



THE CATALYST GROUP
strategy and environment

p 06 358 6300

e enquiries@thecatalystgroup.co.nz

w www.thecatalystgroup.co.nz

a Top Level, 31 George Street,
PO Box 362, Palmerston North 4440

Rangitikei Catchment: Groundwater Use and Availability

Report prepared as part of the Rangitikei Strategic Water Assessment project, jointly funded by Rangitikei District Council and the Ministry for Primary Industries (Irrigation Acceleration Fund)



Rangitikei
UNSPOILT...

Ministry for Primary Industries
Manatū Ahu Matua



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1 Introduction

The Rangitikei district is heavily reliant upon the primary sector for its economic and social well-being. This sector is founded upon the district's topography, soils, climate, water resources, and farmer investment and innovation. However, the district's water resource is coming under increasing pressure from irrigators and droughts.

In response to these challenges the Rangitikei District Council and Ministry for Primary Industries (via the Irrigation Acceleration Fund) are jointly funding [The Catalyst Group](#) to undertake a strategic water assessment for the district. This project will generate information about the:

- availability and certainty of water supply (surface and groundwater) in the district;
- efficiency of current water use, and opportunities for improvement;
- costs, benefits, on-farm implications, and regulatory and environmental considerations around irrigation, and
- alternative uses for irrigated land.

Such an assessment is a priority for Rangitikei District Council as this project will provide guidance on what additional benefits and opportunities could arise through smart use of the water resource, and identification of the costs of capitalising on these opportunities at a district and individual level.

One of the tasks within the wider Rangitikei Strategic Water Assessment project is an analysis of the availability and allocation of groundwater across the wider district. The purpose of this review is to report on the current level of groundwater allocation, water use and any issues with the Rangitikei groundwater resource.

This assessment draws upon publically available reports and information, and specifically requested data from Horizons Regional Council. Whilst every effort was made to use the most up-to-date information available, this assessment was still reliant on information sources that were several years old. Where appropriate, the ages of data sources used to inform this assessment are noted.

This assessment should be read in conjunction with the report titled 'Rangitikei catchment: surface water use and availability'.

2 Background

The Rangitikei River rises in the Southern Kaimanawa Ranges of the central North Island and flows south into the Tasman Sea at Tangimoana. The catchment also takes in drainage from the North-Western Ruahine Ranges. The One Plan identifies two groundwater management zones in the Rangitikei catchment – the Northern Rangitikei and Rangitikei groundwater zones (Figure 1). Of the two zones, only the Rangitikei groundwater zone is utilised at this time, and is the subject of this assessment.

