Manaaki Whenua
Landcare Research

Recommendations for accounting for stockwater takes and for setting permitted activity water takes in the Tasman District

Prepared for: Tasman District Council

June 2022

Recommendations for accounting for stockwater takes and for setting permitted activity water takes in the Tasman District

Contract Report: LC4130

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Manaaki Whenua – Landcare Research

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In Part 2 we present results of a literature survey on existing methods for estimation of other permitted activity water takes used by other councils in New Zealand and recommendations on appropriate method(s) and limits to consider in Tasman. The recommended method(s) cover domestic use, stockwater (Part 1) and other water uses within the current permitted take thresholds in Tasman. These suggested thresholds take into account (in broad terms only) the hydrological regimes of the seven major catchments in Tasman District and the status of current water allocation and availability. The results from this work will support decision-making on the categories and levels of permitted water take which could be proposed in the new TEP.

Both sets of advice will help inform development of freshwater provisions in the new Tasman Environment Plan and improvement of freshwater accounting systems in Tasman.

This research was funded by MBIE Envirolink Grants 2220-TSDC181 Sustainable thresholds for stock water takes (Part 1 in this report) and 2221-TSDC182 Methods for estimation of permitted water takes (Part 2 in this report).

Part 1 Recommendations for assessing stockwater demand

- We recommend that the per capita livestock water use data of Stuart and Rout (2007) be used as a basis for ongoing assessment of stockwater demand by livestock class and catchment.
- We suggest that AgriBase estimates of numbers of farms and numbers of livestock should be treated as at the high end of estimates.
- Property-based allowances for stockwater use (and domestic water use) should be considered to be within future permitted activity allocations in the future TEP (see Part 2 for further detail of freshwater accounting).
- If stockwater use is prescribed as being within future permitted activity allocation limits, our analyses suggest that the current TRMP permitted activity take limit of 5,000 l/day in the Takaka catchment would be insufficient to provide for stockwater and other water demands on some properties. This means a requirement for a water permit could be triggered for some affected properties; therefore a higher permitted take limit should be considered for the Takaka catchment.
- Setting stock water take limits needs to be administratively straightforward for the rule to be acceptable to farm practitioners.

- Based on the analyses in this report, and declining trends in intensive livestock numbers in Tasman District, it appears unnecessary to prescribe enforceable specific property-based numerical limits in the future TEP for stockwater takes, but instead to set guidelines for estimating stockwater use within water management zones.
- Options such as requiring stopcocks for all gravity fed takes and encouraging water storage and destocking when water shortages are imminent are useful tools for managing stock water take.
- Most of Tasman's water management zones are at or near full allocation, so numerical estimation of cumulative permitted stockwater takes as has occurred in some FMUs is recommended as an ongoing part of the Council's freshwater accounting system, especially in the context of Te Mana o te Wai.
- With climate change, Tasman is predicted to have more severe droughts, more so in the east, therefore pressure on summer water resources will increase. An improved assessment of farm and livestock numbers will increasingly be required to better provide within allocation limits for the water needs of households and livestock.

Part 2 Recommendations for setting permitted activity water take rules

The current permitted activity settings for water take under TRMP Rule 31.1.2.1 are a good starting point for refinement of maximum take rates and conditions under which permitted takes may operate.

Given the likely compliance issue for dairy farms in the Takaka catchment, combined with locally high rainfall, it is recommended that the permitted take limit for the Takaka catchment be increased from 5 to 15 m^3/day for rural zoned land.

Each of Tasman's seven major catchments have different physical characteristics, cultural and aesthetic values, land uses, and stresses on available water for allocation and permitted uses. A qualitative assessment of those factors suggests that the catchments where lower levels of permitted water allocation (e.g. the current 5 m^3/day) are needed would be the rural zoned land of Waimea, Moutere and potentially Abel Tasman.

The review of nine regional councils' practice in devising permitted activity water take rules suggests opportunities for refinement of the Tasman rules. Specific consideration is recommended to

- clarify/state that the permitted activity only relates to water taken from a natural water source within the property, including for stockwater use.
- set a permitted activity take limit per property but allowing multiple points for that water take within any property.
- continue to provide as a permitted activity for water takes for short-term water resource investigations and aquifer pump testing. However, conduct a review of the level at which small-scale hydro-electricity generation should continue to be permitted, due to potential adverse effects of diversions on small streams.
- provide for short-term temporary water takes outside of periods of water take restrictions for prescribed purposes such as construction and dust suppression.

- develop an 'allocation calculator' approach to water allocation, similar to that being used by Environment Waikato, in which s14 domestic and stockwater takes are deemed included within the permitted take limits and are accounted for alongside individual water body allocation limits (this would enable compliance with the NPSFM 2020 clause 3.29 requirement for freshwater quantity accounting).
- provide a permitted activity for domestic water takes within a single property, i.e. avoid requiring a water permit for multiple domestic water takes within a property (potentially excluding regularly water-short catchments such as Moutere), as this would further add to the recent regulatory interventions already proposed by Taumata Arowai for potable water quality.
- avoid, in the interests of conjunctive management, the need for separate permitted activity prescriptions for surface waters versus groundwater.
- set maximum instantaneous take rates for takes from rivers and streams, alongside a daily or weekly limit, to avoid localised adverse effects on instream life, residual flows, etc.
- allow for permitted takes to be assessed as consumptive 'nett takes' in prescribed circumstances such as for small-scale hydro-electric generation, where water is returned to the same water body near the point of take.
- continue use of the Council's Dry Weather Task Force and s329 water shortage directions to curtail permitted activity water use during drought.

Other contextual issues to consider will include whether the permitted activity settings achieve Te Mana o te Wai and cultural values, how future climate change could affect permitted activity settings, and the cumulative effects of population growth especially outside of water reticulated areas.

1 Introduction and purpose

Tasman District Council (TDC) is tasked with ensuring that Tasman's "freshwater ecosystems are healthy and that there's enough water of good quality for people and communities to thrive both now and in the future" (TDC Freshwater factsheet). The purpose of this report is to provide advice that will help inform the development of freshwater provisions in the new Tasman Environment Plan – Aorere ki uta, Aorere ki tai and will provide input to improve freshwater accounting systems in Tasman.

The report is divided into two parts. In Part 1, we suggest suitable thresholds (volumes/rates) for stock water takes which would ensure cumulative adverse effects of those takes on waterbodies are not likely to occur. These thresholds could be considered for smaller waterbodies where the pressure of stockwater takes is a greater portion of all takes. The results will provide information for the new Tasman Environment Plan (TEP) by suggesting permitted thresholds for stock water takes that meet the requirements of the statutory entitlement of this take and use under the Resource Management Act (1991) Section 14(3)(b).

In Part 2, we present results of a literature survey on existing methods for estimation of other permitted activity water takes used by other councils in Aotearoa New Zealand (A-NZ) and recommendations on appropriate method(s) and limits to consider in Tasman. The recommended method(s) cover domestic use, stockwater (from Part 1) and other water uses within the current permitted take thresholds in Tasman. These suggested thresholds take into account (in broad terms only) the hydrological regimes of the seven major catchments in Tasman District and the status of current water allocation and availability. The results from this work will support decision-making on the categories and levels of permitted water take which could be proposed in the new TEP.

This research was funded by MBIE Envirolink Grants 2221-TSDC182 – Methods for estimation of permitted water takes) and 2220-TSDC181 – Sustainable thresholds for stock water takes).

2 New Zealand Context

Fresh water is fundamental to people's well-being and way of life and has many uses and values, e.g. drinking water and stock water, customary uses and food supplies, recreation, hydro-electric power generation and irrigation. However, there are competing demands for fresh water and the cumulative effects of abstractions and discharges on flow, level or quality of water in freshwater bodies.

Development of water resources has largely moved from run-of-river water takes, to groundwater takes and now towards more water storage (NZ Hydrological Society 2021). With increasing pressure on freshwater environments in New Zealand, the government has implemented obligations under the National Policy Statement for Freshwater

Management (NPS-FM 2020[1]) requiring councils to set allocation limits for water takes and for water quality for water bodies across NZ. Such limits must achieve the hierarchy of obligations in Te Mana o te Wai.[2] That means that the health and wellbeing of the water is prioritised over provision for human health needs and other users of water (MPI 2021).

Regional plans are needed that deliver on the hierarchy of obligations but include the needs and aspirations of the community and tangata whenua (MPI 2021). Integrated catchment approaches and spatial planning are two methods for enabling these plans. Planning must accommodate both consented activities as well as smaller scale permitted activities such as minor water takes and those allowed as of right under legislation. This report addresses the scale of stockwater takes and of water takes which may be allowed in the Tasman Environment Plan as permitted activities, i.e. not requiring a water permit to authorise them.

2.1 Legislative setting

The Ministry for the Environment is the lead organisation for national freshwater policy under the Resource Management Act (RMA 1991) and via national policy statements and national environmental standards. Regional and Unitary councils are responsible for development, implementation, and enforcement of regional plans for water resource management under the RMA; in Tasman District these policies and rules are contained in the Tasman Resource Management Plan (TRMP) which will soon be redrafted as the Tasman Environment Plan. Despite the current government proposal to replace the RMA with a Natural and Built Environments Act, a Spatial Planning Act, and a Climate Change Adaptation Act (NZ Hydrological Society 2021), we assume the current system of water consenting and permitted activities will remain in a similar form.

There are three key pieces of freshwater legislation that aim to restore and protect the health of New Zealand waterways and to which councils must give effect. These are the drivers for this work.

3 **The Resource Management Act (RMA) 1991 Section 14 Restrictions relating to water**

- **Section 14 (3)(b) is relevant to Part 1 on stockwater takes:**

(3) A person is not prohibited by subsection (2) from taking, using, damming, or diverting any water, heat, or energy if—…

(b) in the case of fresh water, the water, heat, or energy is required to be taken or used for—

(i) an individual's reasonable domestic needs; or

(ii) the reasonable needs of a person's animals for drinking water,—

[1] NPS–FM 2020 https://environment.govt.nz/acts-and-regulations/national-policy-statements/national-policy-statement-freshwater-management/

[2] See section 2.1 for an explanation of Te Mana o te Wai.

and the taking or use does not, or is not likely to, have an adverse effect on the environment; ***...***

Regional councils need to estimate the level of stockwater numerical estimation of cumulative permitted stockwater takes, and individual domestic water demands so that they have an evidence base to set water body cumulative allocation limits for taking and/or use of water. TDC does not currently have any guidelines or rules in the TRMP for unlimited stock water take. We consider it unlikely that stockwater use (as opposed to take) is likely to have an adverse effect on the environment so have limited this review only to the effects of stockwater takes.

- **Section 14 (3)(a) is relevant to Part 2 on permitted activity water takes:**

(3) A person is not prohibited by subsection (2) from taking, using, damming, or diverting any water, heat, or energy if—...

(a) the taking, using, damming, or diverting is expressly allowed by a national environmental standard, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent; ...

While s14(3)(a) refers to taking, using, damming or diverting, this review is limited to the effects of water taking. Currently, the TRMP has existing provisions for permitted activities (see section 7 in this report for details of these provisions).

4 **The National Policy Statement for Freshwater Management 2020** (NPS-FM 2020) provides local authorities with direction on how they should manage freshwater under the RMA (1991). Section 3.17 outlines the requirements for 'Identifying take limits':

1 In order to meet environmental flows and levels, every regional council:

a must identify take limits for each FMU (Freshwater Management Unit); and

b must include the take limits as rules in its regional plan(s); and

c must state in its regional plan(s) whether (and if so, when and which) existing water permits will be reviewed to comply with environmental flows and levels; and

d may impose conditions on resource consents.

2 Take limits must be expressed as a total volume, a total rate, or both a total volume and a total rate, at which water may be:

a taken or diverted from a FMU or part of a FMU; or

b dammed in a FMU or part of a FMU.

3 Where a regional plan or any resource consent allows the taking, damming, diversion or discharge of water, the plan or resource consent must identify the flows and levels at which:

a the allowed taking, damming, or diversion will be restricted or no longer allowed; or

b a discharge will be required.

4 *Take limits must be identified that:*

a provide for flow or level variability that meets the needs of the relevant water body and connected water bodies, and their associated ecosystems; and

b safeguard ecosystem health from the effects of the take limit on the frequency and duration of lowered flows or levels; and

c provide for the life cycle needs of aquatic life; and

d take into account the environmental outcomes applying to relevant water bodies and any connected water bodies (such as aquifers and downstream surface water bodies), whether in the same or another region.

Te Mana o te Wai is a concept fundamental to the NPS-FM and promotes restoring and preserving the balance between the water (wai), the wider environment (taiao) and the people (tāngata). Te Mana o te Wai is relevant to all freshwater management. There are six principles: Mana whakahaere, Kaitiakitanga, Manaakitanga, Governance, Stewardship, and Care & Respect. Regional plans must ensure that freshwater is prioritised according to the following 'hierarchy of obligations' from s1.3(5):

(5) There is a hierarchy of obligations in Te Mana o te Wai that prioritises:
(Tier a) first, the health and well-being of water bodies and freshwater ecosystems
(Tier b) second, the health needs of people (such as drinking water)
(Tier c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Section 14 (3)(a) permitted water takes for domestic consumption and drinking water supplies requiring resource consent are covered by Tier (b), whereas Tier (c) includes the Section 14 (3)(a) stockwater takes and the Section 14(3)(b) permitted activity takes (and on the face of it, firefighting water takes under Section 14(3)(e)).

A range of essential freshwater milestones must be commenced or implemented by Regional Councils as part of the new national direction to protect and improve New Zealand's rivers, streams, lakes, and wetlands, the primary one being the notification of proposed plans setting water quantity and quality limits nationwide by December 2024.

5 **National Environmental Standard for Freshwater** (NES-FW 2020)[3] – sets requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems.

In addition, the Resource Management Regulations (2010) – Measuring and Reporting of Water Takes require holders of consents who take more than five litres per second of water to meter their water take and provide records to the regional council. A 2020

[3] NPS–FM 2020 https://environment.govt.nz/acts-and-regulations/regulations/national-environmental-standards-for-freshwater/

amendment introduced a staged timeline requiring electronic monitoring and submission of water take records. Permitted takes do not require metering under these regulations but metering or another form of recording water taken could conceivably be required (as currently for Moutere (Deep) Aquifers) under a permitted activity rule for water takes in the proposed TEP.

2.2 Current Tasman Resource Management Plan permitted activity settings

TDC is currently guided by two key documents that ensure Tasman's freshwater is protected and restored, the Tasman Resource Management Plan (TRMP) and the Tasman Regional Policy Statement (TRPS). These documents are currently being reviewed and will be replaced with Aorere ki uta, Aorere ki tai – the Tasman Environment Plan (TEP). There are nine themes in the TEP, including the theme Freshwater Management. The TEP must ensure that the freshwater legislation outlined in the previous section is given effect to. The findings in this report will support the TEP.

TRMP chapters 30 and 31 are relevant to this review. Chapter 30 describes Tasman's catchments; the range of water uses and the challenges for sustainable management of their water resources. It sets objectives and policies for managing the primary issues of 'reduced water body flows or levels' (30.1), for allocating water among competing water users (30.2) and for freshwater augmentation (30.3). Chapter 30 includes a detailed Schedule 30A of uses and values of all major Tasman water bodies affected by reduced flows or levels, and water management objectives for water quantity and quality. Thus, Schedule 30A is a current snapshot of water bodies more vulnerable to abstraction pressure.

