



Rainfall or river water that seeps from soils into the pore spaces between fractures of solid rock or sediments, like sand or gravel, is known as groundwater. Groundwater is the largest source of accessible freshwater in the world, accounting for around 98% of freshwater available for use on Earth. While groundwater is generally hidden beneath the land surface, many of the region's springs, rivers and lakes are sustained by groundwater flow, particularly during summer when there is little rainfall.

Because of our climate and geology, huge volumes of water are hidden below the ground in Aotearoa. Geological formations that hold or allow the flow of groundwater are called aquifers. The amount of water within each aquifer depends not only on how large the geological formation is, but also how much space is available between individual grains within that formation. Generally, sands and gravels are more permeable and allow water to flow more freely, whereas silt and clay layers inhibit groundwater flow.

In Taranaki, there are 12 main underground groundwater systems, or aquifers; each one named for the geological formation it is contained within. The region's largest groundwater aquifer, found within the Taranaki Volcanic formation, covers a large part of the region. The volume of water available for use each year within this aquifer alone is equivalent to almost nine times the amount of water in Lake Taupō.

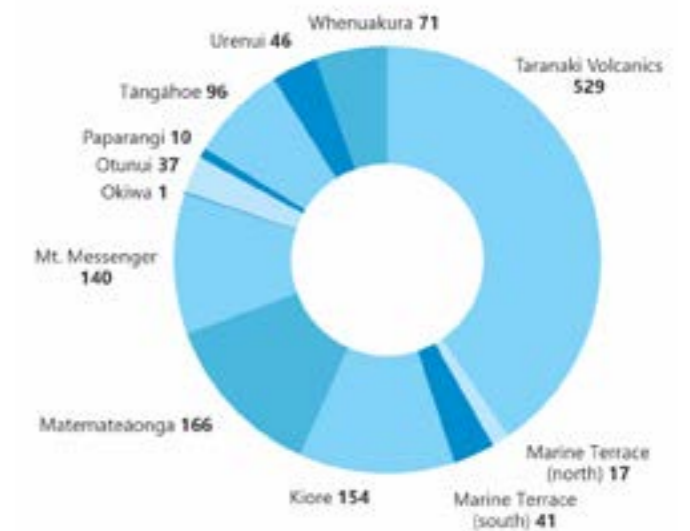
To protect these valuable resources the Council undertakes a groundwater quantity monitoring programme. This monitors the amount of groundwater people are presently allowed to take (the allocation) to ensure it does not exceed what the aquifers can sustainably maintain. We also monitor groundwater levels at a number of sites to assess the status of the resource and track any changes in groundwater levels over time.