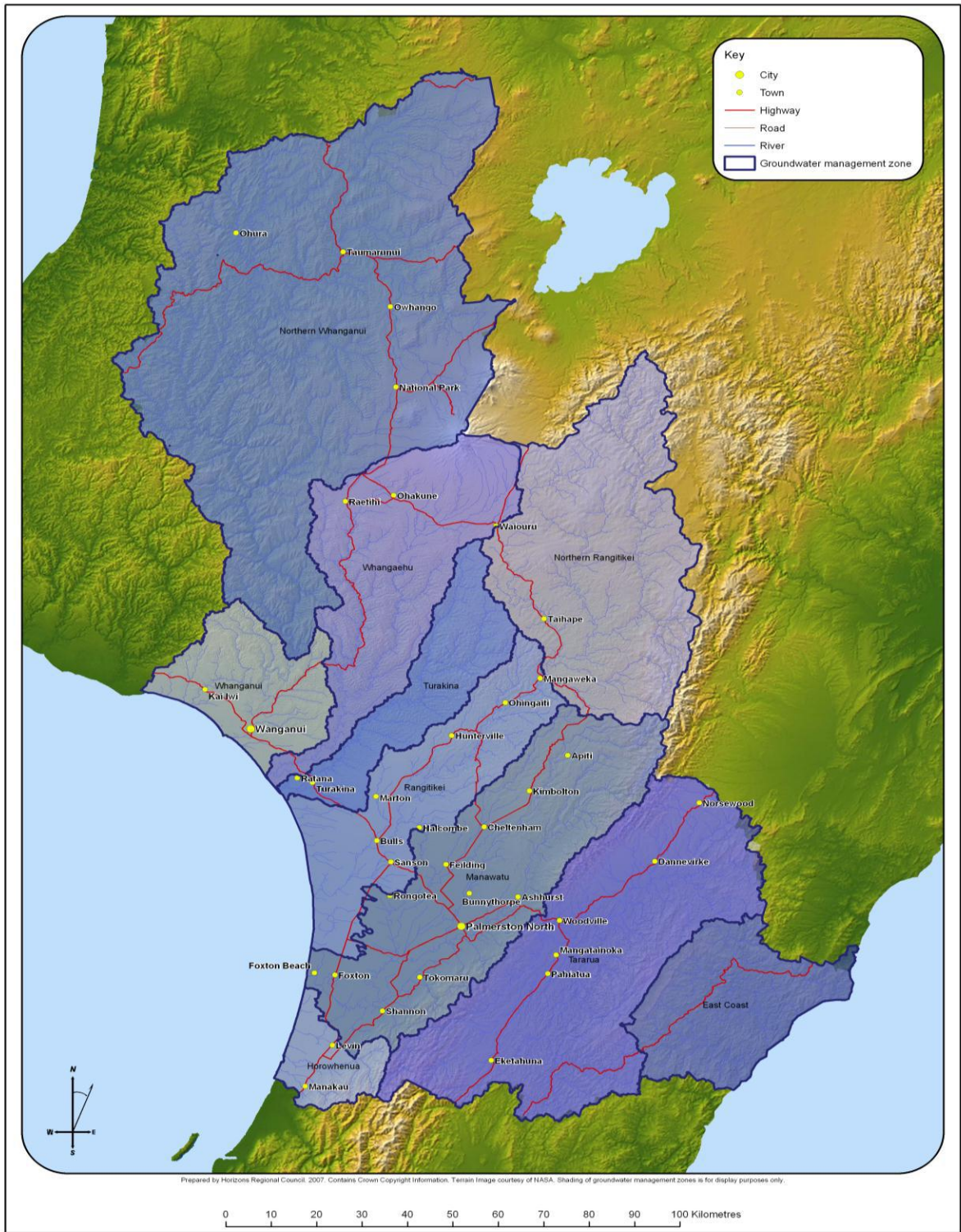


Figure 1: Groundwater management zones of the Manawatu-Wanganui region.

The Rangitikei groundwater zone takes in the Lower and Coastal Rangitikei surface water management zones of the river as well as surface water zones to the North and South of the river mouth. These coastal zones encompass the coastal sand dune complexes which support a number of significant lakes, wetlands and lagoons, and a network of small streams and drainage channels.

Land cover across the Rangitikei groundwater zone is dominated by sheep and/or beef farming (67%), followed by dairying (15%), exotic cover (11%) and native cover (4%). Cropping, waterways, towns and parks make up the remainder according to Clark and Roygard (2008).

2.1 Rangitikei groundwater management zone and waterbody values

The One Plan¹ identifies a number of water management zones and sub-zones that comprise the Rangitikei groundwater management zone in Schedule C of the plan (Table 1). The Region's groundwater resource is allocated annually by zone.

Table 1: The Rangitikei surface water management zones and sub-zones making up the Rangitikei groundwater management zone.

Water Management Zone	Sub-zone name/description	Sub-zone code
Lower Rangitikei (Rang_3)	Lower Rangitikei	(Rang_3a)
	Makohine	(Rang_3b)
Coastal Rangitikei (Rang_4)	Coastal Rangitikei	(Rang_4a)
	Tidal Rangitikei	(Rang_4b)
	Porewa	(Rang_4c)
	Tutaenui	(Rang_4d)
Southern Whanganui Lakes (West_5)	Lakes Vipan, Heaton, Bernard, William, Herbert, Hickson, Alice, Koitiata, Dudding and all surrounding catchment area	
Northern Manawatu Lakes (West_6)	All lakes and lagoons between Coastal Rangitikei and Coastal Manawatu zones and all surrounding catchment area	

Water-related values are defined for each of these water management zones. Values applying across the entire Rangitikei groundwater zone include:

- Life-Supporting Capacity (across a range of geology classes)
- Aesthetics
- Contact Recreation
- Mauri
- Industrial Abstraction²
- Irrigation²
- Stockwater
- Existing Infrastructure
- Capacity to Assimilate Pollution

¹ The One Plan is a combined regional policy statement and regional plan for the Manawatu Whanganui region. This document sets out the objectives, policies, rules and non-regulatory methods Horizons Regional Council will apply to the management of the region's natural resources. The full plan is not operative yet, pending sign-off from the Environment Court and Horizons, but the water quantity provisions are operative.

² This value is limited to areas where the water allocation framework shows there is water available for abstraction.

Values applying across specific reaches of the Rangitikei groundwater zone include:

- Natural State
- Sites of Significance - Aquatic for red fin bully, giant kokopu, brown mudfish and banded kokopu
- Sites of Significance - Riparian for dotterels
- Inanga Spawning
- Whitebait Migration
- Trout Fishery (ranging from outstanding to regionally or locally significant depending on location)
- Trout Spawning
- Water Supply (municipal takes of drinking water)
- Flood Control and Drainage

2.2 Groundwater Monitoring

Horizons Regional Council is the organisation responsible for the monitoring and management of the regional groundwater resource. Horizons' groundwater monitoring programmes comprises three specific initiatives:

1. Groundwater level monitoring (monthly and continuous) - groundwater depth-to-water is measured in non-artesian wells, whereas head is measured in artesian wells and converted to elevation above ground. Both measures are converted to groundwater level in metres above mean sea level as a standard unit. Groundwater level is measured monthly at fourteen wells in the Rangitikei groundwater zone.
2. Well registration and survey (field surveys, well logs and pump test data) - well logs and pump test data are collected from well owners and drillers as part of groundwater take consents and consents to drill bores. This data is important for understanding the local hydrogeology and stream connectivity. Around 200 to 400 wells in the Manawatu-Whanganui Region are inspected annually and surveyed. If these bores are being pumped at the time of inspection, they are also tested for groundwater quality.
3. Groundwater quality monitoring - groundwater quality is monitored for salinity (to detect saltwater intrusion), nitrates (in Horowhenua only) and pesticides as part of the regional and national programmes. Quality data is used to assess the suitability of groundwater drinking, stock and irrigation uses, by comparison with relevant standards. There are seven State of the Environment groundwater quality monitoring sites in the Rangitikei zone, all of which were included in the last national pesticides survey in 2010.