Chapter 31 implements the objectives and policies of Chapter 30 via prescriptions of regional planning rules for water take, diversion, use or damming. Of relevance to this review is section 31.1.2.1 describing permitted activities for water take, diversion, and use. Apart from some conditions on takes from dams, subclause (a) sets no limits for water takes for stock drinking water. Figure 31.1A prescribes maximum permitted water takes for each water management zone, ranging from 5 to 20 m^3/day per point of take per site, with a limit of one take point per site. Figure 31.1B prescribes permitted takes for a limited range of specified purposes rather than zones; these purposes comprise drilling for resource investigations, pump testing and hydro-electric power generation. Rule 31.1.2.1 does include a range of conditions limiting the effects of all permitted takes, including stream drying, fish barriers, effects on other water users, avoidance of erosion, and limits on coastal takes that may induce seawater intrusion.

The NPS-FM at s3.28 requires regional councils to improve the efficiency of water allocation. For many regional councils, information on permitted water takes is either unreliable or non-existent. There will always be differences between consented allocation and actual take because consents specify maximum rates of take and water take rates for most uses will vary according to changing demand through each year (Fenemor & Robb 2001). Also, accounting methods for estimating all consented and permitted water takes differ between councils. Access to good quality water data and analysis is crucial to improving water allocation and use.

2.3 Report outline and method

This research focuses on two areas where there are information gaps in developing the TEP. They are reported in two interlinked parts.

Part 1 provides recommendations on water needs of different categories of livestock farmed in the Tasman District, and on levels of stockwater demand in the major catchments of Tasman. This work is based on land use mapping from AgriBase to inform freshwater accounting and the setting of water take allocation limits for Tasman FMUs and water bodies in the updated TRMP (new TEP).

Part 2 provides recommendations on potential permitted water take categories and levels of water take for each category, taking into account current permitted take settings in the TRMP and a review of those used in other regions. These recommendations will be tailored to Tasman's major catchments. The purpose of the work is to inform freshwater accounting and the setting of water take allocation limits for Tasman FMUs and water bodies in the updated TRMP (new TEP).

We carried out a review of the grey literature, the TRMP, other regional council plans, and land use data for Tasman by major catchment to inform Parts 1 and 2 in this report.

Data from multiple sources were used to provide rationale for our recommendations. Stats NZ and DairyNZ provide regional/national data but not at the catchment level which was important for this report. In addition, the Stats NZ data only cover agricultural businesses registered for goods and services tax (GST) with Inland Revenue.[4] The compulsory registration level for GST is $60,000 so units below this level are not covered. AgriBase[5] is a database that has spatially mapped 144,500 New Zealand rural properties and assigned them a traceable ID. The database holds information about the farm type, size, and animal numbers by stock class for the farms, including lifestyle blocks, and these data are collated at the catchment and water management zone level. Therefore, we used AgriBase data from November 2021 for analysis at the catchment scale but make comparisons where possible with Stats NZ and Dairy NZ data.

[4] Figure. NZ https://figure.nz/chart/fdspH3Xo7XrlJb62-ua88PT6ZzenaWybo

[5] AgriBase https://www.asurequality.com/about/terms-of-business/

Figure 1. The Tasman region showing the location of the nine Water Management Areas, seven major catchments and major river tributaries (from the Tasman Resource Management Plan, Map Water 230 – Water Management location – 2000- 07-14).

Part 1 Thresholds for permitted stock water takes

3 Livestock pressure in relation to water availability and allocation stress

Historically, the TDC has not sought or retained any information on permitted stock water takes except in the case of Motupiko surface waters where takes have been assessed and accounted for during consent hearings. Currently these takes are unlimited in the operative TRMP. The TDC needs to better understand the cumulative impacts of these permitted takes on allocation limits in each Tasman Freshwater Management Unit (FMU) or Water Management Area and the cumulative effects of stock water take on smaller waterbodies (Fig. 1). Part 1 aims to define sustainable thresholds (volumes/rates) for stock water takes to ensure that cumulative adverse effects of those takes on smaller waterbodies are not likely to occur.

An important distinction in the analysis of stock water requirements in Part 1 is that the assessment is limited to stock drinking water. Other water needs associated with stock such as dairy shed washdown water are discussed in Part 2 as potential permitted activity take.

We provide a breakdown of the types and numbers of livestock farms and livestock numbers at the Tasman catchment scale and provide some examples from other Regional Councils of methods they use to calculate the peak daily water requirements per head or per hectare for livestock.

3.1 Livestock statistics and stockwater allowances

3.1.1 Tasman District

Tasman has a wide range of livestock farm types in its catchments and water management zones (Fig. 2). Beef, cattle, sheep, dairy, and combined sheep and beef farms are the main livestock farm types in Tasman (Tables 1 and 2). There were also smaller numbers of deer, horse, pig, goat, alpaca, llama, and poultry farms. While the number of beef farms is high compared to the other livestock farm types, Table 2 shows that there are significant numbers of 'lifestyle farms' that carry livestock too. At the catchment scale (Table 2), the number of beef cattle farms are highest in Waimea (188 farms) followed by Motueka with 144 beef farms. Dairy farms are most numerous in Takaka (56 farms), Aorere/West Coast (36 farms), and the Upper Buller (42 farms) catchments but there are more sheep and mixed sheep & beef farms than dairy (Table 2).

According to Bunting (2021), dairy farming in Tasman is a significant rural industry but the scale and intensity are relatively low when compared to the national data, which show a steady decline since 2005/2006. In addition, small dairy farms are being amalgamated with larger entities and there is a move away from dairy to beef and hops in Tasman (Bunting 2021). These trends are also reflected in the Stats NZ data (Table 3), which show decreases in livestock numbers for dairy cattle and sheep from 2018-2020 and a slight decrease in

beef cattle numbers from 2019 to 2020. The Agribase (2021) data in Table 3 highlights the difference in data collected by Stats NZ and Agribase.

Table 1. The types and numbers of livestock farms in the Tasman District

Farm type	Number of livestock farms in Tasman	
	2012[1]	2021[2]
Beef cattle farms	276	508
Sheep farms	180	209
Dairy farms	153	194
Sheep/beef cattle farms	99	291
Deer farms	30	55
Horse farms	27	31
Other livestock farming – goats, alpaca, llama	15	12
Pig farms	9	1
Poultry farms (eggs)	6	11
Grain-sheep or grain-beef cattle farms	3	-
Grazing other people's stock	-	162

[1] From Stats NZ – Selected livestock numbers by Tasman region

[2] Tasman Farms AgriBase data (2021).

Table 2. Number of farms with livestock for each Tasman catchment (AgriBase 2021)

Tasman Catchments	Farms with livestock								Total
	Beef	dairy + dry stock	Mixed sheep & beef	Sheep	Deer	Lifestyle	Grazing other people's stock	Other e.g. alpaca, llama, goats, horses & poultry	
Aorere/ West Coast	8	36	20	3	0	74	8	0	149
Takaka	47	56	23	15	2	246	19	2	410
Abel Tasman	17	2	12	5	1	76	1	0	114
Motueka	144	32	123	64	19	446	45	17	890
Moutere	74	5	24	29	5	652	26	10	825
Waimea	188	21	51	84	20	801	47	26	1238
Upper Buller	30	42	38	9	8	56	16	0	199
Total	**508**	**194**	**291**	**209**	**55**	**2351**	**162**	**55**	**3825**

Table 3. Tasman Livestock numbers from 2018 to 2021

Livestock[1]	2018[1]	2019[1]	2020[1]	2021[2]
Total sheep	246,000	234,000	165,000	478,951
Total dairy cattle	78,000	65,000	59,000	102,936
Total beef cattle	32,000	37,000	35,000	83,300
Total deer	Suppressed	6,000	Suppressed	34,438

[1] From Stats NZ – Selected livestock numbers by region.

[2] Tasman Farms AgriBase (2021). This is the total number of livestock held by all farm types not just the specialised ones. Many farms have a mixture of livestock in addition to their core business.

Golden Bay, which includes the Aorere/Westcoast & Takaka catchments, has two-thirds of the dairy farms in Tasman but the average farm size and stocking rates are less than Murchison dairy farms (2.57 and 2.62 cows/ha respectively) (Bunting 2021). However, these numbers are lower than the average stocking rates of dairy cows for the combined Tasman/Nelson City region which are reportedly 2.73 cows per/ha (Table 4) (LIC & DairyNZ 2020).

Table 4. Dairy cow statistics from LIC & Dairy NZ and AgriBase (2021) data

Dairy herds	2019/20[1] Tasman/ Nelson City	2021[2] Tasman District
Total dairy cows	54,081	88,226
Total effective hectares	19,788	23,796
Number of dairy herds	138	-
Average herd size	392	-
Average cows per/ha	2.73	

[1] Data from LIC & DairyNZ 2020 (https://www.dairynz.co.nz/media/5794073/nz-dairy-statistics-2019-20-dnz.pdf)

[2] Tasman Farms AgriBase (2021)

In Tasman, there has been a move away from the traditional twice-a-day (TAD) milking regime to Full Season Once-a-Day (FSOAD) milking (Bunting 2021), therefore reducing water take requirements for dairy shed wash-down. The Tasman District has 33 farms practising FSOAD milking and there are indications that more farms are considering moving to this regime. There are also a small number of farms who only milk seven out of ten days (Bunting 2021).

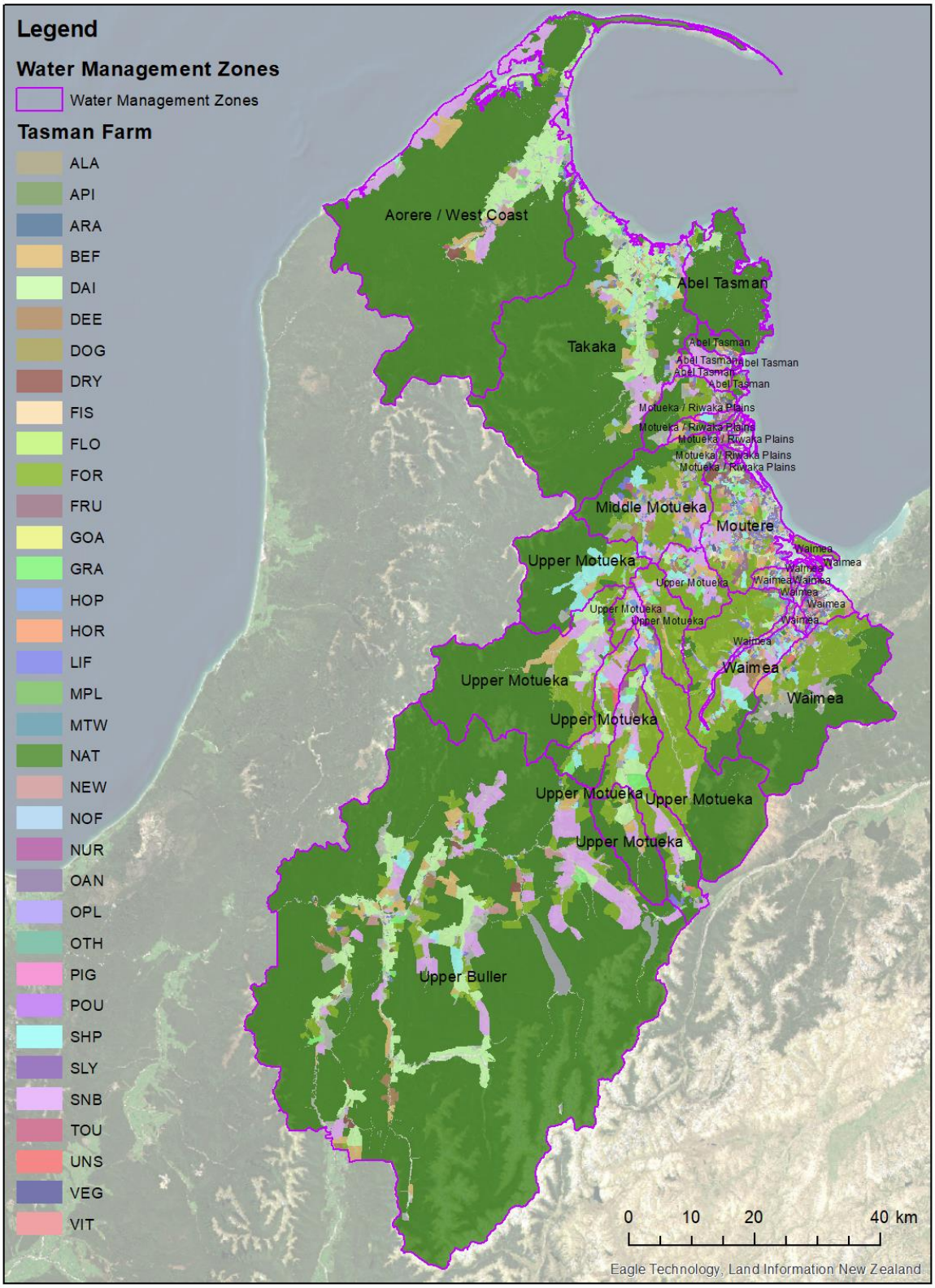

Figure 2. Tasman water catchment zones overlaid with farming types (May 2019, source Agribase database).

List of codes for the farm types in Figure 2

Code	Farm Type	Code	Farm Type
ALA	Alpaca and/or Llama Breeding	MPL	Multiple
API	Beekeeping and hives	MTW	Meat slaughter premises
ARA	Arable cropping or seed production	NAT	Native bush
BEF	Beef cattle farming	NEW	New record unconfirmed
DAI	Dairy cattle farming	NOF	Not farmed (idle land or non-farm use)
DEE	Deer farming	NUR	Nurseries
DOG	Dogs	OAN	Other livestock (not covered by other types)
DRY	Dairy dry stock	OPL	Other planted types (not covered by other types)
FIS	Fish, marine fish farming, hatcheries	OTH	Enterprises not covered by other classifications
FLO	Flowers	PIG	Pig farming
FOR	Forestry	POU	Poultry farming
FRU	Fruit growing	SHP	Sheep farming
GOA	Goat farming	SNB	Mixed sheep and beef farming
GRA	Grazing other people's stock	TOU	Tourism (camping ground, motel)
HOP	Hops	UNS	Unspecified (farmer did not provide indication)
HOR	Horse farming and breeding	VEG	Vegetable growing
LIF	Lifestyle block	VIT	Viticulture, grape growing and wine

3.1.2 Other Regional Councils

Tasman District Council currently has no limits set for individual stock or domestic water take in the TRMP, so we have reviewed the approaches of other regional and unitary councils.

We found that regional councils have used different approaches to estimate reasonable use water take volumes and demand. Stewart and Rout (2007) is a key technical report that was commissioned by Horizons Regional Council (HRC) to determine reasonable stock water requirements and guidelines for resource consent applications. The purpose of the study was to recommend reasonable levels of water use that could be applied as a standard for resource consent applications and to devise a simple procedure to use when processing applications. They reviewed standard estimates for drinking water requirements for eight farm animals/fowl including dairy cattle, beef cattle, sheep, deer, horses, goats, pigs, and poultry. They estimated average day demand (ADD)[6] and peak day demands (PDD)[7] for each stock category so that a standard could be determined. Horizons Regional Council plans to review the stock drinking water values provided in Stewart and

[6] ADD is the average day demand over the year derived from total annual consumption divided by 365 (Stewart and Rout 2007)

[7] PDD is the highest single day consumption during the year (Stewart and Rout 2007)

Rout (2007) and is in the process of setting up a contractor to do this (pers. comm. HRC 6 April 2022).

Hurndell et al. (2010) – a Horizons Regional Council Technical report – provides guidance on permitted activity water takes for policy development by comparing different options (see Appendix 3 for further information). They used case studies from the Upper Manawatu and Mangatainoka Catchments to calculate peak daily water requirements per hectare for the HRC using the following equation:

Litre/ha/day = average stock rate/ha x L/animal/day

WRC uses average stock water requirements from Fleming (2003) whose estimates are included as part of the assessment by Stewart and Rout (2007).