What we know

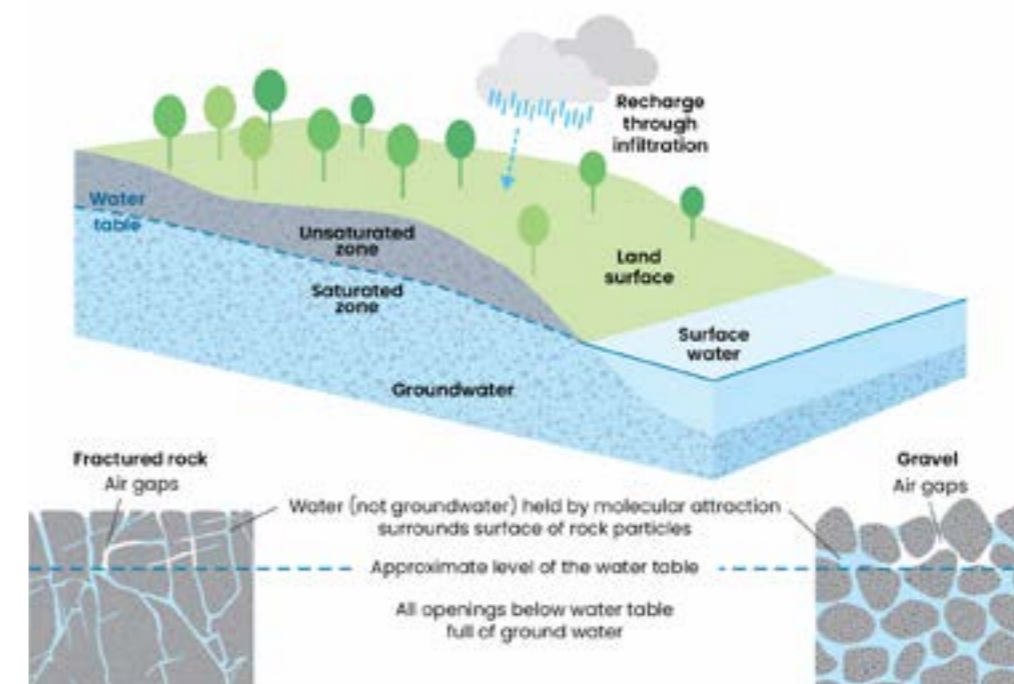
Groundwater allocation

The amount of groundwater allocated across the region is very low, with only small increases in demand over the last 10 years. As of 30 June 2020, there were 73 consents authorising groundwater use, up from 51 in 2013 (+43%). The total volume of groundwater allocated by these consents is equivalent to just over 2% of the region's total estimated sustainable yield.

Groundwater is generally used in rural areas where other water sources are not easily accessed. These are often properties that require more water than can be collected using a rainfall roof supply, or do not have access to a municipal supply scheme, stream or river. The volume required by each consent holder generally depends on its intended use. Uses include private households and farms, industrial facilities and town supplies. While there is plentiful groundwater in Taranaki, our aquifers generally do not release water easily, making it challenging to source groundwater, particularly for high demand uses such as irrigation or public supply. Groundwater quality can also limit its usability in some instances.



Estimated sustainable yields (1,000 GL/yr) for each of the region's groundwater aquifers.



A simplified representation of a groundwater system. A proportion of rainfall infiltrates the land surface and 'recharges' groundwater aquifers. Water then moves downward to a depth where all spaces between individual grains are filled with water, a level otherwise referred to as the 'water table'. Groundwater then moves by gravity toward a discharge point, which could be a spring, a river, lake or the coast.

73 Groundwater consents which account for **2%** of available groundwater

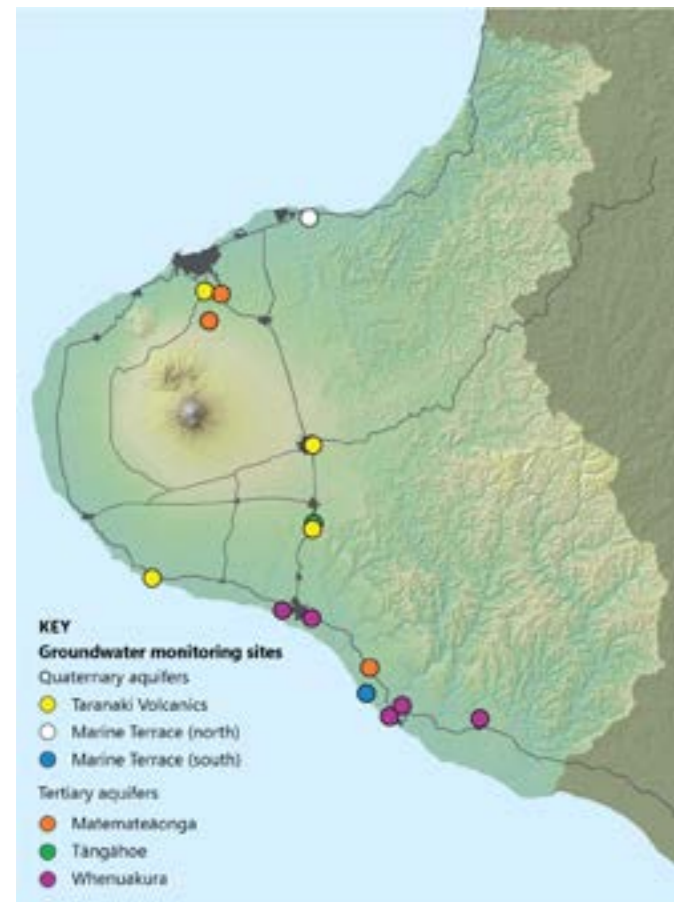
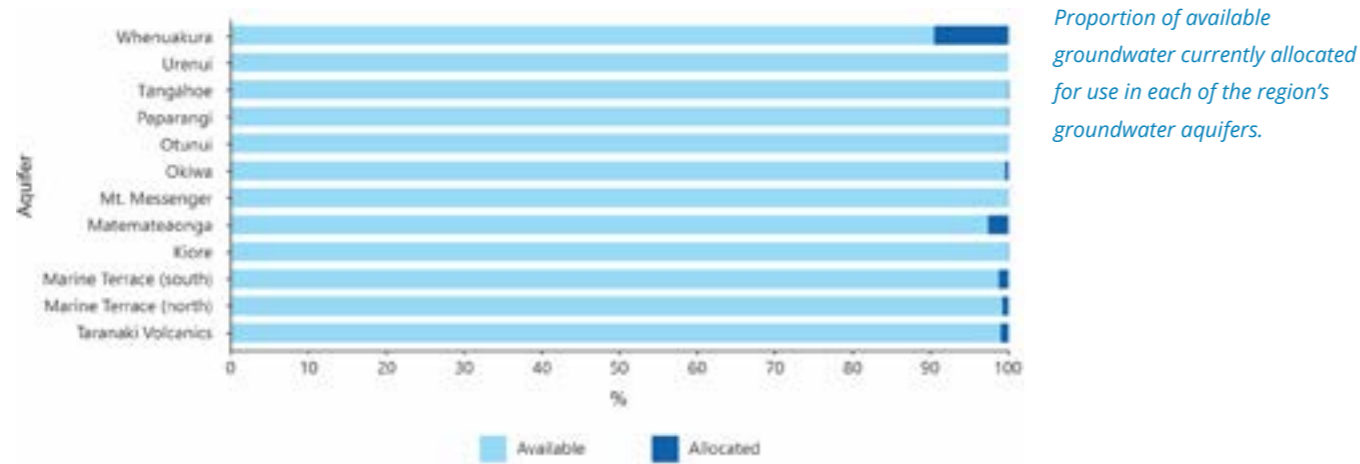
12 groundwater aquifers the largest having almost **9 times** the volume of water in **Lake Taupo**