Groundwater policy 15-2D of the One Plan requires saltwater intrusion monitoring as a condition of consent to take groundwater within five kilometres of the coast. Continuous monitoring for saltwater intrusion is undertaken in two bores within the Rangitikei groundwater zone – one near Parewanui, and another at Himatangi Township. Several other bores in the groundwater zone are manually tested for electrical conductivity and level on a monthly basis, as per resource consent conditions.

2.2.1 Water use monitoring

Groundwater use information is automatically collected from a number of sites in the Rangitikei groundwater zone via water meters and telemetered to Horizons regional council. Consent holders abstracting small volumes are required to keep records via metering and provide these regularly for compliance monitoring purposes. Compliance testing and reporting occurs automatically for telemetered takes through the WaterMatters system. Some water use information is publicly available via WaterMatters (Figure 2): <http://www.horizons.govt.nz/managing-environment/resource-management/water/watermatters/watermatters-overview/>

WaterMatters has a “Water Metering” page which provides useful information for irrigators on the National Water Measurement and Reporting Regulations, meter installation and verification, and the general state of the regional water resource. There are various downloadable resources on WaterMatters covering these subjects.

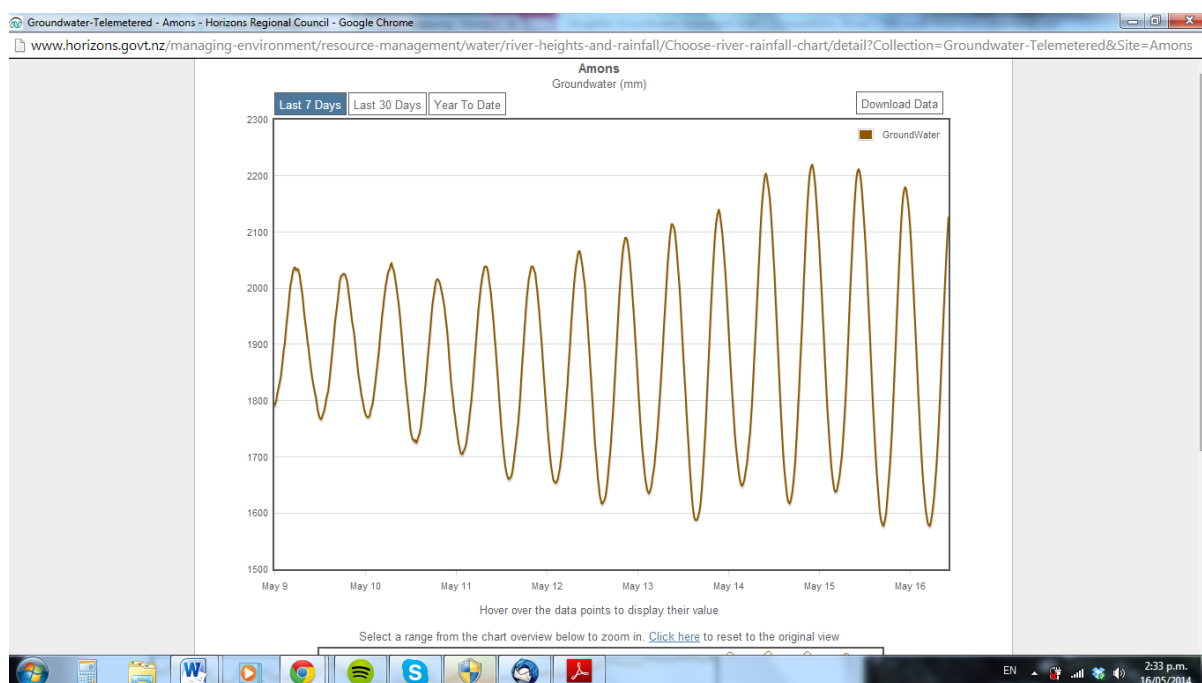


Figure 2: Screenshot from WaterMatters showing the telemetered continuous groundwater level (mm) data for Amons bore in the Coastal Rangitikei Zone.

2.2.2 Rainfall and soil moisture monitoring

Rainfall and soil moisture monitoring are useful for irrigation management of pasture and crops and are also important for flood warnings and flood control design purposes. Horizons has ten continuous rainfall monitoring sites in the Rangitikei catchment, some of which are managed in conjunction with other agencies like NIWA. Currently, there are no continuous soil moisture monitoring sites in the catchment linked to the Council’s webpage, although many landowners have initiated their own soil moisture monitoring systems. All rainfall data is available to view (Figure 3) or download from the Horizons website at:

<http://www.horizons.govt.nz/managing-environment/resource-management/water/river-heights-and-rainfall/Choose-river-rainfall-chart/>