Table 5 summarises reasonable use water take volumes (L/individual/day) or peak daily demands from eight Regional/District Councils for a range of livestock, domestic take per person and per household or property. The councils include Bay of Plenty Regional Council (BoPRC), Hawkes' Bay Regional Council (HBRC), Horizons Regional Council (HRC), Marlborough District Council (MDC), Otago Regional Council (ORC), Taranaki Regional Council (TRC), and Waikato Regional Council (WRC). Only three regional councils provide maximum reasonable use water take volumes for livestock, i.e. BOPRC, HRC, and WRC. There is consistency between these regional councils for water take volumes for dairy cows and shed wash-down but WRC has slight variations from BOPRC and HRC for beef cattle, sheep, and deer. HRC has the most extensive range of data for reasonable use water take volumes for livestock which are based on data from Stewart and Rout (2007).

Water use take per household or property data are provided for the eight regional councils, including TDC, and there is variation in the permitted takes and the attached conditions – some of which are different, depending on whether they are surface water or groundwater takes, e.g. BOPRC, HRC.

Table 5. Maximum reasonable use water take volumes or peak daily demands (PDDs) for a range of livestock by Regional Council

Regional Council	Document source	Water use take per household (property) m^3/day	Maximum reasonable use water take volume (litre/individual/day) or peak daily water (PDD) demand									
			Domestic take per person	Dairy shed wash-down	Dairy Cows	Beef Cattle	Sheep	Deer	Horses	Goats	Pigs	Poultry
Bay of Plenty Regional Council (BOPRC)	Barber (2014) Report	**15** for surface water, **35** for ground water (RNRP)		70	70 Milking	55	4.5	12	55	4.5		
Hawkes Bay[1] Regional Council (HBRC)	RRMP POL 6.7.1 Take & use of water Rule 53, 54 Policies 24, 33, 35, 43,77	Not exceed **20** (excludes reasonable domestic needs, stock drinking purposes and firefighting). Rate of take cannot exceed 10L/s	200									
Horizons Regional Council[2] (HRC)	Stewart and Rout (2007) Aqualinc report, Hurndell et al. (2010), Rule 15-1 HRC One Plan.	**30** Surface Water (Rule 16-1) (domestic & animal drinking water must not exceed 400 L/day) **15** any other water uses. Rate of take must not exceed 2.0 L/s & must be used on the property **50** Ground Water (Rule 16-2)	300	70	70 Milking 45 Dry 30 Calf	55	4.5	12	70 Working 50 Grazing	10 Milking 7 Dry	18 Mature 35 Brood sow	0.45 Layer & breeder hens 0.29 non-laying hens & chickens
Marlborough District Council (MDC)	MEP[3] Rules Chapter 2.2	**5/dwelling** (must not exceed 5% of river flow at the point of take at any time – see 2.3.1)	Reasonable domestic needs	**15** m^3/day/ dairy shed								

Regional Council	Document source	Water use take per household (property) m^3/day	Maximum reasonable use water take volume (litre/individual/day) or peak daily water (PDD) demand									
			Domestic take per person	Dairy shed wash-down	Dairy Cows	Beef Cattle	Sheep	Deer	Horses	Goats	Pigs	Poultry
Otago Regional Council (ORC)	Rules 12.1.2.1 & 12.2.2.1 Regional Plan: Water for Otago	**25** Rate of surface water take must not exceed 0.5 L/s in some subregions[4] elsewhere 1 L/s.		Not permitted under the Regional Plan								
Taranaki Regional Council (TRC)	RFWP[5]	**50** for domestic, stock or farm dairy use (Rule 15 surface water and Rule 48 Groundwater)										
Tasman District Council	TRMP (Rule 31.1.2.1)	**5** (Waimea, Moutere, Abel Tasman, Takaka) **10** (Motueka, Riwaka Plains) **20** (Aorere/West Coast & Upper Buller)	Informally 200 L/head/day	No limits set								
Waikato Regional Council[6] (WRC)	Fleming (2003)*, Brown et al. (2007) & WRP Section 3.3	Up to **15** for farm use e.g. irrigation, washdown without a permit (excludes domestic and stock water)		70*	70* Milking	45*	3*	7	55* working 35* grazing		11*	.3*

Notes for Table 5:

1 Hawke's Bay Regional Council – Regional Resource Management Plan (RRMP)

2 Horizons Regional Council One Plan. Other uses includes milk cooling (See conditions/standards/terms for the Rules – Takes and Uses of Water (https://www.horizons.govt.nz/publications-feedback/one-plan/part-2-regional-plan/chapter-16/16-3-rules-takes-and-uses-of-water)

3 Marlborough District Council – Proposed Marlborough Environment Plan also includes 1825 m3/year for marae activities – 2.2.3 (excluding 5 m^3/day/dwelling for papakāinga units 2.2.2); 20 m^3/water body/day for dust suppression on gravel roads (2.2.7) and 50 m^3/day/per construction site for road, rail, or river control construction, maintenance, repair or upgrade works (2.2.11). See section 2.2 and extra conditions under General rules 2.3. https://www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Your%20Council/Environmental%20Policy%20and%20Plans/MEP_Decisions/Vol_2_Tracked_Changes/Rules_Chapter_02_General_Rules.pdf)

4 In North Otago, Maniototo, and Central Otago the maximum rate of water take is 0.5 L/s but elsewhere in Otago water take of 1L/s is allowed. Water meters are recommended to confirm water take. Take must not have an adverse effect on the environment (https://www.orc.govt.nz/news-and-events/news-and-media-releases/2019/july/information-about-stock-water-takes)

5 Taranaki Regional Council (TRC) – Regional Fresh Water Plan (RFWP) see standards, terms and conditions under Rules 15 and 48. https://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan

6 Waikato Regional Council * refers to average daily stock water requirements from Fleming (2003), WRP Waikato Regional Plan https://www.waikatoregion.govt.nz/Council/Policy-and-plans/Rules-and-regulation/Regional-Plan. Brown (2007) notes that water for dairy shed operations such as water shed wash-down and milk cooling is not available as a right if it exceeds the permitted take (15m^3/day for WRC) and that in summer some dairy farm operators may have to temporarily stop the taking of water for these operations or reduce stocking levels if the demand for stock drinking water is high. They suggest that controlling animal numbers at the catchment scale may provide a better balance between numbers of animals in each catchment and surface water availability so that there is a reliable supply of water for stock and minimum flows are not compromised.

3.2 Suggested livestock classes and stockwater allowance for the major Tasman catchments

TDC has seven major catchments (and eight proposed FMUs – including seven surface FMUs) with different freshwater attributes and geography. Table 6 summarises the catchments, aquifers, rivers and springs in the Tasman catchments as well as cultural values and land uses. There are water conservation orders for the Buller and Motueka Rivers (order 2001 and 2004 respectively). This means that the outstanding amenity or intrinsic values of these rivers are protected and must be addressed in the TEP. This information provides context for the recommended stockwater allowances in each of these catchments.

Under section 14(3)(b) of the RMA reasonable stock water needs must be met so there is no feasible way to restrict the amount of water needed for stock currently on the farm. Consequently, we suggest that reasonable stock water requirements from Stewart and Rout (2007) are the best source for guidance. Based on the key livestock classes in Table 2 and catchment characteristics from Table 6, we assess reasonable water take volumes and peak daily demands for the Tasman catchments. For heavily stressed catchments more conservative numbers may apply, but we recommend that the level of stress caused by livestock water demand should be re-assessed from time to time.

Figure 2 and Table 2 show the diversity of farm types in the Tasman catchments and overall, there were 3,825 livestock farms identified from the 2021 AgriBase data in the Tasman District. The Waimea Catchment has the most livestock farms (32%), whereas Abel Tasman Catchment has the least number, with just 3% of the livestock farms.

We estimated livestock numbers and peak daily and weekly stock water demands for the seven Tasman catchments and the following livestock types: dairy cows, beef cattle, sheep, deer and other (goats, horses, pigs, and poultry) (Table 7). Maximum reasonable use water volumes (L/individual/day) were taken from Stewart and Rout (2007). These calculations showed that the total peak daily stock water take for the seven catchments was 14,695 m^3/day (170 L/s) and 102,874 m^3 per week. The Motueka catchment has the highest peak daily stockwater take per individual (4,646 m^3/day (54 L/s)) and Abel Tasman catchment the lowest (135 m^3/day (1.6 L/s)).

In Table 8 we compare the permitted daily water take per catchment for livestock farms with the estimated daily livestock water take per catchment. These numbers do not include dairy shed wash-down. Daily water takes using the individual livestock data give total estimates that are around half that calculated using the current permitted activity settings and estimated numbers of livestock farms. Although stockwater and permitted activity takes should be considered cumulatively, by way of comparison, all the peak daily stock water takes per catchment are less than the permitted water use takes per livestock farm per catchment except for the Takaka catchment. This is likely due to the Takaka catchment having the highest number of dairy cattle (30,349) and only 56 dairy farms giving a high ratio of dairy cattle per farm. This means that if stockwater allocations must be provided for within the current generic permitted activity water take allocations (5,000 L/day for Takaka), some dairy farms will be non-compliant, based on stockwater demand alone. Compared with the 20,000 L/day allocated for the Aorere/Westcoast catchment, the 5000 L/day permitted allocation for the

Takaka catchment appears low but may reflect the higher sensitivity and lower water availability in the predominantly karst terrain of the Takaka Valley.

We also calculated the total area (hectares) per catchment for the different types of livestock farms in the Tasman District (Table 9). While we have not used these data in our calculations, we thought it would be useful information to include in this report. Livestock farms in the Upper Buller catchment cover the biggest area (43,919 ha) while Abel Tasman livestock farms cover the smallest (4,203 ha). Farms with mixed sheep and beef livestock cover the largest total area in the Tasman District with 54,081 hectares, followed by dairy (& dry stock) 43,511 hectares and beef farms at 23,796 hectares. The total area covered by livestock farms in the Tasman District is 158,425 hectares (1.65% of the region).

For completeness, Appendix 2 contains an equivalent summary of livestock numbers to that in Table 7 but by water management zone. This will allow a finer scale review of stockwater demand if desired by the TDC.

Table 6. A summary of the catchments, aquifers, rivers and springs in the seven major Tasman catchments, as well as cultural values and land uses

Tasman Catchment	Resource(s)	Water Management	Uses and values – Range of land uses
Aorere/West Coast	Tasman Regional Policy Statement 2001 – Chapter 30.0.1.1	Aorere, Patarau, Anatori, Para Para	The Aorere River is the major river that flows through this region. To the west are several West Coast catchments. This area is a dairy farming valley. The Catchment has high rainfall, high water flow and low stress on water take.
Tākaka	Takaka FLAG (2019) recommendations report. Manawhenua Mātauranga Report for the Tākaka Catchments (Manawhenua ki Mohua 2019) and Lovett & Rissman (2018)	Wainui, Tukurua, Catchments. Waingaro, Anatoki, Motupipi, and Waikoropupū Rivers, Aquifers - Arthur Marble, Takaka Limestone, and Takaka Valley unconfined gravel; Te Waikoropupū springs.	Covers 928 km^2 of catchment areas from the Wainui catchment in the east to the Tukurua catchment in the west and includes all catchment areas that drain into the Tākaka River and three primary aquifers. The area has steep ranges to the east, south and southwest and narrow valleys broadening out towards Tākaka. 635 km^2 sits within the Kahurangi National Park and Tākaka Hill Forest Park and is administered by the DOC. Outside these parks are another 150 km^2 of indigenous forest, exotic grasslands, and small areas in pine forests and orchards. There are a range of significant habitats, e.g. Te Waikoropupū springs (subject to a proposed Water Conservation Order) and a variety of taonga species of cultural significance to local iwi, e.g. inanga, long and short fin eel, koaro, banded kokopu, upland bully, redfin bully, and common bully. Tākaka FLAG (Freshwater and Land Advisory Group) was set up in late 2016 to develop a framework for protecting these values. Ki uta ki tai (from mountains to the sea) and reciprocity are important values as is the flow of water (wai). The Cobb power station discharges into the Cobb River. Main uses of water are for dairy farms, horticultural irrigation and the salmon farm at Waikoropupū springs.
Abel Tasman	TDC & DOC (2012)	Abel Tasman, Mārahau Plains, Otuwhero, Mārahau coastal, Holyoake, and Kaiteriteri.	The Totaranui, Bark Bay/Wairima, Torrent Bay/Rakauroa and Mārahau estuaries and Wainui and Awaroa inlets provide important habitats for migratory freshwater fish, including whitebait. Freshwater fish of importance include giant kōkopu, banded kōkopu, short jaw kōkopu, red fin bully, inanga, koaro, and eels. High tourism value.
Motueka (including Middle and Upper Motueka) /Riwaka Plains	From MWLR Motueka River Integrated catchment management Atlas[5]	Wangapeka, Tadmor, Baton, Glen Rae, Stanley Brook, Dovedale, Motupiko, Tapawera and Rainy Catchments	Drains an area of 2180 km^2 and flows into Tasman Bay which has high economic, ecological and cultural significance. It is the largest catchment in the Nelson region. The Riwaka River drains a 105 km^2 catchment, flowing into Tasman Bay 3 km north of Motueka River. The area has steeplands, floodplains (40 km^2) and low terraces. Horticulture is limited to the river flats and terraces and pasture grassland generally occupies the lower and easier slopes, the west-bank tributaries and the river flats and terraces. Commercial production forests occupy large areas of steeper and less fertile soils. There are several small ecologically significant areas of wetland at the coast and scattered throughout the catchment. The Motueka River has a Conservation Order (Motueka River) 2004. In Middle Motueka there are significant amounts of planted forests in the east and native forests and scrub in the western regions.

Tasman Catchment	Resource(s)	Water Management	Uses and values – Range of land uses
			In the Upper Motueka the main stem of the Motueka River rises in the Red Hills and flows north for around 110 km to the sea. A series of small and medium-sized tributaries drain the dry, hilly terrain in the east. Larger tributaries join from the west and drain both hilly and mountainous terrain. Major tributaries include the Motupiko, Tadmor, Sherry, Wangapeka, Baton, Graham, Dove, and Orinoco rivers, and Stanley Brook. There are 33 km^2 of extensive flat areas but there are large areas of native forest at the headwaters of the western tributaries (Kahurangi National Park) and in the upper reaches of the Mt Richmond Forest Park. There are also commercial production forests of mostly radiata pine. Pasture occupies the lower slopes and river flats and terraces. Current water demand is for irrigated hops, berries and some livestock in the upper Motueka and for intensive irrigated horticulture on the Motueka and Riwaka Plains.
Moutere	Tasman Regional Policy Statement (2001)	Moutere and Appleby Catchments, Moutere eastern, western, and southern groundwater and Moutere Coastal groundwater. 3 Deep Moutere Gravel Aquifers	The Moutere catchment and adjacent coastal catchments from Appleby to Lower Moutere have low summer flows, and many headwaters are dry in summer. The deep aquifers are used for orchard irrigation in the lower Moutere valley and along the coast, particularly for apple growing.
Waimea	Fenemor et al (2015), Fenemor and Weir (2016), Tasman Regional Policy Statement (2001)	Redwood, Wai-iti, Wai-iti Dam Service, Reservoir, Upper Catchment, Hope Aquifers & Eastern Hills, Upper Confined Aquifer, Waimea West, Golden Hills, and Delta.	The Waimea plains cover an area of 75 km^2. The Wairoa River and Wai-iti River are the major tributaries to the Waimea plains along with the Lee and the Roding Rivers. There are three major aquifers – the Lower Confined, the Upper Confined, and the Appleby Gravel Unconfined and two minor aquifer the Hope Confined and the Hope Unconfined beneath the Waimea Plains. The aquifers are used for irrigation, industrial and urban water supplies. The soils are highly productive and support dairy, market gardening, horticulture and viticulture land uses. The summer water resources of the Waimea catchment are fully allocated, and the Waimea Community Dam is currently being built to augment the summer resources and cater for future irrigation, urban and other water demand.
Upper Buller	Tasman Regional Policy Statement (2001)	Matiri, Gowan/Te Kauparenui, Matakitaki, and Lower Maruia Rivers and Lakes Rotoiti and Rotoroa. Buller River	The Buller catchment is upstream from Lyell. Water abstraction is low except for some tributaries of the Mangles River and the Owen River bin dry summers. The Buller River has important instream values and is recognised in the Water Conservation (Buller River) Order 2001.

