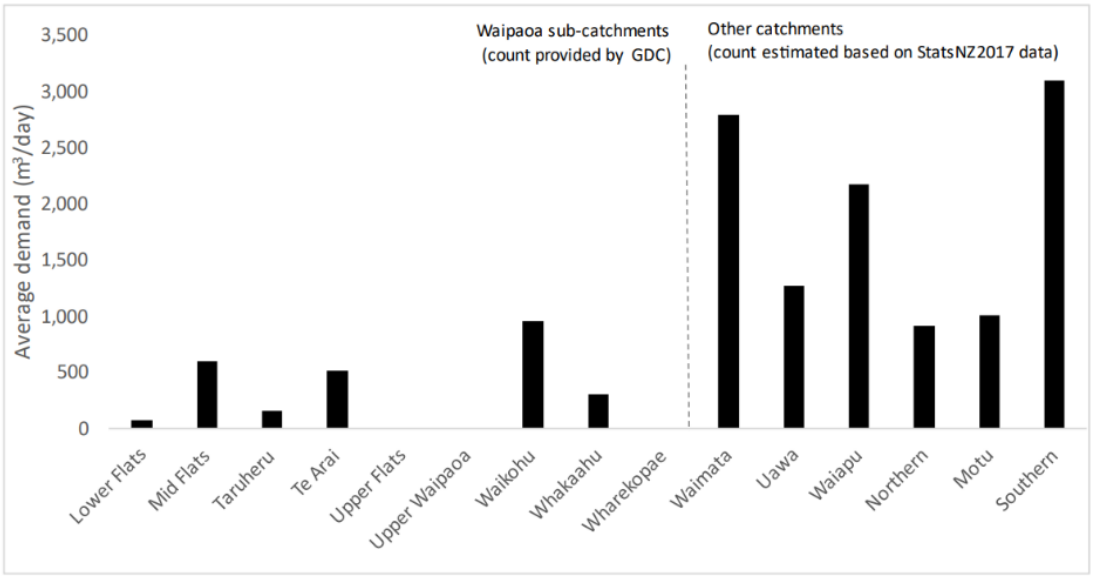

Figure 3: Average daily demand for stock water, grouped by sub-catchment (Source: Alexander et al.)

4. How is water quantity currently managed in the Waimatā-Pakarae Catchment area?

Water quantity in the catchment is managed in accordance with the rules set out in the TRMP.

How much water can be taken?

The TRMP currently has two distinct approaches for environmental flow and take limits:

- Water quantity limits set for monitored waterbodies through catchment plans. There are specific flow and/or take limits set for rivers and aquifers within the Waipaoa Catchment area, where most abstraction in the region occurs. Limits for the Mōtū catchment have also been drafted.
- a default methodology for determining the minimum flow and allocation 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.

As part of the development of the Waimatā-Pakarae Catchment Plan, this Catchment Advisory Group will need to consider appropriate minimum flows and take limits in line with the NPS-FM requirements set out above.

How is available water allocated?

Water is allocated on a first in, first served basis. The TRMP provides for 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 Resource Management Act 1991 (RMA) (or the TRMP) does not 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.

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.

The allocation framework is set out in regional provisions rather than at the catchment level. Issues and options with the current water allocation framework has been a focus of discussions with the Regional Freshwater Advisory Group throughout 2024.

Consent criteria

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.

These criteria are detailed in **Appendix B**.

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.

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 under the reasonable use test for the current water use.
- The transferee's take and use is assessed against the water permit criteria (as discussed above).

5. Flow data

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

Water level and flow data are available from Council's sites on the Waimatā River at Monowai Bridge (located in the mid area of the catchment) and at Goodwins Road Bridge (located in the lower catchment). Flow is inferred from water level using rating curves. Council has a site on the Waimatā River at William Pettie Bridge where only water level data are available. Summary flow statistics have been calculated for the Waimatā River at Goodwins Road Bridge (Table 1). The data used is from July 1987 to June 2021 (34 years), as the record is nearly complete between these dates. The Mean Annual Low Flow (MALF) has been estimated using hydrological years (July to June), as the low flows are not separated (as they would be in a calendar year).

Table 1. Summary of flow data (m3/s) for the Waimatā River at Goodwins Road bridge monitoring site for the period July 1987 to June 2021

Mean	Median	d-MALF	Upper Quartile	Lower Quartile	Q5 (flow exceeded 5% of the time).
4.663	1.380	0.146	3.613	0.490	15.741

6. Future 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[3]. Council commissioned technical research to understand current and future water supply, demand and availability[4]. 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?

Some findings relevant for the Waimatā-Pakarae catchment area are:

- The Waimatā-Pakarae catchment area is expected to have reduced surface water availability in the future due to an ~8% reduction in mean annual low flow.
- Average annual rainfall recharge is projected to decrease under climate change, resulting in lower groundwater availability.
- Demand for water is projected to increase in the future as cropped areas convert to surface water irrigation.

[3] 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

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

- Under a future supply-demand scenario the Waimatā-Pakarae catchment is projected to change from a positive supply-demand balance (supply exceeds demand) to a negative balance in the future.

These findings highlight projected pressures on water availability in the future.

7. Next steps

Staff will report back to the Group with proposed minimum flows, take limits and appropriate timeframes for implementation at the next Hui.

Appendix A: Glossary of Water Quantity Key Concepts

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*".

> *"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."*

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

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

Appendix B: Key criteria for water take consenting (non-exhaustive)

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.