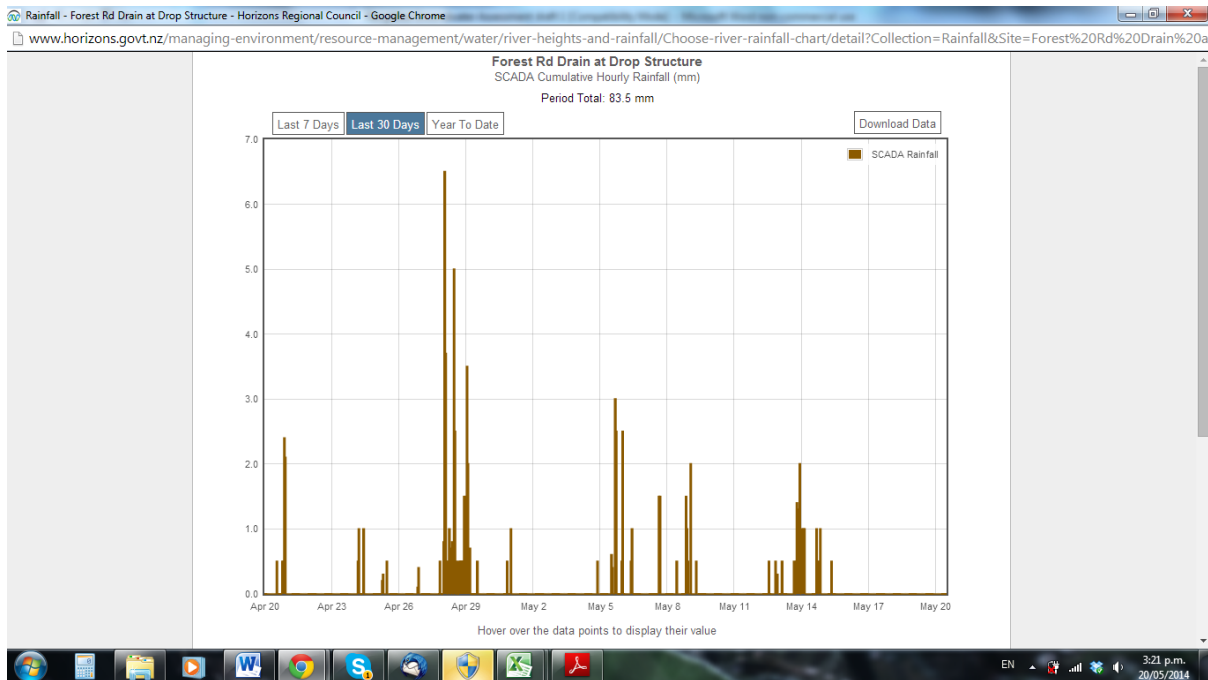


Figure 3: Screenshot of cumulative hourly rainfall for the 30 days prior to 20 May 2014 for the Forest Road Drain at Drop Structure rainfall monitoring site near Parewanui, taken from the Horizons Regional Council Rivers and Rainfall website.

2.2.3 Groundwater quality

No significant trends in groundwater quality have been identified in the Manawatu-Whanganui Region. No significant nitrate levels or pesticide residues have been detected in groundwater quality monitoring for wells in the Rangitikei zone.

The groundwater system in the Western Coastal areas, including the Rangitikei zone has been identified as being at risk of saltwater intrusion. Largely this is a water allocation problem which becomes a water quality problem from unsustainable drawdown of groundwater resources near the coast. A high risk saltwater intrusion zone has been identified between the Rangitikei River delta in the North and the Manawatu River mouth to the South. Policies aimed at safeguarding the resource against saltwater intrusion require specific monitoring and take restriction conditions on all groundwater consents within 5km of the West Coast.

Generally, groundwater quality is considered suitable for drinking water and irrigation use in the Rangitikei zone, although some wells in the Manawatu and Rangitikei Districts contain naturally 'hard' water and high levels of iron and manganese. This is especially so in deeper wells.

3 Groundwater Allocation Framework

The One Plan establishes the main objective for groundwater management in the Manawatu-Wanganui Region as “enabling people, industry and agriculture to take and use water to meet their reasonable needs while ensuring that:

1. water is used efficiently;
2. takes do not cause a significant effect on the long-term groundwater yield;
3. groundwater takes that are hydrologically connected to rivers, lakes or wetlands are managed within the minimum flow and allocation regimes established for those water bodies to protect their life-supporting capacity;
4. existing groundwater quality is maintained or enhanced;
5. saltwater intrusion into coastal aquifers is avoided; and
6. the effects on other groundwater takes are managed.”

Prior to 2000, knowledge of the surface and groundwater resources, use of these resources, and the effects of that use was poor and did not allow for the development of ground and surface water allocation regimes. Since that time, collection and processing of well data, requirements for water use records, metering of takes and telemetry and the division of the region into surface and groundwater management units has allowed for the development of a comprehensive framework for the Manawatu-Whanganui Region. In saying this, knowledge of the region’s groundwater resource is nowhere near as advanced as knowledge of the region’s surface water resource.

3.1 The Rangitikei groundwater allocation framework

Groundwater is recharged by rainfall and flowing surface water systems. In the Manawatu-Whanganui region rainfall is the dominant groundwater recharge source. The rate at which a groundwater system is recharged determines its sustainable yield, and therefore the amount of water that can be allocated for abstraction on an annual basis.

Horizons Regional Council has set the allocable groundwater abstraction limits in the One Plan for all groundwater management zones in the region at 5% of the average total annual rainfall falling on each groundwater zone (Zarour, 2008).

On this basis the annual allocable abstraction volume for the Rangitikei groundwater management zone is 75,000,000m³/year (Table 2).

Table 2: One Plan allocation limit for the Rangitikei groundwater management zone.