Table 7. Estimated livestock numbers and peak weekly stock water demands for the seven Tasman Catchments (taken from Tasman Agribase database 19 May 2022). Livestock maximum reasonable use water takes (L/individual/day) are from Stuart & Rout (2007)

Tasman Catchments	**Estimated Livestock numbers for each Tasman catchment** Maximum reasonable use water take rate (m^3/day)									Peak **daily** stock water take per catchment **m^3/day (L/s)**	Peak **weekly** stock water take per catchment **(m^3/week)**
	Dairy Cows 70 L/day Milking		**Beef Cattle** 55 L/day		**Sheep** 4.5 L/day		**Deer** 12 L/day		**Other**[1] (Goats, horses, pigs and poultry)		
	Total stock	Total take (m^3/day)	Total stock	Total take (m^3/day)	Total stock	Total take (m^3/day)	Total stock	Total take (m^3/day)	Total take (m^3/day)		
Aorere/ West Coast	20172	1,412	6632	365	40503	182	140	2	5	**1,965 (22.7)**	**13,758**
Takaka	30349	2,124	6067	334	38526	173	11783	141	14	**2,787 (32.3)**	**19,508**
Abel Tasman	476	33	838	46	11008	50	230	3	3	**135 (1.6)**	**943**
Motueka/ Riwaka Plains/ Middle & Upper Motueka	23528	1,647	32657	1,796	218491	983	11766	141	79	**4,646 (53.8)**	**32,525**
Moutere	1814	127	11297	621	38590	174	691	8	28	**958 (11.1)**	**6,708**
Waimea	5985	419	15323	843	75001	338	4435	53	189	**1,841 (21.3)**	**12,890**
Upper Buller	20612	1,443	10486	577	56832	256	5393	65	23	**2,363 (27.3)**	**16,541**
Total	**102,936**	**7,206**	**83,300**	**4,582**	**478,951**	2,155	**34,438**	413	**341**	**14,695 (170.1)**	**102,874**
Total L/s		83.4		53.0		24.9		4.8	3.9	**170.1**	
m^3/week		50,439		32,071		15,087		2,893	2,385		**102,874**

Table 8. A comparison of the peak daily stock water take (from Table 7) and the daily permitted activity water take for all livestock farms within each of the Tasman catchments. Water use take per livestock farm was calculated by multiplying the number of livestock farms/catchment by the permitted water use take per household/property (This was 20,000 L/day for Aorere/West Coast and upper Buller, 5000 L/day for Takaka, Abel Tasman, Moutere and Waimea and 10,000 L/day for Motueka.)

Tasman Catchments	Peak daily stock water take per catchment m^3/day (L/s)	Permitted water take (for livestock farms) per catchment m^3/day (L/s)	Difference[8] m^3/day (L/s)
Aorere/West Coast	1,965 (22.7)	2,980 (34.5)	1,015 (11.7)
Takaka	2,787 (32.3)	2,050 (23.7)	-737 (-8.5)
Abel Tasman	135 (1.6)	570 (6.6)	436 (5.0)
Motueka	4,646 (53.8)	8,900 (103.0)	4,254 (49.2)
Moutere	958 (11.1)	4,125 (47.7)	3,167 (36.7)
Waimea	1,841 (21.3)	6,190 (71.6)	4,348 (50.3)
Upper Buller	2,363 (27.5)	3,980 (46.1)	1,605 (18.6)
Total	14,695(170.1)	28,795 (333.3)	14,088 (163.1)

[8] Noting that stockwater limits are not limited within permitted take limits, so this is simply a comparison

Table 9. The total area (hectares) of livestock farms per Tasman Catchment

Tasman Catchments	Total Area (ha)								Total Area (ha)/ catchment
	Beef	dairy + dry stock	Mixed sheep & beef	Sheep	Deer	Lifestyle	Grazing other people's stock	Other, e.g. alpaca, llama, goat, horse, & poultry	
Aorere/West Coast	2533	8680	9858	127	0	693	431	0	22,322
Takaka	2366	9787	3553	1570	157	1161	1132	48	19,774
Abel Tasman	375	509	2725	136	113	265	80	0	4,203
Motueka	6872	7509	16,751	4462	1409	3215	2888	291	43,397
Moutere	2008	879	1536	988	137	2310	859	90	8,807
Waimea	3986	624	2829	2854	1294	3239	908	269	16,003
Upper Buller	5656	15523	16829	1702	2303	452	1454	0	43,919
Total	**23,796**	**43,511**	**54,081**	**11,839**	**5,413**	**11,335**	**7,752**	**698**	**158,425**

3.3 Recommendations for assessing stockwater demand

- We recommend that the per capita livestock water use data of Stuart and Rout (2007) be used as a basis for ongoing assessment of stockwater demand by livestock class and catchment.
- We suggest that AgriBase estimates of numbers of farms and numbers of livestock should be treated as at the high end of estimates.
- Property-based allowances for stockwater use (and domestic water use) should be considered to be within future permitted activity allocations in the future TEP (see Part 2 for further detail of freshwater accounting).
- If stockwater use is prescribed as being within future permitted activity allocation limits, our analyses suggest that the current TRMP permitted activity take limit of 5,000 l/day in the Takaka catchment would be insufficient to provide for stockwater and other water demands on some properties. This means a requirement for a water permit could be triggered for some affected properties, therefore a higher permitted take limit should be considered for the Takaka catchment.
- Setting stock water take limits needs to be administratively straightforward for the rule to be acceptable to farm practitioners.
- Based on the analyses in this report, and declining trends in intensive livestock numbers in Tasman District, it appears unnecessary to prescribe enforceable specific property-based numerical limits in the future TEP for stockwater takes, but instead to set guidelines for estimating stockwater use within water management zones.
- Options such as requiring stopcocks for all gravity fed takes and encouraging water storage and destocking when water shortages are imminent are useful tools for managing stock water take.
- Most of Tasman's water management zones are at or near full allocation, so numerical estimation of cumulative permitted stockwater takes as has occurred in some FMUs is recommended as an ongoing part of the Council's freshwater accounting system, especially in the context of Te Mana o te Wai.
- With climate change, Tasman is predicted to have more severe droughts, more so in the east, therefore pressure on summer water resources will increase. An improved assessment of farm and livestock numbers will increasingly be required to better provide within allocation limits for the water needs of households and livestock.

Part 2 Assessing limits for permitted activity water take

4 Current TRMP Permitted Activity Settings

The Tasman District (along with Northland, Waikato, Bay of Plenty, Gisborne, Otago, and Greater Wellington) has been identified as having potential to grow the food and fibre sector by improving water availability and security. However, this potential growth needs careful management and to be considered within the context of Te Mana o te Wai and to incorporate community needs and expectations for safe drinking water, and potential climate change effects such as droughts and warmer temperatures (MPI 2021).

According to Dark et al. (2021: Tables 1 and 7), 15,808 ha of land in the Tasman District has been mapped as irrigated areas and there is potential for a further 103,385 ha to be developed for fruit trees, vegetables, vineyards and kiwifruit. The main driver for growth in non-irrigation water demand is population growth and based on projections from Statistics NZ and 200 litres per person per day, the Tasman District would need an additional 1.35 million m^3 of potable water based on 2048 projections.[9] If annual irrigation demand volumes for new viable areas are considered at 27.16 m^3, an additional 5% in drinking water will be required (Dark et al. 2021: Table 16)[10].

Section 2.2 of this report summarised the TRMP Part V: Water that covers the taking, using, diverting, and damming of water and includes the management of water quality. Table 6 of this report summarised the primary water uses and values of Tasman's seven major catchments.

There are set rules in the TRMP for taking and using water for irrigation and domestic water supply. The amount of permitted water that can be taken varies between the different Water Management Zones (Table 10). There are also some conditions attached to the permitted water takes:

- Permitted takes may be limited during times of rationing
- Water take must not cause any stream or river flow to cease
- Water can only be taken from one point per site
- Fish and eels must be prevented from entering the reticulation system
- The water take must not prevent another user from taking their domestic or stock drinking needs
- In Moutere groundwater zones a water meter must be installed
- The water take must not cause erosion of the land.

A resource consent is required for all other water takes and will be subject to specified conditions depending on whether it is a controlled or restricted discretionary activity.

[9] Mm^3 is a volume in millions of cubic metres. 1 m^3/day equals 1000 litres per day and is a rate of take.

[10] Further information from Dark et al. (2021) is in Appendix 3.

Waiting lists by chronological date are kept where Freshwater Management Zones have been fully allocated and guide the re-allocation of any water that becomes available.

Table 10. Current maximum permitted water takes from the Water Management Zones in the Tasman Region (Fig. 31.1A of the TRMP)

Water Management Zone	Maximum permitted quantity of water per day per point of take per site (1 take per site) (m^3/day)
Waimea Zones – All zones except as provided in (e)(i)[1]	5
Motueka/ Riwaka Plains Zones **Middle Motueka/ Upper Motueka Zones** – All zones except as provided in (e)(ii)[1]	10
Moutere Zones – All zones	5
Abel Tasman Zones – All zones except as provided in (e)(iii)[1]	5
Takaka Zone – All	5
Aorere/West Coast and Upper Buller Zones – All	20
All Zones – Any take lawfully existing before 3 November 2001	10

[1] From TRMP 31.2.1. Permitted Activities (Take, Diversion or use from fresh or inshore coastal water). There is no new take occurring after 3 November 2001 from:

(i) the coastal margin of the Delta Zone

(ii) the coastal margin of the Hau Plains Zone

(iii) the coastal margin of the Marahau Zone

(iv) occurring after 27 April 2013 in the coastal margin of the Lower Confined Aquifer Zone.

5 Other Regional Councils permitted activity water takes

This section summarises how nine other Regional or District Councils in New Zealand are assessing, developing, and implementing their permitted water takes policies and rules. As expected, due to the variability of catchment water availability and demand, there is great variation in the permitted activity rules of each Council, and these can be expected to evolve with the tightened requirements for limit-setting and accommodation of Te Mana o te Wai under the NPS-FM 2020. Information for some Councils was difficult to access, and the following sections reflect the level of detail provided. Table 11 summarises the permitted water takes for the nine Councils for permitted surface water and ground water take. The Rules for the policies have also been included.

Table 11. Regional Council rules and allocation rates for permitted surface and groundwater takes and use

Regional Council	Document source	Permitted surface water take and use (m^3/day/property)	Rule surface water	Permitted groundwater take and use (m^3/day/property)	Rule ground-water	Notes
Bay of Plenty (BOP)	BOP RWLP	**15**	**41**	**35**	**38**	
Environment Canterbury	EC CLWP	**From 2–50[1]**	**5.111**	**From 10-100[2]**	**5.113, 5.114**	[1] Depends on the 7DMALF, flow rate and type of water body. See Table 13 in this report for the rates and volumes per water body. [2] The bore must be 20 m from the property boundary or any surface waterbody. See Table 13 for rates and volumes.
Environment Southland	ESRWP 2010	**10**	**18**	**20**	**23**	
Hawkes Bay Regional Council	HBRC RRMP	**20[3]**	**54**	**20[4]**	**53**	[3]If less than 4 weeks within a 90-day period the total volume taken shall not exceed 200 m^3/7-day period. [4] Rate of take not greater than 10 L/s.
Horizons Regional Council	HRCOP	**Max 30 400[5] L/ha/day**		**Max 50 400[6] L/ha/day**		[5] For animal farming up to a maximum of 30 m^3/day/property. Rate must not exceed 2 L/s. [6] for animal farming up to a maximum of 50 m^3/day/property – see conditions.
Marlborough District Council	RMPP Vol 2 Chapter 2 General Rules for Water Take, Use, Damming or Diversion	**5[7]**	**2.3.1, 2.3.2.**			[7]Domestic, papakāinga needs; incidental or intensive farming use (m^3/day/record of title). 1825 m^3/year for marae activities (except papakāinga units)**.**
Otago Regional Council	WfORP Rule 12.1.2.1	**25**	12.1.2.1	**25**	12.2.2.1	No surface water take is at a rate greater than 0.5 L/s in the North Otago, Maniototo or Central Otago subregions. Take from some specified aquifers is no > than 50 $m^{3/}$day see Rule 12.2.2.2.

Regional Council	Document source	Permitted surface water take and use (m^3/day/property)	Rule surface water	Permitted groundwater take and use (m^3/day/property)	Rule ground-water	Notes
Taranaki Regional Council	RFWPT	Max **50**[8]	**15**	**50**[9]	**48**	[8] no more than 25% of instantaneous flow, measured at the point of abstraction and not exceeding 1.5 L/s or not more than 5 L/s for 30 mins/day for temporary takes. [9] For bore or well – rate of abstraction does not exceed 1.5 L/s; see additional conditions & terms under Rule 48.
Waikato Regional Council	Chapter 3.3 Water Module -Operative WRP	**1.5** (<1ha) **30** (Waipa, Waikato mainstems, Lake Taupo) **15** from all other sites	3.3.4.13	**2,500** (conditions apply)	3.3.4.12 & Policy 10 (a)(ii)	All net takes. See conditions and exceptions in section 6.9. of this report. These takes are additional to an individual's reasonable domestic needs and stock drinking water requirements. Does not include geothermal energy. See also Rule 3.3.3.14 Surface Water Temporary Takes max 150 m^3/day for no more than 5 days per annum from any river or aquifer (see conditions and exceptions). And Rule 3.3.3.4.15 well or Aquifer Testing max 2,500 m^3/day.

5.1 Bay of Plenty Regional Council

The Bay of Plenty's (BOP) Regional National Resources Plan (RNRP) 2017, formerly the BOP Regional Water and Land Plan (RWLP)), sets out the rules for small water takes. Rule 38 outlines the Permitted – Take and Use of Groundwater and Rule 41 outlines the Permitted – Take and Use of Surface Water. Rule 38 allows for $35m^3$/day/property of groundwater take and use and rule 41 allows for $15m^3$/day/property of surface water take and use. These rules allow small water takes for dairy shed wash-down, horticultural spray makeup, irrigation of gardens/small glasshouse operations, domestic and stock water needs providing these small takes don't have any adverse effects on the environment. However, not all allocations can be quantified, especially those that are permitted or not required to be notified under the RMA (1991) and the BOP's RNRP. Two reports were identified that helped assess unconsented or permitted water use in the Bay of Plenty Region – Barber (2014) and Rutter (2015).

Rutter (2015) assessed reasonable water take through estimated water use figures for stock and human consumption, and dairy wash-down. The report noted that dairy shed water use often exceeded the permitted activity predictions based on cow numbers. This means those dairy farms would be non-compliant and need a consent for those takes.

5.2 Environment Canterbury

Environment Canterbury has two key water management documents: the Canterbury Water Management Strategy (CWMS 2018) and the Canterbury Land & Water Regional Plan (CLWRP 2018). The CWMS sets priorities for planning and guiding the allocation of water. Of first order priority are the environment, customary use, community supplies and stock water. The second order priorities include irrigation, renewable electricity generation, recreation and amenity values.