Demand for groundwater has not changed significantly since **2015**

Groundwater levels in monitored bores have not changed significantly since monitoring began

The highest level of allocation is in the Whenuakura aquifer, which has around 11% of its sustainable yield allocated, followed by the Matemateaonga aquifer at 3%. All other

aquifer allocations combined make up less than 1% of the region's available groundwater.



Groundwater level monitoring and the aquifers monitored at each location.

Groundwater levels

The Council monitors groundwater levels at 15 sites across the region. These measurements are collected continuously to protect aquifers from over-use. The majority of sites have data records spanning 10 to 37 years.

The information is analysed to assess whether there have been any effects on the aquifer from groundwater use. For example, if the water level in an aquifer has fallen over a sustained period of several years this may show that the current groundwater use is no longer sustainable.

From 2015 to 2020, water levels rose and fell in response to local rainfall patterns. The range of change in water levels varied considerably by site, from a few millimetres up to several metres. Over the longer term, some sites also showed a small continuous fall or rise in groundwater level. None of these changes was considered significant enough to affect the sustainability of the aquifer and could be linked to either localised groundwater use or longer-term rainfall patterns.

What we're doing

Working as one

Regional councils are increasingly working together to both guide and respond to national direction. We work through our network of special interest groups to develop strategy, guide scientific research and data initiatives. The regional sector's Groundwater Forum recently developed a research strategy to help guide future groundwater research. During the last few years, we have also been working towards the development of a national wells database. The aim is that the database will eventually contain information about all known groundwater wells across the motu, and that this information will be publicly available.

We are also working together to find effective ways to meet new national regulations around groundwater allocation, and regularly contribute information to the website LAWA (Land, Air, Water Aotearoa), designed to help connect the public to New Zealand's environment by sharing scientific data.

Where we're heading

Future proofing groundwater allocation

With low demand for groundwater in Taranaki, none of the region's aquifers is presently under significant pressure. While there may be an increase in demand as people look to move away from less secure surface water sources, it is not expected to place groundwater under significant pressure in the short to medium term.

That said, there remains potential for localised pressures to arise where there are multiple groundwater users in a specific area. These demand pressures are a primary consideration when assessing any resource consent applications for a groundwater take. Likewise, the conditions for a groundwater take to be considered a

permitted activity under our regional rules are intended to minimise the potential for these effects to arise.

Planning ahead ensures that we are prepared for any change in water use demand should it occur. Work is under way to refine the estimates of the amount of groundwater available both at a regional and national level and what impacts, if any, are likely to be seen in the future due to climate change. The development of a new Regional Policy Statement and Natural Resources Plan for Taranaki is under way. With significant changes in requirements for freshwater management, there will be amendments to policies, rules and limits relating to water allocation, including groundwater.