Groundwater Management Zone	Surface water management zones	Annual allocable volume (m ³ /year)
Rangitikei	Lower Rangitikei (Rang_3)	75,000,000
	Coastal Rangitikei (Rang_4)	
	Southern Whanganui Lakes (West_5)	
	Northern Manawatu Lakes (West_6)	

4 Rangitikei groundwater use

4.1 Groundwater takes

The maximum groundwater take allowable within the permitted activity threshold is 400 litres per hectare per day, up to a maximum of 50 cubic metres per day, for animal farming; or 50 cubic metres per day for any other purpose (Rule 15-2). Permitted groundwater takes are not included within the groundwater allocation. Those operating permitted groundwater takes must provide information to the Regional Council on the location of the bore, the maximum take, and the intended use of the water. Water must also be used on the property, not taken from a rare, threatened or at-risk habitat, or be allowed to run to waste. Additionally, groundwater takes are not permitted without consent if they are within 50 metres of another bore on another property, within 100 metres of a river, within 200 metres of any wetland, or if they lower the water level in any wetland.

As at April 2014 there were 97 consents to abstract groundwater in the Rangitikei groundwater zone. Thirty-seven of these consents were for stockwater or dairyshed washdown purposes. Of the remaining 60 groundwater take consents, all had conditions setting the daily maximum take volume, with 9 consents also having conditions that stipulated the annual maximum take volume.

A total of 68,600,000m³/year (calculated from maximum annual volume and/or maximum daily volume consent limits) of groundwater is allocated in the Rangitikei groundwater zone across these 97 current consents.

4.2 Surface water depletion effects

Groundwater takes have the potential to deplete surface water resources depending on the depth, hydrogeological connectivity, location, volume of take, and pumping rate. Groundwater takes in riparian zones or areas with high surface water depletion effects are included within the surface water allocation and are subject to the same minimum flow restrictions as surface takes. These groundwater takes are included in the surface water allocation. High, medium and low depletion effects are described in Annex 1 and are being implemented by Horizons Regional Council over time as new consents or consent renewals are processed and pump test data is analysed to confirm the classification of each ore.

The Rangitikei groundwater zone is predominantly recharged from rainfall, with some input from the Rangitikei River under suitable conditions. There is a high degree of connectivity between the Rangitikei River and associated groundwater system – particularly in riparian areas and shallow groundwater zones (Zarour 2008).

4.3 Water use

Agricultural irrigation is by volume the greatest groundwater use in the Rangitikei groundwater zone (Figure 4). Consent information was not always specific about the type of irrigation i.e. dairying, cropping, or a combination of both. From available information it appears that at least 75% of the agricultural irrigation consents relate to dairy pasture irrigation. Industrial water takes are dominated by Canterbury Meat Packers, Riverlands Meat Processing and Malteurop malting plant, with golf clubs making up most of the remaining industrial take volume. Two per cent of the groundwater take is used for stock and dairy washdown water. Many of these takes also contain a component of domestic water use.

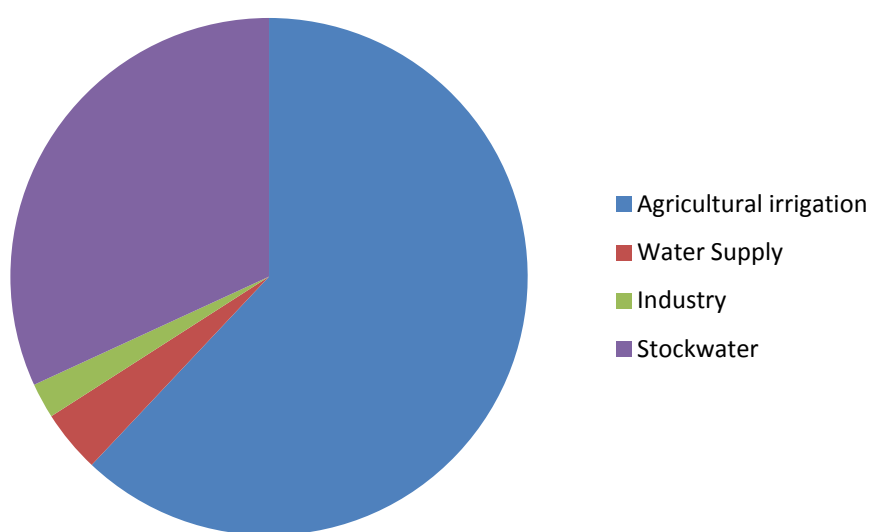


Figure 4: Groundwater use by volume, for the Rangitikei groundwater management zone.

4.4 Other consented water use

Excluding hydroelectricity generation, there are 64 surface water and riparian abstraction consents in the Rangitikei catchment (Lower and Coastal Rangitikei management zones only). As was the case for groundwater use, agricultural irrigation is the greatest surface water use in the Rangitikei catchment by volume. Just over 60% of the agricultural irrigation consents relate to dairying operations. Industrial surface water takes are dominated by gravel washing operations, largely in the Coastal Rangitikei zone. There are nine surface water consents for stock water and washdown water – eight for dairying, and one for a piggery.

4.5 Current groundwater allocation status

In the last two decades there has been a considerable increase in use of the region's surface and groundwater water resources (Hurdell et al, 2007). During the period 1997 and 2007, the number of active groundwater abstraction consents increased by 5%, but the daily allocation and consented abstraction volume nearly doubled (Zarour, 2008). Demand has continued to increase since 2008, and is expected to continue increasing for the foreseeable future.