In the CLWRP Section 2.4 outlines the Fresh Water Objectives which must be read alongside the Strategic Policies 4.1–4.8. The Plan sets limits (Section 2.5) at the catchment scale where the maximum amount of a resource can be allocated or controlled

Rule 5.111 sets limits on the take and use of water from a river, lake or an artificial watercourse as a permitted activity. Total take and use per property must follow specified conditions. The take and the volume of take per day from surface waters varies depending on the 7-day mean annual low flow (7DMALF). Ground water takes from bores as a permitted activity are outlined in Rules 5.113 and 5.114 and are differentiated by the volume of permitted take per day. The conditions are outlined in Table 12.

Table 12. Environment Canterbury maximum permitted takes and use of water from a river, lake, artificial watercourse, or groundwater (taken from CLWRP 2018)

Water body	7DMALF (L/s)	Rate (L/s)	Volume per day (m^3/day)	Rule
River	<100	0.5	2	5.111
River	100–500	2	10	5.111
River	500–10,000	5	20	5.111
River	10,000–20,000	5	50	5.111
River	>20,000	5	100	5.111
Artificial watercourse	N/A	5	10	5.111
Lakes	N/A	5	50	5.111
Water body	**Distance from property boundary or any surface water body**	**Rate (L/s)**	**Volume per day (m^3)**	**Rule**
Bore	>20 m	<5	<10	5.113
Bore	>20 m	<5	>10 & <100	5.114

Conditions that need to be met:

1 Total take and use per property must be (a) less than the rates and volumes in Table 12 or (b) for rivers where the 7DMALF is unable to be calculated, is at a rate of less than 5 L/s and a maximum volume of 10 m^3 per day;

2 Fish are prevented from entering the water intake as set out in Schedule 2; and

3 Where the take is from a waterbody with a minimum flow that is set in Sections 6 to 15, the take of water for other than an individual's reasonable domestic and stockwater use ceases when the flow is at or below the minimum flow for that waterbody, as estimated by the Canterbury Regional Council; and

4 The take is not from any river or part of a river that is subject to a Water Conservation Order; and

5 Where the take is from a water race, irrigation or hydro-electricity canal or storage facility, the abstractor holds a current written agreement with the holder of the resource consents for the taking of water into the water race, canal or storage facility; and

6 The take is not from the Avon River/Ōtākaro or Heathcote River or a wetland or a hāpua.

5.3 Environment Southland

The Environment Southland Regional Water Plan (ESRWP) for Southland (2010) promotes the sustainable management of Southland's rivers, lakes, and water resources. The plan (with community and co-operation and support) is guided by the Regional Policy Statement and provides a framework for the use and development of water in a

sustainable manner. All water bodies on land including surface water, groundwater and wetlands are included in the Plan.

Section 2.2.2 in the ESRWP outlines 'Taking and using water'. Rules 18 and 23 outline the permitted activities of abstraction, diversion, and use of surface water (up to 10 m^3/day) and the abstraction and use of ground water (up to 20 m^3/day) respectively.

In Rule 18, the rate of surface water abstraction cannot exceed 5 L/s and must not result in adverse effects on existing water users, aquatic ecosystems or water quality. Fish must not be prevented from entering the reticulation system. Rule 18c permits the activities of abstraction and use of surface water for milk-cooling or washing down dairy sheds and piggeries if conditions i-iv are met.

Rule 23 outlines the abstraction and use of groundwater. The abstraction and use of up to 20 m^3/day is a permitted activity provided the rate of abstraction does not exceed 2 L/s (except for aquifer tests or hydrological studies) and does not result in adverse effects on existing water users, surface water ecosystems or ground water quality. As with Rule 18, groundwater can be abstracted and used for milk-cooling or washing down dairy sheds and piggeries as a permitted activity as long as conditions i–iv are met.

5.4 Hawke's Bay Regional Council

The Hawke's Bay Regional Council Regional Resource Management Plan (RRMP) 2006 incorporates the Regional Policy Statement, policies and guidelines for the sustainable management of the region's natural and physical resources (RRMP 2006). Section 6.7 and Rules 53 and 54 outline permitted minor water takes & uses of water for groundwater and surface water respectively (also refer to policies 24, 33, and 77).

Table 6.7.1 in the RRMP and Rule 53 'Minor takes & uses of ground water' states:

a The total volume taken shall not exceed 20 m^3/day/property (other than for aquifer testing, for which the volume of take is not restricted) but the take and use of water for reasonable domestic needs, stock drinking purposes, and firefighting, including from locations within the groundwater management zones in Schedule VI is not required to be included in this measurement. Also, when the permitted activity limit of 20 m^3/day is exceeded, a consent is required for the total take.

b The rate of take shall not exceed 10 L/s (other than aquifer testing, for which the rate of take is not restricted).

c The take shall not adversely affect any lawfully established efficient groundwater take, or any lawfully established surface water take, which existed prior to commencement of the take unless written approval is obtained from the affected person.

d The take shall not adversely affect any wetland.

e A backflow prevention device shall be installed in circumstances where there is the risk of contaminants flowing down a bore used for taking groundwater

Rule 54 'Minor takes & uses of surface water' states:

a Except for takes occurring for a period of less than 4 weeks, the total volume taken from a surface water body shall not exceed 20 m^3/day/property nor exceed the reasonable needs of the user, whichever is the lesser.

b For takes occurring for a period of less than 4 weeks within any 90-day period, the total volume taken by any person shall not exceed 200 m^3/7-day period.

c The rate of take shall not exceed 10% of the instantaneous flow at the point of take.

d The intake velocity shall not exceed 0.3 m/s.

e The activity shall not adversely affect any wetland.

f The take shall not adversely affect any lawfully established efficient groundwater take, or any lawfully established surface water take, which existed prior to commencement of the take unless written approval is obtained from the affected person.

5.5 Horizons Regional Council

Horizons Regional Council (HRC) sets out a policy framework for managing water take and use activities in its One Plan (2014 amended 2016). Part I is the Regional Policy Statement for the Manawatū-Whanganui Region and Part II is the Regional Plan for the Region. Chapter 5 Water and 5.1.3 Water quantity outline the demands being placed on surface water and groundwater. Chapter 16.2 outlines the policies for takes, uses and diversions of water and bores. These policies include an outline for consent decision-making for takes and uses of surface water and groundwater (16-1), consideration of alternative water sources (16-2), effects of ground water takes on other ground water takes (16-5) and the effects of groundwater takes on surface water bodies (16-6). Chapter 16.3 outlines the Rules for Takes and Uses of Water.

Rule 16-1 Minor takes and uses of surface water allows a maximum of 400L/ha/day for animal farming and up to a maximum of 30 m^3/day/property. Other uses are limited to 15 m^3/day. The rate of take must not exceed 2 L/s and there are other conditions and standards outlined in Rule 16-1 including no take from rare, threatened, or at-risk habitats.

Rule 16-2 Minor takes and uses of groundwater also allow 400L/ha/day for animal farming and up to a maximum of 50 m^3/day/property. There are other conditions/standards/terms that must be complied with – including takes not within 50 m of another bore or property, 100 m of any river or lake and within 200 m of a wetland that is a rare or threatened habitat. In both rules the water must be used on the property.

Rule 16-3 permits the use of heat or energy from the surface water and rule 16-4 allows for the testing of bores or groundwater.

Further information on water allocation approaches can be found in Appendix 3.

5.6 Marlborough District Council

The Marlborough District Council (MDC) Proposed Marlborough Environment Plan – (PMEP) Chapter 5: Allocation of Freshwater Resources[11] outlines policies relevant to setting water take limits.

Policy 5.1.2 recognises that the taking of water and the use of water are two distinct activities and therefore need separate water permits if resource consent is needed.

Policy 5.3.1 allocates water in the following priority order:

a Te Mana o te Wai

b natural and human use values

c aquifer re-charge

d domestic and stock water supply

e municipal water supply

f other takes of water

Policy 5.7.7. allocates water for domestic needs based on 5 m^3/household/day. Rule 2.3.5 allows for the take and use of water for incidental use associated with farming or intensive farming up to 5m^3 per day per Computer Register[12].

In the Appeals version of the PMEP, Volume Two, Chapter 2 outlines the General Rules for Water take, use, damming or Diversion. Section 2.2. lists 28 rules for Permitted Activities.

- 2.2.1. Take and use of water for an individual's reasonable domestic needs up to 5 m^3 per day per dwelling.
- 2.2.2. Take and use of water for domestic needs for a papakāinga unit up to 5 m^3 per day.
- 2.2.3. Take and use of water for needs for marae activities, except papakāinga units, up to 1825 m^3 per year.
- 2.2.4. Take and use of water for the reasonable drinking water needs of a person's animals.
- 2.2.5. Take and use of water for incidental use associated with farming or intensive farming up to 5 m^3 per day per Record of Title[13]
- 2.2.6. Take and use of water for dairy shed wash-down or ancillary milk cooling up to 15 m^3 per day per dairy shed.

[11] https://www.marlborough.govt.nz/your-council/resource-management-policy-and-plans/proposed-marlborough-environment-plan/decisions-on-the-pmep/appeal-process/appeals-version-of-the-pmep/volume-1

[12] A Computer Register has the same meaning as in Clause 12 of Section 4 1 of the Land Transfer Act 2017.

[13] The Record of Title has the same meaning as in Section 5 of the Land Transfer Act 2017 and, until a record of title is created for an estate or interest in land for which there is a computer register or certificate of title, includes the computer register or certificate of title.

- 2.2.7 Take and use water for the purposes of dust suppression on gravel roads up to 20 m^3 per water body per day.
- 2.2.8. Take and use of water for fire-fighting purposes and firefighting training by Fire and Emergency New Zealand and the New Zealand Defence Force.
- 2.2.9. Take of water for the purposes of calibrating a water meter.
- 2.2.10. Take of water for the purposes of completing a bore test required to determine the yield of a bore and interference effects on other users
- 2.2.11. Take and use of water for road, rail or river control construction, maintenance, repair or upgrade works up to 50m^3 per day per construction site.
- 2.2.12. Take of water for dewatering of a trench by a network utility operator or for regionally significant infrastructure.
    - 2.2.12A Take of water for dewatering of a tank pit associated with underground fuel infrastructure.
- 2.2.13. Take and use of water from Significant Wetland W599 for ski field facilities and snowmaking at Rainbow Ski field.
- 2.2.14. Take and use of water for a recreational hut up to 1 m^3 per day per hut.
- 2.2.15. Take, use and discharge of surface water for non-consumptive use.
- 2.2.16. Take and discharge of water to land for the purposes of purging water supply infrastructure or in emergency circumstances.
- 2.2.17–2.2.25 – relate to damming or diversion rules not relevant to this report.
- 2.2.26 The take, use and discharge to land of surface water for the use of water treatment units.
- 2.2.27 The take and use of water for weed or pest control.
- 2.2.28 Use of water from the Barnes Dam on a tributary of the Waitohi Stream by the Marlborough District Council for municipal supply purposes

5.7 Otago Regional Council

The Regional Plan: Water for Otago is currently the primary document for managing water in Otago, but it is under review and the Land and Water Regional Plan (LWRP) is to be notified by 31 December 2023. The latest proposed plan change for the Otago Regional Water Plan occurred on 17 December 2021 (Regional Plan: Water for Otago. Proposed Plan Change 7 (Water Permits) As Amended by Environment Court Decisions No. [2021] NZEnvC 164 & No. [2021] NZEnvC 170[14]).

The current plan covers all freshwater resources in Otago and includes lakes, rivers, groundwater, and wetlands. Since the plan became operative in 2004 there have been 15 plan changes (Skelton 2019).

[14] https://www.orc.govt.nz/media/11600/plan-change-7-as-amended-by-the-environment-court-clean-version.pdf)

Section 12 in the Water for Otago Regional Plan (WfORP) outlines the rules for Water take, use and management.

Rules 12.1.2.1. and 12.2.2.1 outline the permitted taking and use of surface water and groundwater respectively for domestic needs or the needs of animals for drinking water providing:

a No take is for a volume greater than 25 m^3 per day; and

b No take is at a rate greater than 0.5 litres per second in the North Otago, Maniototo or Central Otago subregions (as identified on Maps A1-A8), or greater than 1 litre per second elsewhere in Otago; and

c The taking or use does not have an adverse effect on the environment.

Other permitted activities for surface water and ground water include:

- Rule 12.1.2.2 & 12.2.2.4 – surface water and groundwater take must not exceed 100 L/s nor 1 ML/day from the main stem of the Clutha/Mata-Au or Kawarau Rivers, or Lakes Wanaka, Hawea, Wakatipu, Dunstan or Roxburgh. Groundwater take must not be within 100 m of any wetland or other lake or river.
- Rule 12.1.2.3 – surface water take from artificial lakes
- Rule 12.1.2.4 with some exceptions and conditions (a-i) maximum take for no more than 3 day in any one month and includes no take greater than 100,000 L/day and the rate of take not greater than 10 L/s.
- Rule 12.1.2.5 – outlines further conditions for permitted surface water takes and use, e.g. no change to the water level range or hydrological function of any Regionally Significant Wetland etc.
- Rule 12.1.2.6 –refers to the taking of surface water for the purpose of land drainage.
- Rule 12.2.2.2 – outlines conditions that must be met e.g. not adversely affecting any lawful take and not taking water from any aquifer identified in Schedule 2C or from within 100m of any wetland, lake or river etc.
- Rule 12.2.2.3- Down-hole pump testing is not > than 2 ML/day and no more than 3 consecutive days.
- Rule 12.2.2.5 – any aquifer listed in Schedule 2C or within 100m of any wetland, lake or river for no more than 3 days in any one month provided take is not >100 m^3/day or not greater than 10 L/s (except Rules 12.2.1.1 to 12.2.2.4)
- Rule 12.2.2.6 –any aquifer listed in Schedule 2C or within 100m of any wetland, lake or river (except 12.2.1.1 to 12.2.2.5) – no take is > 25 m^3/day/landholding and no > than 1 L/s.

See Appendix 3 Otago Regional Council for sections 10A4.1 – Methods for calculating the 'Rate of Take Limit', and Sections 10A4.2, 10A4.3 and 10A4.4. which outline the methodology for calculating daily, monthly and annual Volume Limit (m^3) respectively.

5.8 Taranaki Regional Council

There are two key Taranaki regional freshwater documents – the Regional Fresh Water Plan for Taranaki (RFWPT) and the Regional Policy Statement for Taranaki 2010.

Chapter 7 in the RFWPT outlines the regional rules. These rules are arranged under seven categories reflecting the type of activity. The Categories relevant to this document are:

1 Taking, use damming and diversion of surface water and Rule 15 – the activity of Permitted taking and use of surface water. The following standards/terms/conditions apply:

   a The rate of abstraction for any one property described in a particular certificate of title shall not exceed 1.5 L/s; or 5L /s for not more than 30 mins/day for temporary taking and use of surface water;

   b The volume of abstraction for any one property described in a particular certificate of title shall not exceed 50 m^3 in any one day;

   c No more than 25% of the instantaneous flow, measured at the point of abstraction shall be taken.

2 Groundwater and Rule 48 – the activity of Permitted taking and use of groundwater. The following standards/terms/conditions apply:

   a The daily volume of abstraction shall not exceed 50m^3;

   b The rate of abstraction shall not exceed 1.5L/s;

   c The bore shall be located not less than 500 m from the sea or adjacent bores;

   d The well shall be located not less than 25 m from the sea or adjacent wells or surface water bodies;

   e The well or bore shall be located not less than 50 m from any effluent treatment pond, septic tank, silage stack or pit.