As mentioned above, a total of 68,600,000m³/year of water is allocated for the Rangitikei groundwater zone across the 97 current consents. Given this figure is 92% of the One Plan allocable limit for the Rangitikei groundwater zone of 75,000,000m³/year, the resource is theoretically nearing its allocation limit.

However, given this annual consented volume is calculated by extrapolating the daily consented volumes for 60 consents across a full year, a false impression of water use is generated. On an average basis the volume of water used is significantly less than the maximum consented water volume because water for irrigation purposes (the largest groundwater user in the Rangitikei zone) is not taken year-round, and few consent holders abstract their maximum daily volume.

Zarour (2008) estimated average actual consented groundwater use for the Rangitikei zone at 13,300,000m³ annually. This volume was calculated from the 62 groundwater take consents in the Rangitikei groundwater zone current at the time. This calculation used the assumption wells would pump 80% of their daily maximum volume for 100 days of the year, regardless of water use. Zarour (2008) also estimated a further 5.5 million cubic metres being used annually on a permitted activity basis in the zone if all unconsented wells pumped 15m³/day. This gives an estimated total actual water use in the Rangitikei groundwater zone of approximately 18,500,000m³/year in 2008. This volume could be abstracted at a combined rate of 166,835m³/day if all 62 consents operated at their maximum daily volume.

There are now 97 current consents to take water in the Rangitikei groundwater zone (as at April 2014). The maximum daily volume from all groundwater consents across the zone totals 225,000m³/day - a 35% increase in consented daily volume over the last six years. The Zarour (2008) method provides an estimate of current average actual consented water use in the Rangitikei groundwater zone of 18,000,000m³/year, with a further 6,000,000m³/year for permitted uses, giving a total of 24,000,000m³/year total groundwater use. The estimated consented water use of 18,000,000m³/year equates to 24% of the One Plan allocable volume for the Rangitikei groundwater zone of 75,000,00m³/year (permitted takes are not considered as part of the allocable volume).

To address the significant discrepancy between the total consented volume and actual water use, recent groundwater consents have been granted with conditions that stipulate daily maximum volume and annual maximum volume limits. This approach ensures the consent more accurately reflects actual water need and use. As existing groundwater consents come up for renewal, they will have these new conditions imposed, which will reduce the calculated total annual consented volume significantly. Most of the existing irrigation takes are due to expire by 2020.

As it currently stands the Rangitikei groundwater resource is nearing its allocation limit, but this is a theoretical situation, rather than a reflection of actual use. In reality, the resource is far from fully allocated. Improved conditions on new and renewed groundwater take consents will effectively 'free up' the resource, allowing for greater utilisation.

5 Understanding the Rangitikei groundwater resource

Under natural conditions, the volume of water in an aquifer reflects the balance between recharge from rainfall and surface water, and discharges to surface water and the ocean. Groundwater abstraction can have negative impacts on other groundwater users and affect groundwater-dependent ecosystems (e.g. wetlands, lakes and lagoons). Given the cumulative effects of groundwater pumping only become evident over time, the potential and actual effects of current and future development require careful consideration.

Horizons Regional Council's monitoring network has shown groundwater levels in the coastal sand country have not fully recharged after each irrigation season in recent years. The area affected is centred on Santoft and involves a number of bores. According to Horizons the decline has been approximately 0.5-1m over the last five years.

This area has seen a significant increase in the number of bores and the volume of water being abstracted and there is considerable potential for further development in the area. Groundwater in this area is of great economic and environmental importance.

The detected water level decline is a change from the status quo, and at this stage it is unknown if it is a temporary or permanent feature or if it is related to the increase in water use. It is also unclear what, if any impact this decline will have on the resource, the surface water features in the zone and their ecology, or existing groundwater users.

In response, Horizons Regional Council has commissioned the Institute of Geological and Nuclear Science (GNS) to undertake a stock-take of the coastal groundwater resource and the Council's understanding and management of the resource. This stock-take is programmed for completion by July 2014. The outcomes of this stock-take will influence Council's science priorities and resourcing in future years.

In the interim, current and future applications to abstract groundwater from the coastal sand country will continue to be processed under the existing One Plan management framework, using available knowledge about the resource. The one difference is that new applications are likely to be publically notified. Any resource consents granted under this arrangement are also likely to include conditions that allow consents to be reviewed once additional information becomes available and/or the groundwater level decline situation worsens.

6 Summary

The key findings from this assessment into the use and availability of the Rangitikei groundwater zone are:

- The Rangitikei groundwater zone is of considerable economic and ecological importance
- There are 97 consents for groundwater takes in the Rangitikei groundwater zone
- Agricultural irrigation is the greatest groundwater use by volume. At least 75% of agricultural irrigation consents relate to dairying.
- The One Plan annual allocable volume for the Rangitikei groundwater zone is set at 5% of the average annual rainfall across the zone, or 75,000,000m³/year.
- The consented maximum annual volume for the Rangitikei groundwater zone is 68,600,00m³/year, or 92% of the allocation limit.
- Actual consented water use in the Rangitikei groundwater zone is estimated at 18,000,000m³/year, or 24% of the allocation limit.
- The theoretical near-full allocation of the Rangitikei groundwater zone is being addressed through the imposition of annual maximum volume and daily maximum volume limits on new and renewed consents.
- Increasing utilisation of groundwater along the coastal margin of the Rangitikei groundwater zone increases the risk of saltwater intrusion and impacts on significant wetlands and lakes.
- Groundwater levels in the coastal sand country near Santoft have not fully recovered after each irrigation season in recent years, leading to a 0.5-1m drop in groundwater levels in the area.
- An assessment has been commissioned by Horizons Regional Council to detail the current level of understanding of the Rangitikei groundwater zone.

7 References

Clark M, Roygard J 2008. Land use and land use capability in the Manawatu-Wanganui Region: internal technical report to support policy development. Horizons Regional Council Report No: 2008/INT/616.

Hurdell R, Roygard J, Watson J 2007. Regional water allocation framework volume 1. Technical report to support policy development. Horizons Regional Council Report No. 2007/EXT/809.

Zarour H 2008. Groundwater Resources in the Manawatu–Wanganui Region: Technical Report to Support Policy Development. Horizons Regional Council Report No. 2008/EXT/948.

Annex 1: One Plan Policies Regarding Groundwater Use and Allocation

Policies applying to both Surface Water and Groundwater

Policy 6-12: Reasonable and justifiable need for water

The amount of water taken by resource users shall be reasonable and justifiable for the intended use. In addition, the following specific measures for ensuring reasonable and justifiable use of water shall be taken into account when considering consent applications to take water for irrigation, public water supply or industrial use, and during reviews of consent conditions for these activities.

- (a) For irrigation, resource consent applications shall be required to meet a reasonable use test in relation to the maximum daily rate of abstraction, the irrigation return period and the seasonal or annual volume of the proposed take. When making decisions on the reasonableness of the rate and volume of take sought, the Regional Council will:
 - (i) consider land use, crop water-use requirements, on-site physical factors such as soil water-holding capacity, and climatic factors such as rainfall variability and potential evapo-transpiration
 - (ii) assess applications either on the basis of an irrigation application efficiency of 80% (even if the actual system being used has a lower application efficiency), or on the basis of a higher efficiency where an application is for an irrigation system with a higher efficiency
 - (iii) link actual irrigation use to soil moisture measurements in consent conditions.
- (b) For industrial uses, water allocation shall be calculated where possible in accordance with best management practices for water efficiency for that particular industry.
- (c) For public water supplies, the following shall be considered to be reasonable:
 - (i) an allocation of 300 litres per person per day for domestic needs, plus
 - (ii) an allocation for commercial use equal to 20% of the total allocation for domestic needs, plus
 - (iii) an allocation for industrial use calculated, where possible, in accordance with best management practices for water efficiency for that particular industry, plus
 - (iv) any allocation necessary to cater for the reasonable needs of livestock or agricultural practices that are connected to the public water supply system, plus
 - (v) an allocation necessary to cater for growth, where urban growth of the municipality is zoned and is reasonably forecast, plus
 - (vi) an allocation for leakage equal to 15% of the total of subsections(i) to (v) above.

Where the existing allocation for a public water supply exceeds the allocation calculated in accordance with subsections (i) to (vi) above, the Regional Council will establish, in consultation with the relevant Territorial Authority, a timeframe by which the existing allocation shall be reduced to the calculated amount.

Policy 6-13: Efficient use of water

Water shall be used efficiently, including by the following measures:

- (a) requiring water audits and water budgets to check for leakages and water-use efficiency
- (b) requiring the use of, or progressive upgrade to, infrastructure for water distribution that minimises use and loss of water
- (c) enabling the transfer of water permits
- (d) raising awareness about water efficiency issues and techniques
- (e) installing water metering and telemetry to monitor water use.

Policy 6-14: Consideration of alternative water sources

When making decisions on consent applications to take surface water, the opportunity to utilise alternative sources such as groundwater or water storage shall be considered.

Policies for Bores and Groundwater

Policy 6-21: Overall approach for bore management and groundwater allocation

- (a) New bores must be constructed and managed in accordance with Policy 15-2A.
 - (aa) Groundwater Management Zones are mapped in Schedule C.
- (b) Total groundwater allocations must comply with the annual allocable volumes for Groundwater Management Zones set out in Policy 6-23.
- (c) The measured or modelled effects of a proposed groundwater take on other groundwater users, surface water bodies and saltwater intrusion must be managed in accordance with Policies 15-1, 15-2B, 15-2C and 15-2D.

Policy 15-2A: Bore construction and management

- (a) New bores must be sited to ensure adequate separation from existing bores, and to avoid an over-concentration of bores in a particular area, wherever practicable, to avoid adverse effects on the reliability of supply from properly-constructed, efficient and fully-functioning existing bores.
- (b) New bores must generally be constructed, and bore logs and other records prepared, in accordance with the NZS 4411:2001 Environmental Standard for Drilling of Soil and Rock.
- (c) New bores must be designed to ensure a high degree of efficiency with respect to bore development, bore depth and diameter, and screen depth and length.
- (d) Bores must be used in a manner that prevents:
 - (i) contaminants from entering the bore from the land surface
 - (ii) the wastage of water in artesian situations.

- (e) Bores that are no longer required must be decommissioned in general accordance with the NZS 4411:2001 Environmental Standard for Drilling of Soil and Rock.