In 2018, Jowett Consulting Ltd (Jowett 2018) carried out a review of minimum flows and water allocation in Taranaki for the TDC. Further information from this report can be found in Appendix 3.

5.9 Waikato Regional Council

The Waikato Regional Policy Statement (WRPS 2016) and the Waikato Regional Plan (WRP 2012) provide the principal framework for water resource management in the Waikato Region. The Waikato River Co-Management framework outlines the principles that give effect to agreements between the Waikato River Iwi and the Crown regarding its management and its catchment. Chapter 3.3 outlines the rules for restricting permitted takes which is capped at the primary allocable flow. Section 3.3.1 summarises the issues associated with the taking and use of water (See parts a-k) and Section 3.3.4 outlines Implementation Methods – Water Takes.

Section 3.3.4.4 outlines the methods to estimate permitted takes and supplementary takes (s14(3)(b)) to implement the policies in section 3.3.3 and Policies 8 and 9.

> *In order to accurately assess the level of permitted takes and water takes for reasonable stock and domestic needs (s14(3)(b) of the RMA), the Waikato Regional Council will maintain a model to estimate the level of permitted takes. In consultation with stakeholders the Waikato Regional Council will also undertake audits of actual use in selected areas to coincide with relevant catchment investigation dates.*

To develop minimum and allocable flow for surface water bodies and sustainable yields for aquifers (Section 3.3.4.6), WRC will work with its iwi co-management partners and use a range of recognised assessment methods, including Mātauranga Māori.

Rule 3.3.4.12 Permitted Activity Rule – Supplementary Groundwater Takes

This is in addition to the taking of groundwater as allowed by s14(3)(b) of the RMA.

Up to 1.5 m^3/day can be taken on sites equal to or less than one hectare; or where the well is within 600 metres of the coastal marine area; or 15 m^3 of groundwater per day can be taken on all other sites by means of a well as a permitted activity subject to the following conditions:

a The take(s) shall be within a single site.

b The site of the activity shall not be within 100 metres of a Significant Geothermal Feature…

c The activity shall not result in saltwater intrusion or any other contamination of the aquifer.

d The total of all takes from the aquifer does not exceed the Sustainable Yield if \

Rule 3.3.4.13 Permitted Activity Rule – Supplementary Surface Water Takes

This is also in addition to the taking of surface water as allowed by s14(3)(b) of the RMA. Up to 1.5 m^3/day of water (calculated on a net take basis) can be taken from sites equal to or less than one hectare; or up to 30 m^3/day of water (calculated on a net take basis) from the main stem of the Waipa River downstream of Otorohanga (SH 31 bridge at Otorohanga) or from the main stem of the Waikato River downstream of Lake Taupo from sites that adjoin either of those rivers; or up to 15 m^3/day of water (calculated on a net take basis) from all other sites from surface water is a permitted activity subject to the following conditions:

a The take(s) shall be within a single site.

b The net rate of the take, assessed in combination with all other authorised water takes, (all calculated on a net take basis) shall not exceed 100 percent of the primary allocable flows for catchments specified in Table 3-5.

c Any water take under this rule shall not be used for the same purpose for which a water take consent is held for the same site

d The intake structure shall comply with the screen and velocity standards as set out in the Water Management Class for that water body

e The intake structure shall comply with the provisions in Rule 4.2.10.1 of the Plan.

f The water take shall not be from a water body classified as Natural State Water in the Water Management Class Maps.

This rule does not apply to the taking of geothermal energy and water; or to takes from wetlands or lakes (excluding artificial lakes and Lake Taupo) or the taking of water for a dam or diversion.

Rule 3.3.4.14 Permitted Activity Rule – Temporary Takes

The taking of up to 150 m^3/day of water (calculated on a net take basis for surface water takes) for no more than five days per annum from any river or aquifer is a permitted activity subject to the following standards and terms:

a The net rate of the take, assessed in combination with all other authorised water takes, shall not exceed 100 percent of the primary allocable flows for catchments specified in Table 3-5.

b For groundwater takes the well is not within 600 metres of the coastal marine area and the total rate of the take in combination with all other takes from the aquifer does not exceed the Sustainable Yield if listed in Table 3-6.

c The intake structure shall comply with the screen and velocity standards as set out in the Water Management Class for that water body (see Chapter 3.2) and with the provisions in Rule 4.2.10.1.

d This rule shall not apply when water restrictions are in place in accordance with Standard 3.3.4.27.

e Written notice of the location, time and duration of take shall be provided to the Waikato Regional Council 10 working days before works commence

Rule 3.3.4.15 Permitted Activity Rule – Supplementary Groundwater Takes and Well or Aquifer Testing

For dairy shed wash-down takes, the Waikato Regional Council based their calculation on 70 litres of water per cow per day for use in the dairy shed and estimates that herds of less than 215 cows will be taking less than 15 m^3 per day. They set an allocable flow for each surface waterbody (see table 3-5 of the Waikato Regional Plan for limits). The limits are percentages and apply at the point of take. To set an allocable flow, WRC estimates the volume of water that was already being taken out the surface waterway under s14(3)(b) of the RMA (i.e. stock water and domestic supply) and permitted activity rules. This was then built into the allocation calculator as 'permitted use', and therefore this portion of flow was not available to others. Consented takes from that surface waterway were then included in the calculator and defined how much water was being taken from the waterway, and hence the current allocation status of that surface water catchment. Groundwater takes are assessed on a case-by-case basis regarding sustainability, and impacts on other users and waterbodies

6 Permitted activity pressure in Tasman in relation to water availability and allocation stress

According to the LAWA web site[15] the average amount of rainfall the Tasman Region receives each year is 22.97 billion m^3/annum. Table 13 shows the consented water allocations for surface water and ground water taken annually. However, allocation rates vary between catchments depending on whether they have an operative plan for integrated water allocation rates for their aquifers and rivers. The river flow and/or ground water level triggers will vary between catchments. The default allocation for rivers of regional significance in catchments without operative plans is 10% of the 1-in-5-year 7-day mean annual low flow (MALF).

Table 13. The volume of surface and ground water consented for use by the Tasman Regional Council per annum (taken from LAWA web site)

Source	Volume consented million m^3
Surface water	40
Ground water	70
Activity	**Annual consented water million m^3**
Irrigation	70.00
Industrial	3.60
Stock	0.03
Town supply	20.00
Other	4.44

There are no data readily available on the level of exercise of permitted activity water takes across Tasman District, therefore we make the following assumptions:

- the level of domestic water take in each catchment or water management zone will be proportional to the number of households not connected to a consented reticulated water supply
- the comparative levels of stockwater take across catchments or water management zones will be as assessed in Part 1 of this review, and relate to the numbers and type of livestock with dairy cattle, beef cattle, deer and sheep farms having the highest per property stockwater demand
- cumulative water takes on lifestyle blocks not connected to a reticulated water scheme (and some which are) may be significant in some zones, and potentially non-compliant with a 5,000 L/day limit if used for garden watering,[16] animals and pools

[15] https://www.lawa.org.nz/explore-data/tasman-region/water-quantity/

[16] 5m^3/day is sufficient allocation to irrigate only 0.1ha (a 30 × 30 m garden and lawn) on a dry summer day

A qualitative view of current allocation stress across Tasman District suggests that the major catchments in which cumulative takes from permitted activities may be significant relative to availability are Waimea (due to its population density), Moutere (due to its low surface water yields on Moutere clay terrain) and Abel Tasman (due to its tourism values).

As a starting point for setting maximum permitted activity take rates in the TEP, perusal of Fig 31.1A of the TRMP (Table 10 in this report) suggests that the current relative daily permitted take settings are appropriate, if the Takaka rate is increased from 5 to 15 m^3/day to accommodate dairy shed washdown.

7 Methods for setting permitted activity water take limits

The observations above about the Tasman water allocation setting can be combined with observations from other regional councils (the section 6 review and Table 13 above) to provide insight into potential refinement of methods for setting permitted activity limits in the new TEP. Those methods are summarised below with some observations about their potential application in the TEP:

- Aside from the priority given to human (domestic) water use under the Te Mana o te Wai hierarchy, permitted activity maximum rates of take should be related to water availability, allocation pressure and allocation status at the scale of catchment or water management zone. This is the case in the current TRMP and apart from Takaka catchment permitted take of 5000 L/day being potentially too low for the types of minor take occurring there, the range of maximum take limits should be considered a starting point for the TEP settings.
- The applicability of permitted activity maximum rates of take to a single point of take, cadastral parcel or property needs to be explicitly stated in the TEP. Some minor takes may be from dispersed sources and any adverse effects of dispersed taking would normally be lower than from a single point. Some properties comprise multiple land parcels so allowing a permitted take from each parcel may result in overly generous water takes on such properties. TRMP Fig 31.1A currently sets take rates per point of take per site with a limit of one point of take per site. Site is defined in a rather complex manner in the TRMP but in its simplest sense means a single land parcel. On balance, we suggest future permitted activity takes should be a limit per property but allow multiple points of take within a property.
- Permitted activity maximum rates of take may also be prescribed for particular uses of the water. Examples vary across the regions particularly depending on the types of rural land use in the region. Common across regional councils are those in the current TRMP, being takes for short-term water resource investigations and aquifer pump testing. Tasman includes small-scale hydro-electric water takes. Other regions permit water takes up to prescribed limits for dairy shed and piggery washdown, horticultural spraying, small garden and glasshouse watering. These could all be considered for Tasman, although many may be accommodated in a generic maximum take limit, without needing to constrain the water use.
- Related to the potential effects of high but short-term rates of take is provision for temporary water takes. Some councils permit temporary takes for purposes such as

construction, dust suppression and potentially frost-fighting during winter. These may be provided for subject to a limit on number of days exercised per month (ORC uses 3 days/month) or minutes per day (TRC uses 30 minutes/day). However, compliance is a challenge with such a rule, and it may be better to provide for consents for temporary water takes, potentially for periods outside of low flows to avoid the issues which occurred for the WRC of not being able to consent a small water take for building a bridge as the allocation limit had been reached at that locality.

- Consideration needs to be given as to whether the framing of the permitted activity rule includes or excludes s14(a) and (b) domestic and stockwater takes. Some councils currently explicitly exclude those takes from their permitted activity limits; however, this raises compliance challenges if those domestic and stockwater take rates have not been quantified. WRC has gone so far as to develop an "allocation calculator" so that when setting sustainable allocation limits for each water body, a calculated allowance for s14 domestic, stockwater, and permitted takes is deducted to determine the residual allocation available for consents. This is a robust approach to freshwater accounting as is now being required under the NPS-FM and should be considered for Tasman. However, as s14 permitted takes increase, it should be understood that the allocations remaining via consents will decline.
- Care will be needed to regulate domestic household water use, given the current prescriptive national regulations proposed by Taumata Arowai for registering and managing potable water taken for more than a single household. In our view, requiring consent to take water when taken on a single property (for example for two houses and a shed) would be excessively bureaucratic. Consent requirements for domestic water takes might be better prescribed through a daily take limit per property.
- Many councils have separate permitted take rules for surface waters vs groundwaters. One reason is that conditions requiring avoidance of adverse effects differ for rivers, streams, lakes and springs (such as effects on residual flows, fish, instream ecology and other users) differ from those for groundwater (such as separation distances from other takes). Given Tasman's advocacy for conjunctive surface water and groundwater management in its largely alluvial water resources, such a separation seems unnecessary in the TEP.
- Permitted activity maximum rates of take are commonly set as a daily (sometimes weekly) figure. A minimum figure of 5,000 L/day is used in many current regional plans. In flowing surface waters, the instantaneous rate of take can have damaging local effects, such as excessive depletion of streamflow, high suction velocities affecting fish life or localised erosion, so a limit on the magnitude and sometimes duration of high rates of pumping should be considered. Environment Canterbury has set permitted rates of take based on the 7-day mean annual low flow (MALF) of the river or stream – this would be feasible in Tasman if records of MALF for every watercourse could be made readily available. However, in our view this level of prescription makes it difficult for a water user to determine whether they are complying without first checking those details with the Council, so compliance may prove to be a problem with that approach.
- Consideration should also be given to prescribing permitted activity maximum rates of take as 'nett takes' so that any takes such as for small-scale hydro-electric or small-scale diversion for household water supply are limited by their consumptive take

rather than the gross initial take. A downside of this approach is that the effects of diversion of a large portion of streamflow during dry conditions may need Council's attention, however this can be addressed through conditions such as a limit on the amount of stream depletion and length of stream affected.

- Revisions of the permitted activity rules should make it clear that the Council through its Dry Weather Task Force will continue to use Water Shortage Directions under s329 of the RMA which may further limit permitted water takes during drought.
- Encouraging alternative milking systems for dairy farms, such as milking once a day or 7 out of 10 days, would reduce the amount of water needed for shed wash-down and milk cooling and relieve stresses on water availability during summer and drought prone months.

8 Recommendations for setting permitted activity water take rules

The current permitted activity settings for water take under TRMP Rule 31.1.2.1 are a good starting point for refinement of maximum take rates and conditions under which permitted takes may operate.

Given the likely compliance issue for dairy farms in the Takaka catchment, combined with locally high rainfall, it is recommended that the permitted take limit for the Takaka catchment be increased from 5 to 15 m^3/day.

Each of Tasman's seven major catchments have different physical characteristics, cultural and aesthetic values, land uses, and stresses on available water for allocation and permitted uses. A qualitative assessment of those factors suggests that the catchments where lower levels of permitted water allocation (e.g. the current 5 m^3/day) are needed would be Waimea, Moutere, and potentially Abel Tasman.

The review of nine regional councils' practice in devising permitted activity water take rules suggests opportunities for refinement of the Tasman rules. Specific consideration is recommended to

- set a permitted activity take limit per property but allowing multiple points for that water take within any property
- continue to provide as a permitted activity for water takes for short-term water resource investigations and aquifer pump testing. However, conduct a review of the level at which small-scale hydro-electricity generation should continue to be permitted, due to potential adverse effects of diversions on small streams.
- provide for short-term temporary water takes outside of periods of water take restrictions for prescribed purposes such as construction and dust suppression.
- develop an 'allocation calculator' approach to water allocation, similar to that being used by Environment Waikato, in which s14 domestic and stockwater takes are deemed included within the permitted take limits and are accounted for within individual water body allocation limits (this would enable compliance with the NPSFM 2020 clause 3.29 requirement for freshwater quantity accounting).

- provide, as a permitted activity, for domestic water takes within a single property, i.e. avoid requiring a water permit for multiple domestic water takes within a property, as this would add further to the recent regulatory interventions already proposed by Taumata Arowai for potable water quality.
- Avoid, in the interests of conjunctive management, the need for separate permitted activity prescriptions for surface waters versus groundwater.
- set maximum instantaneous take rates for takes from rivers and streams, alongside a daily or weekly limit, to avoid localised adverse effects on instream life, residual flows, etc.
- allow for permitted takes to be assessed as consumptive 'nett takes' in prescribed circumstances such as for small-scale hydro-electric generation.
- continue use of the Council's Dry Weather Task Force and s329 water shortage directions to curtail permitted activity water use during drought.

Other contextual issues to consider will include whether the permitted activity settings achieve Te Mana o te Wai and cultural values, how future climate change could affect permitted activity settings, and the cumulative effects of population growth especially outside of water reticulated areas.

9 Acknowledgements

Thanks to Robbie Price, Manaaki Whenua Hamilton, for the GIS analysis and mapping of livestock numbers, and to Melissa Robson-Williams for review of the final draft report.