Policy 15-2B: Effects of groundwater takes on other groundwater takes

- (a) Consent applications to take groundwater must include pumping tests and hydrogeological assessments in order to determine the likely impact on existing groundwater takes in the vicinity.
- (b) Consent conditions restricting the rate and duration of pumping must be imposed on new takes of groundwater where this is necessary to avoid significant drawdown impacts on existing groundwater takes from properly-constructed, efficient and fully-functioning bores in the vicinity. A groundwater take is considered to be from a properly-constructed, efficient and fully-functioning bore in circumstances where the bore penetrates the aquifer from which water is being drawn at a depth sufficient to enable water to be drawn all year (ie., the bore depth is below the range of seasonal fluctuations in groundwater level), the pump and bore are adequately maintained, the bore is of sufficient diameter and is screened to reasonably minimise drawdown, and the bore has a pump capable of drawing water from its base to the land surface.
- (c) Consent conditions specifying short-term restrictions on the rate and duration of pumping may also be imposed on new takes of groundwater where this is necessary to avoid significant drawdown impacts on existing bores that are not properly-constructed, efficient and fully-functioning, in order to allow sufficient time for such bores to be upgraded or replaced.
- (d) The Regional Council may encourage consent applicants to consider the option of providing water to neighbouring properties in circumstances where this would be more practical than meeting the requirements of (b) or (c).

Policy 15-2C: Effects of groundwater takes on surface water bodies

The effects of groundwater takes on surface water bodies, including wetlands, must be managed in the following manner:

- (a) An appropriate scientific method must be used to calculate the likely degree of connection between the groundwater and surface water at the location of the groundwater take.
- (ba) Subject to (a), the potential adverse effects of groundwater takes on surface water depletion must be managed in accordance with Table 15-1.

Table 15-1: Surface water depletion

Classification of Surface Water Depletion Effect	Magnitude of Surface Water Depletion Effect	Management Approach
Riparian	Any groundwater take screened within the geologically recent bed strata of a surface water body	The groundwater take is subject to the same restrictions as a surface water take, unless there is clear hydrogeological evidence that demonstrates that the effect of pumping will not impact on the surface water body.
High	The surface water depletion effect is calculated as 90% or greater of the groundwater pumping rate after seven days of pumping, or 50% of the groundwater pumping rate after 100 days of pumping	The groundwater take is subject to the same restriction as a surface water abstraction.
Medium	The surface water depletion effect is calculated as 20% or greater and less than 50% of the groundwater pumping rate after 100 days of pumping	The calculated loss of surface water is included in the surface water allocation regime, but no specific minimum flow restrictions are imposed on the groundwater take.
Low	The surface water depletion effect is calculated as less than 20% of the groundwater pumping rate after 100 days of pumping	The calculated loss of surface water is not included in the surface water allocation regime and no specific minimum flow restrictions are imposed on the groundwater take.

Policy 15-2D: Saltwater intrusion

Saltwater intrusion along the coastal margins of the Region arising from groundwater takes must be managed by the following measures:

- (a) Consent applicants wishing to take groundwater within 5 km of the coastal mean high water springs line must be required to carry out pumping tests and hydrogeological assessments in order to determine the level of drawdown at the coast and the likelihood of inducing saltwater intrusion.
- (b) In cases where saltwater intrusion might occur, the consent application may be declined or the amount of water that can be taken must be limited to an amount that restricts the likelihood of saltwater intrusion.

- (c) In addition, consents to take groundwater within 5 km of the coastal mean high water springs line must contain conditions relating to the monitoring of electrical conductivity and the restriction or suspension of takes if specified electrical conductivity thresholds are reached or exceeded. These monitoring requirements and electrical conductivity thresholds will be determined on a case-by-case basis.

Policy 15-4: Monitoring requirements of consent holders

Water takes must generally be subject to the following monitoring requirements:

- (a) the installation of a pulse-count capable water meter on all water takes that are allowed by way of a resource consent, in order to monitor the amount of water taken
- (b) the installation of a Regional Council compatible telemetry system on surface water takes greater than 750 m³/d, and on groundwater takes greater than 750 m³/d where the groundwater is highly interconnected with surface water
- (c) the installation of a Regional Council compatible telemetry system on other groundwater takes greater than 4000 m³/d (d) Appropriate water quality monitoring, including conductivity monitoring on groundwater takes located within 5 km of the coast, or on a nearby monitoring bore
- (e) the installation of a Regional Council compatible telemetry system on consented surface water takes where:
 - (i) the amount of water taken, when assessed in combination with all other water takes upstream, exceeds 15% of the estimated one-day mean annual low flow, or
 - (ii) the amount of water taken from a Water Management Sub-zone as identified in Schedule AA exceeds 15% of the one-day mean annual low flow for that Sub-zone.

Policy 15-6: Transfer of water permits

On the application of any consent holder, the transfer of a permit to take water will generally be approved in terms of s136(2)(b)(ii) of the RMA, providing:

- (a) the transferred take is exercised within the same Water Management Zone as the original consent,
- (b) the rate and quantity of water taken are consistent with the provisions of Chapter 6 regarding the need for water and efficient use of water,
- (c) the transferred take complies with all relevant water allocation requirements of Chapter 6 at the site of transfer, and
- (d) there are no more than minor adverse effects on any other take or use of water.