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Appendix 1 – Glossary of terms used

Term	Source	Definition
Domestic Water Supply	TRMP	The water usage of an individual home or household, including the needs of domesticated animals and of a household vegetable garden where the production of the garden is for that household's personal consumption.
Efficient allocation and use	HBRC RRMP	Efficient allocation and use have the same meaning as given in the 2011 NPSFM's interpretation section. For the purposes of this Plan, economic efficiency means water use which results in the optimum outcome for the environment and community; technical efficiency means the amount of water beneficially used in relation to that taken; and dynamic efficiency means the adaptability of water allocation to achieve ongoing improvements in efficiency.
Groundwater	CLWRP	All water beneath the surface of the earth contained within the saturated zone, but excludes the water chemically combined in minerals.
	TRMP	Water occupying openings, cavities, or spaces in soils or rocks under the ground.
Landholding	Environment Southland	Landholding (a) For land subject to the Land Transfer Act 1952, land in: (i) a single certificate of title; or (ii) two or more adjoining certificates of title, with a common occupier. (b) For land not subject to the Land Transfer Act 1952, all contiguous land last acquired under one instrument of conveyance and occupied by a common occupier.
	Marlborough District Council	Single land holding means an area of land held in either: (a) One Record of Title; or (b) More than one Record of Title where: • the land in the various Records of Titles are held in common ownership or leased under the same lease; and • the land in the Records of Title or lease are contiguous to each other; or • the Records of Title are held together by a covenant under Section 220 RMA
	Otago RC	Landholding (1) For land subject to the Land Transfer Act 1952, land in: (i) A single certificate of title; or (ii) Two or more adjoining certificates of title, with a common occupier. (2) For land not subject to the Land Transfer Act 1952, all contiguous land last acquired under one instrument of conveyance and occupied by a common occupier.
Mean Annual Low Flow (MALF)	CLWRP	The average, for a number of years, of the annual lowest daily flows. This is determined by selecting the lowest daily flow (average over 24 hours or 7 days) for each year of record, summing those values and then dividing the total by the number of years of record.
Minimum flow	HBRC RRMP	A critical flow set to ensure sufficient water is left in a river to maintain the life-supporting capacity of aquatic ecosystems and/or other identified values, during low flow conditions
	TRMP	The flow regime that is required as set out in the policies and rules of this Plan, as a minimum, to maintain or provide for the specified uses and values identified for that river, but which, during severe droughts may be further reduced through a combination of reduced water flows and water abstraction.
Permitted activity	HBRC RRMP	An activity that is allowed by a plan without a resource consent if it complies in all respects with any conditions.
Property	Bay of Plenty RC	The land described in a particular certificate of title, or a group of contiguous certificates of title owned or leased by the same owner or lease holder, or land which is designated as a road or reserve, or is Māori land.

Term	Source	Definition
	ECAN	Property means any contiguous area of land, including land separated by a road or river, held in one or more than one ownership, that is utilised as a single operating unit, and may include one or more certificates of title.
	Hawke's Bay RC	Property refers to one or more allotments as contained in a single certificate of title, and also includes all adjacent land that is in the same ownership.
	Horizons RC	Property means one or more adjacent allotments^ that are in the same ownership. A legal road^ is considered a property for the purposes of this Plan. Allotment as described in Section 218(2) of the Act
	Waikato RC	Property means one or more allotments contained in single certificate of title, and also includes all adjacent land that is in the same ownership but contained in separate certificates of title.
Reasonable domestic needs	HBRC RRMP	Refers to needs associated with occupation of a dwellinghouse. (With respect to the taking and use of water for an individual's reasonable domestic needs, as a guideline this should involve the taking and use of up to 15 m^3 over any 7-day period per dwellinghouse – HBRC RRMP).
River	RMA (1991) CLWRP	The RMA (1991) defines a river as a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal). In Snelder et al. (2011) a small river is defined as having means flows less than 5 m^3/s and minimum flow 90% MALF and total allocation 30% MALF. For a large river the mean flows are greater than 5 m^3/s with a minimum flow of 80% MALF and total allocation of 50% MALF. Snelder et al. (2011) developed a method to assess environmental flow rules that can be applied across different regions. (See Snelder et al. 2011 for further details and the 2008 draft NES for Environmental Flows, which has not been gazetted.)
Surface water or surface water body	CLWRP	Water above the ground surface and within a lake, river, artificial watercourse or wetland, but does not include water in the sea, snow or rain or water vapour in the air. When a distance to a surface water body is being considered, it means the distance to the bed of a lake, river, artificial watercourse or to the boundary of a wetland.
Water Conservation Order	HBRC RRMP	Has the meaning set out in section 200 (of the RMA), and refers to a status applied to a water body which has significant environmental, or recreational values

Appendix 2 – Estimated peak weekly stock water take for Tasman Water Management Zones

Table 14. Estimated livestock numbers and peak weekly stock water demands for the Tasman Catchments and Water Management Zones (WMZ) (taken from Tasman Agribase database 19 May 2022). Livestock maximum reasonable use water takes (L/individual/day) are from Stuart & Rout (2007)

Tasman Catchments	**Water management Zone (WMZ)**	**Estimated Livestock numbers for each Tasman catchment** Maximum reasonable use water take rate									Peak **daily** stock water take per WMZ **(L/day)**	Peak **weekly** stock water take per WMZ **(m^3/week)**
		Dairy Cows 70 Milking L/day		**Beef Cattle** 55 L/day		**Sheep** 4.5 L/day		**Deer** 12 L/day		**Other** (Goats, horses, pigs and poultry)		
		Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total take L/day		
Aorere/ West Coast	Aorere/ West Coast	20172	1412040	6632	364760	40503	182263.5	140	1680	4704	1,965,448	13,758
Takaka	Takaka	30349	2124430	6067	333685	38526	173367	11783	141396	13713	2,786,591	19,506
Abel Tasman	Abel Tasman	476	33320	87	4785	2532	11394	0	0	525	50,024	350
	Holyoake	0	0	348	19140	5124	23058	0	0	46	42,244	296
	Kaiteriteri	0	0	28	1540	27	121.5	0	0	594	2,255	16
	Marahau Coastal	0	0	32	1760	0	0	0	0	294	2,054	14
	Marahau Coastal Margin	0	0	49	2695	5	22.5	0	0	303	3,020	21
	Marahau Plains	0	0	162	8910	43	193.5	230	2760	931	12,795	90
	Otuwhero	0	0	132	7260	3277	14746.5	0	0	0	22,007	154
	Total	476	33320	838	46090	11008	49536	230	2760	2692	134,398	941
Motueka	Baton	1050	73500	586	32230	7312	32904	1030	12360	2010	153,004	1,071
	Central Plains	0	0	767	42185	466	2097	1116	13392	3352	61,026	427

Tasman Catchments	Water management Zone (WMZ)	Estimated Livestock numbers for each Tasman catchment Maximum reasonable use water take rate **Dairy Cows** 70 Milking L/day		**Beef Cattle** 55 L/day		**Sheep** 4.5 L/day		**Deer** 12 L/day		**Other** (Goats, horses, pigs and poultry)	Peak **daily** stock water take per WMZ **(L/day)**	Peak **weekly** stock water take per WMZ **(m^3/week)**
		Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total take L/day		
Motueka (cont.)	Dovedale	507	35490	5982	329010	19494	87723	950	11400	8070	471,693	3,302
	Glen Rae	960	67200	1016	55880	10375	46687.5	350	4200	4252	178,220	1,248
	Hau Plains	0	0	859	47245	178	801	722	8664	2657	59,367	416
	Hau Plains Coastal Margins	0	0	569	31295	28	126	0	0	939	32,360	227
	King Edward	0	0	248	13640	50	225	361	4332	77	18,274	128
	Middle Motueka	1015	71050	8242	453310	32738	147321	2149	25788	24420	721,889	5,053
	Motupiko	4,968	347760	3,679	202345	39,642	178389	752	9024	2733	740,251	5,182
	Rainy	1756	122920	228	12540	1429	6430.5	0	0	1565	143,456	1,004
	Riwaka	1172	82040	1175	64625	11733	52798.5	2468	29616	3612	232,692	1,629
	Stanley Brook	181	12670	1859	102245	16553	74488.5	950	11400	5780	206,584	1,446
	Swamp	0	0	736	40480	5808	26136	85	1020	1550	69,186	484
	Tadmor	5181	362670	2315	127325	31996	143982	740	8880	3444	646,301	4,524
	Tapawera	2211	154770	1579	86845	24854	111843	0	0	3158	356,616	2,496
	Te Matu	0	0	305	16775	250	1125	0	0	0	17,900	125
	Umukuri	1	70	838	46090	1278	5751	93	1116	2990	56,017	392
	Wangapeka	4526	316820	1674	92070	14307	64381.5	0	0	7990	481,262	3,369
	Total	23528	1646960	32657	1796135	218491	983209.5	11766	141192	78599	4,646,096	32,523

Tasman Catchments	**Water management Zone (WMZ)**	**Estimated Livestock numbers for each Tasman catchment** Maximum reasonable use water take rate									Peak **daily** stock water take per WMZ **(L/day)**	Peak **weekly** stock water take per WMZ **(m^3/week)**
		Dairy Cows 70 Milking L/day		**Beef Cattle** 55 L/day		**Sheep** 4.5 L/day		**Deer** 12 L/day		**Other** (Goats, horses, pigs and poultry)		
		Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total stock	Total take L/day	Total take L/day		
Moutere	Moutere Surface Water	1814	126980	11297	621335	38590	173655	691	8292	27890	958,152	6,707
Waimea	Delta	819	57330	993	54615	2614	11763	70	840	8379	132,927	930
	Delta Coastal Margin	275	19250	299	16445	1859	8365.5	35	420	3382	47,863	335
	Golden Hills	0	0	14	770	171	769.5	0	0	1205	2,745	19
	Hope Aquifers & Eastern Hills	969	67830	1039	57145	2327	10471.5	164	1968	54648	192,063	1,344
	Redwood	0	0	1756	96580	5396	24282	407	4884	1685	127,431	892
	Reservoir	356	24920	476	26180	1822	8199	23	276	7549	67,124	470
	Upper Catchment	1	70	1810	99550	6407	28831.5	147	1764	9492	139,708	978
	Wai-iti	1551	108570	7088	389840	45745	205852.5	3538	42456	60263	806,982	5,649
	Wai-iti Dam Service	1645	115150	1707	93885	8017	36076.5	51	612	41266	286,990	2,009
	Waimea Islands	0	0	0	0	0	0	0	0	0	0	0
	Waimea West	369	25830	141	7755	643	2893.5	0	0	1423	37,902	265
	Total	5985	418950	15323	842765	75001	337504.5	4435	53220	189292	1,841,732	12,892
Upper Buller	Upper Buller	20612	1442840	10486	576730	56832	255744	5393	64716	22672	2,362,702	16,539

Appendix 3 – Summary of selected water allocation approaches across New Zealand

National overview of water allocation

Dark et al. (2021) carried out a national scale assessment of water availability and security in New Zealand to identify which regions had the highest potential for further development of water resources so that the primary sector could increase diversification. They found that land-use options with the highest financial value from new irrigated areas were horticultural land-uses, e.g. in Tasman fruit trees, vegetables, vineyards, and kiwifruit were found to be viable options within existing water access constraints.

They found that each Regional Council expressed their allocation rules in different ways and so they were translated into a common format. Council Plans and Water Conservation Orders were used. They identified:

- catchment/freshwater management units (FMU) and named them uniquely,
- the RECv1 catchment outlet reach number (and monitoring site)

and then they specified the cease-take flow (m^3/s), the block's allocation limit (m^3/s) and the percentage flow in each block allocated to abstractive uses. This framework allowed flows allocated to the river environment to be included.

They then used the LimSim modelling system to determine the instream effects of water takes and diversions. This system analyses the consequences of potential water allocation limits, take and diversions and is a low-cost method for identifying significant conflicts in water use at a catchment scale. The framework uses empirical models derived from national datasets such as MfE's River Environment Classification (REC) and River Water Quality Monitoring Datasets. Section 13 in Dark et al. (2021) provides more detail on the framework and the inputs required for the modelling and predicting river flow characteristics, hydrological indices to evaluate ecological effects of water takes, and habitat values. Of note is that for the Tasman region, longfin eels, bluegill bully and adult brown trout were identified as indicators of potential impact on habitat if new water supply projects were developed (Dark et al. 2021).

Takaka Catchment Case Study – Freshwater Land Advisory Group (FLAG) and setting allocation limits for water

Young (2006) identified an initial framework for flow management for the Takaka Catchment and in-stream management objectives. Six waterway groups were proposed based on a combination of local knowledge, the source of the flow, the size of the waterway and the distribution of the freshwater fish. In response to this study, TDC set up a Freshwater Land Advisory Group (FLAG) for the Takaka Freshwater Management Units (FMU) and this group has been considering existing and potential future water quantity and quality challenges and developing solutions for managing water allocation and land use effects on water quality (Young & Hay 2016).

To set appropriate allocation limits for water quantity and quality, the TDC needs to set appropriate freshwater objectives that reflected community aspirations, define FMUs, identify regional and FMU specific values (including both the Ecosystem and Human Health national values) and set environmental flows or levels for all FMUs. Environmental flows for rivers and streams must include an allocation limit, and a minimum flow (Young & Hay 2016). Identifying in-stream and out-of-stream values that can be maintained are required for assessing like flow regime requirements (Young & Hay 2016) (see Table 15 for examples and Young & Hay (2016) Section 4 for ecological flow requirements).

Table 15. Examples of in-stream and out-of-stream values and their location and rating in the Tasman Region (from Young & Hay 2016)

	Example	Location	Rating
In-stream	Native fish diversity	Takaka coastal streams	Very high
In-stream	Native fish diversity	Upper Takaka	Low
In-stream	Clarity of water	Te Waikoropupū	Exceptional
Out-of-stream	White bait fishing	Golden Bay/ Tasman Region	Major importance to recreational fishers Significant or average importance to commercial fishers
Out-of-stream	Trout fishing	Lower Takaka	High

A minimum flow requires sufficient in-stream habitat to provide refuge to sustain populations during periods of low flow, but they must also meet minimum water quality requirement for in-stream life (Young & Hay 2016). There are two methods commonly used to assess in-stream flow regimes in New Zealand – historical flow data and habitat models. Young and Hay (2016) recommended FLAG use the historical flow methods for setting minimum flows and allocation limits.

1 **Historical flow data** – a low risk approach that uses historical flow data to set minimum flows and allocation limits. This approach aims to maintain an ecosystem in its existing state.

2 **Habitat models –** these models are more complex and often applied where there are high in-stream values and/r abstraction pressure. The hydraulic-habitat model aims to predict how the quality and quantity of physical habitat responds to changes in flow. There is an assumption that the biological response to flow change is dependent on the habitat preference for a given species. Other in-stream models (e.g. Benthic, dissolved oxygen) are available to address specific systems where there are moderate to high degrees of change in hydrology and in-stream values.

When making water allocation decisions, the interplay between the minimum flow and the allocation limit needs to be understood. Recommended indicative minimum flow and water allocation levels for Takaka are listed in Table 16.

Table 16. Recommended indicative minimum flow and water allocation levels for Takaka. The flows are based on historical flow methods across all classes of in-stream ecological values. The minimum flow and allocation limits are derived as percentages of naturalised 7-day mean annual low flow (MALF). The percentages vary according to in-stream values (from Young & Hay 2016)

In-stream ecological value	Minimum flow (%) of 7-day MALF	Allocation limit
Significant	90–100	10–20
Moderate-high	70–90	20–30

Note that the allocation limits are ultimately based on the examination of the frequency and duration of low flows, the minimum flow equals a cease take condition, and 50% allocation rationing is triggered when flow equals the minimum flow plus allocation limit. There is a higher risk of adverse effects when minimum flows are decreasing and sustained for long periods and allocation rates are rising (Table 17).

Table 17. The risks and benefits from interactions between minimum flow and allocation limits (from Young and Hay 2016)

	Benefits	Risks
High minimum flow	• High habitat retention • Less risk of minimum flow adversely affecting critical in-stream values, dependent fisheries and mahinga kai	• ← in security of supply for water abstraction
Low minimum flow	• Set a low allocation rate to help offset this risk	• ← risk of adverse effects on critical in-stream values
High allocation rate and minimum flow		• ← the frequency & duration of minimum flow occurrences • ← security of supply for water abstraction • ← likelihood of adverse ecological effects.

Data on native fish diversity, population size structure and abundance, fishery use, invertebrate community composition, and water quality parameters are useful for monitoring and assessing instream values and flow management for setting quantifiable management objectives.

Horizons Regional Council Case Study – An approach to allocating water

Horizons Regional Council has installed telemetry to measure water usage for most consented water takes and a website 'WaterMatters' allows water usage to be reported daily so that allocation versus use can be assessed. Up until the mid-2000s Horizons had little factual knowledge of how much water was available for allocation, how much was already allocated and what the potential effects of the allocations might be (Hurndell

2009). Forty-four Water Management Zones (WMZs) and 117 sub-zones are now defined across the Manawatu-Wanganui Region and provide a catchment or part-catchment approach to water management (McArthur et al. 2007). In addition, data collection networks and consent monitoring have allowed critical values to be identified for the rivers. This has enabled A Water Allocation Framework to be developed and recommended minimum flows and core allocation limits to be determined so that instream requirements for ecosystem health can be met. Scenarios with different levels of information were used to adopt a tiered approach to water allocation for each WMZ or Subzone.

Horizons' approach to water allocation aims to meet the needs of the community, the economy and the environment. A single threshold is used in the Water Allocation Framework compared to other frameworks which use a stepped or multi-level restrictions. The purpose of using a single threshold was to make the monitoring and compliance of the abstractions more straightforward for the water users. The framework is based on core allocation and minimum flows (Policies 5.15-17 and Schedules B: Surface Water Management Values[17] & C: Surface Water Quantity[18])

1 **Minimum or environmental flow** – a volume of water left in the river to maintain environmental values.

2 A **core allocation limit** – volume of water that may be taken from the river at flows above the minimum flow.

3 **Management flow** – the sum of the minimum flow and the core allocation volume and allows for surety of supply.

Horizons has five categories for managing river takes and flow thresholds when at minimum flow to determine when takes can and cannot be abstracted (See Policy 5-18).[19] These are:

a **Permitted takes** – taken at all flows

b **Existing hydroelectricity generation** – allowed to continue subject only to any minimum flow restrictions specified in consent conditions

c **Supplementary allocation takes** – must cease at a flow specified by consent conditions

d **Essential takes** – consented abstracts at reduced rates and flow below the minimum flow e.g. (see i-iv for more detail about these takes including public water supply (A-E))

[17]Schedule B: Surface Water Management Values https://www.horizons.govt.nz/CMSPages/GetFile.aspx?guid=9dc34171-2a86-4050-ab71-3f4043f12a8a

[18] Schedule C: Surface Water Quantity https://www.horizons.govt.nz/CMSPages/GetFile.aspx?guid=b519e6d9-c8b1-45a6-a5ab-89cce244d9b4

[19] Surface water policies https://www.horizons.govt.nz/publications-feedback/one-plan/part-1-regional-policy-statement/chapter-5/5-4-3-2-policies-for-surface-water

e **Non-essential takes** – Other Core water allocation takes, including irrigation takes but excluding essential takes outlined under D) (see i and ii for further conditions on minimum flow)

Natural variability in high flow in the different catchment landscapes and the hydrological characteristics of the water bodies influence the minimum flow at which abstraction can occur. For Horizons where the catchments are often short and steep, once the minimum flow is reached, abstractions excluding essential takes (D) are switched off, allowing for the stream's natural flow recession to resume (Hurndell 2009).

Often knowledge about a region's streams and rivers is variable so a tiered approach to minimum flow setting based on available information can be used. Horizons Regional Council adopted a modified version of the Jowett and Hayes (2004) tiered approach to inform the One Plan Water Allocation Framework (Hurndell 2009). Four levels of information as well as National Water Conservation Orders (NWCOs) and Local Water Conservation Notices (LSCNs) were included. Little or no water abstraction can be taken from the NWCO water bodies so that they remain in or close to their natural state. LSCNs are regional policy instruments for protecting regionally significant water bodies.

Information on non-consented take volumes is explored in Hurndell et al. (2010) using case studies in the Upper Manawatu and Mangatainoka. Scenarios and methodologies for allocating water were identified and compared to the recommended core allocation limits in the Proposed One Plan (see Hurndell et al. (2020) a-f p2). The following information was collated:

- number of individual properties in each catchment
- average stocking rates and water requirements per hectare (for dairy and sheep & beef farms)
- water use requirements using Peak Daily Demand (PDD) (outlined in Stuart & Rout (2007)).

Eighteen scenarios were run:

1 Notified proposed rule 30 m^3/day per property (reasonable domestic needs and stock drinking water)

2 Notified proposed rule 15 m^3/day per property (other use)

3 Per hectare basis using known land uses and average stocking rates

4 As for 3 but including dairy shed wash-down

5 Expansion of dairy from 17% to 25% of the land area in the Upper Manawatu catchment

6 As for 5 but including dairy shed wash-down

7 Whole catchment at set volumes per hectare – dairy herd drinking requirements

8 As for 7 plus shed wash-down

9 Whole catchment at set volumes per hectare at the daily volume required for sheep and beef

10 200 L/ha

11 Property analysis with an allocation based on property size – 200L/ha/day except properties > 50 ha - allocated 15 m^3/day

12 Property analysis with an allocation based on property size – 400L/ha/day except properties > 50 ha - allocated 30 m^3/day

13 As for 11 plus an extra 1.5 m^3/day per property for domestic purposes

14 Fonterra submission excluding stock drinking water

15 Fonterra submission including stock drinking water

16 Federated Farmers' submission excluding stock drinking water

17 Federated Farmers' submission including stock drinking water

18 Property analysis with an allocation based on property size – 200L/ha/day except properties > 50 ha – allocated 30 m^3/day.

The results are presented in the report (Table 21) but are not analysed. For the Upper Manawatu the total permitted activity allocation (m^3/day) is highest for Scenario 2 with 129, 450 m^3/day and 154% of the core allocation limit. The next closest is Scenario 1 (64,725 m^3/day, 77 % of core allocation limit). Except for Scenario 8 (54,265 m^3/day, 65 % core allocation limit) the remaining scenarios range from 7,790 m^3/day and 9% core allocation limit to 36,361 m^3/day and 43 % core allocation limit. For the Mangatainoka the total permitted activity allocation (m^3/day) is also highest for Scenario 2 with 68,340 m^3/day and 259 % of the core allocation limit. The next closest is also Scenario 1 (34,170 m^3/day, 130 % of core allocation limit). Except for Scenarios 8 (16,940 m^3/day, 64% core allocation limit) and 17 (16,558 m^3/day, 63 % of core allocation limit) the remaining scenarios range from 2638 m^3/day and 10 % core allocation limit to 11,818 m^3/day and 45 % core allocation limit.

Taranaki Regional council – A review of minimum flows and water allocation

In 2018, Jowett Consulting Ltd (Jowett 2018) carried out a review of minimum flows and water allocation in Taranaki for the TDC. This report reviews

- the function of the Council in water resource management
- research that has been carried out into effects of water abstraction and methods of assessing environmental flow requirements
- principles involved in setting minimum flows and allocation
- the technical basis for the minimum flows and allocation limits in the Draft Plan
- flow requirements in a sample of Taranaki rivers, and
- minimum flows and allocations that would provide various levels of environmental protection.

This report concluded that setting minimum flows and allocation limits needs to be a collaborative process that involves both the Regional Council and the community to achieve sustainable water management outcomes. To set appropriate minimum flow and allocation limits, the level of protection needs to be acceptable to the stakeholders.

Waikato Regional council – Water allocation methods and procedures

The Aqualinc study (Rout 2004) recommended a range of improvements to water allocation methods and procedures for the Waikato Region which are reflected in the WRP. They were based on a case study in the Waihou Catchment which had land use typical of the region, i.e. a combination of dairy farming and forestry (production and native). The principal uses of consented takes within the catch were for irrigation (57%), supply networks (29% rural and town schemes) and industry (16%). They estimated that non-consented takes for livestock and non-reticulated domestic use (authorised under the RMA) and permitted takes were 8Mm^3/year. They recommended:

- defining daily take period for high take rates that are greater than a nominal daily rate.
- defining the irrigation season (November-April) i.e. the specified number of take days that are operative.
- specifying a maximum daily take rate (m^3/day) for the irrigation season margins ie. November-December and March-April.
- logging takes greater than 10L/s to verify daily take period, seasonal daily take, and to provide accurate water use records for assessment of cumulative demand.
- amending the consent process (cumulative demand) to include estimation of recharge from discharges and actual water use reviews.
- establishing additional surface water allocation tiers for allocation above Q_5 and from winter median flow.
- establishing allocation thresholds for review of in-stream values and allocation limits.
- establishing rules on restriction of takes during periods of low flow for principal water use categories.
- defining minimum flow levels at which water takes cease or are severely limited.

Otago Regional Council – Methods for calculating the rate of take limit, and calculating daily, monthly and annual water volume limits.

1. Methods for calculating the 'Rate of Take Limit'

The 'Rate of Take Limit' (litres per second – L/s) is determined by calculating the maximum rate of take taken in all water years (1 July to 30 June) up until 30 June 2020 for which water meter data is available. Water meters are used to record the rate of take over different time intervals.

1 Water meters record rate of take over different time intervals.

   a Where a water meter records a volume of water taken over a fixed time interval which is less than or equal to an hour, the rate of take will be determined by first calculating the hourly volume and then converting this to a l/s rate. For example, 40 m^3 taken over one hour will equate to a rate of take of 11.11 l/s.

b Where a water meter records the volume of water taken over an interval of time greater than an hour, the hourly rate of take will be calculated and used as the base data set.

2 Any measurement that is at or below 0 l/s will be removed.

3 Any measurement that exceeds the Authorised (Consented) Rate of Take is adjusted *down to the* Authorised Rate of Take.

4 If any measurement (including those from step 3) deviates from the general pattern of taking, it shall be adjusted down to the maximum of the typical data record across the full data record. The methodology for undertaking this step is set out below:

a Order the rate of take data by size (descending order).

b Determine D, where D is the number of complete water years covered by the record being considered.

c Calculate N (where N is the number of measurements) = 18+(3×D).

d Find the highest value.

e Calculate the number of other data values which are within the margin of error of that value.

f Repeat steps (d) and (e) until the first value which has N data values within the margin of error (+ and -) of that value is found.

g This number is the maximum typical rate of take. The margin of error to be applied to any calculation in steps (4)(e) and (4)(f) will be either ±5% for piped takes or ±10% for water taken by any other method, including by any open channel or a partially full pipe.

Steps 4 (a) to (g) above do not apply to applications for community water supplies or where the only purpose is for hydroelectricity generation.

5 'Rate of Take Limit' (litres per second – l/s) will be determined as the maximum value after steps (1) to (4) have been completed.

2. Methodology for calculating Daily Volume Limit (m^3)

The 'Daily Volume Limit' shall be determined by calculating the maximum daily volume taken in all water years (1 July to 30 June) up until 30 June 2020 for which water meter data is available, using the following methodology.

1 Where a consent or permit being replaced does not include a 'Daily Volume Limit', the Authorised Daily Volume will be calculated based on the following formula:

Authorised Daily Volume m^3 = ((Consented Rate of Take l/s) x 86,400)/1,000

Where a consent or permit does not specify a rate of take in l/s the Consented Rate of take will be determined by dividing the volume specified on the permit over the shortest duration by the timeframe over which that volume can be taken.

2 Any measurement that is at, or below, 0 m^3 will be removed.

3 On any day where the Actual Daily Volume exceeds the Authorised Daily Volume, the Actual Daily Volume is adjusted down to the Authorised Daily Volume.

4 If any measurement (including those from step 3) deviates from the general pattern of taking, it shall be adjusted down to the maximum of the typical data record across the full data record. The methodology is set out below:

   a Order the daily volume data by size (descending order).

   b Determine D, where D is the number of complete water years covered by the record being considered.

   c Calculate N (where N is the number of measurements) = 1+(2xD).

   d Find the highest value.

   e Calculate the number of other data values which are within the margin of error of that value.

   f Repeat steps (d) and (e) until the first data value which has N data values within the margin of error (+ and -) of that point is found.

   g This number is the maximum typical daily volume.

   h Adjust any daily volumes above the maximum typical daily volume, down to the maximum typical daily volume.

   The margin of error to be applied to any calculation in steps (4)(e) and (4)(f) will be either ±5% for piped takes or ±10% for water taken by any other method, including by any open channel or a partially full pipe.

   Steps 4 (a) to (h) above do not apply to applications for community water supplies or where the only purpose is for hydroelectricity generation.

5 The 'Daily Volume Limit' will be determined as the maximum value after steps (1) `to (4) above have been completed.

3. Methodology for calculating Monthly Volume Limit (m^3)

The 'Monthly Volume Limit' shall be determined by calculating the maximum monthly volume taken in all water years (1 July to 30 June) up until 30 June 2020 for which water meter data is available, using the following methodology.

1 Where a consent or permit being replaced does not include a 'Monthly Volume Limit' the Authorised Monthly Volume will be calculated based on the following formula:

   Authorised Monthly Volume m^3= Authorised Daily Volume (as determined under Step (1) in the methodology in Schedule 10A.4.2) × 30.4

2 Actual Monthly Volumes will be calculated based on the sum of the daily volumes taken in each calendar month. For the purposes of this calculation daily volumes will be determined using the steps (2) – (4) in the methodology set out in 10A.4.2 for calculating the Daily Volume Limit.

3 In any month where the Actual Monthly Volume taken exceeds the Authorised Monthly Volume, the Actual Monthly Volume is adjusted down to the Authorised Monthly Volume.

4 The 'Monthly Volume Limit' will be determined as the maximum value after steps (1) to (3) above have been completed.

4. Methodology for calculating Annual Volume Limit (m3)

The 'Annual Volume Limit' shall be determined by calculating the maximum annual volume taken in all water years (1 July to 30 June) up until 30 June 2020 for which water meter data are available, using the following methodology.

Methodology:

1 (1) Where a consent or permit being replaced does not include an 'Annual Volume Limit' the Authorised Annual Volume will be calculated based on one of the following formulae. The formula used will be whichever one produces the lower calculated Authorised Annual Volume

Authorised Annual Volume m^3 = Authorised Daily Volume (as determined under Step (1) in the methodology in Schedule 10A.4.2) x 365.25; Authorised Annual Volume m^3 = (Consented Monthly Volume) × (Months where water can be taken)

Where the consent or permit being replaced specifies the months during which water can be taken, a count of those months will be used. Where the consent or permit being replaced does not specify the months during which water can be used the number used will be 12

2 Actual Annual Volumes will be calculated based on the sum of the daily volumes taken in each water year. For the purposes of this calculation, daily volumes will be determined using the steps (2) – (4) in the methodology set out in 10A.4.2 for calculating the Daily Volume Limit

3 In any year where the Actual Annual Volume taken exceeds the Authorised Annual Volume, the Actual Annual Volume is adjusted down to the Authorised Annual Volume

4 The 'Annual Volume Limit' will be determined as the maximum value after steps (1) to (3) above have been completed.