

Managing a Private Water Supply Well



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This brochure provides information for private water supply well owners in the Waimakariri District, to ensure the water supplied to their home or workplace is safe to drink.

Managing the water supply for yourself and your family is a significant responsibility and it is important that you consider this information.

Managing an Existing Private Well



Water quality monitoring and management

While all the steps included within this brochure are designed to minimise the risk of contaminants entering your water supply, this risk can never be eliminated entirely. It is therefore important that you monitor your water quality to ensure that it is free of contaminants, and you consider the need for treatment to further reduce this risk.

Sampling for microbiological contaminants

Microbiological contaminants are microscopic bugs – viruses, bacteria or other organisms – that can lead to illness. There are a wide variety of these organisms that can affect drinking water, and we can't test for all of them.

Instead, we usually test for one bacteria, *E. coli*, which is a good indicator that water has been contaminated with faecal material. If *E. coli* is present in the water, there is a good chance that other harmful organisms are also present, and the water should not be considered safe to drink.

Total coliforms is another indicator organism. While in itself it does not present a safety risk, it is a sign of living organisms in the water and indicates that the supply may not be secure from microbiological contamination.

Microbiological contaminants can come from waste disposal, septic systems, or grazing animals.

Regular testing of your water for *E. coli* is a good way to help manage the risks from microbiological contaminants. However, even wells that have had no *E. coli* in the past, can become contaminated at any time as conditions underground or on the surface change (for example after a rainfall event or a flood, or a change in land use in the surrounding area).

Treatment and well depth

As a general rule, the deeper the well, the lower the risk of contamination. However, no well can be considered completely safe from contamination, regardless of depth.

Therefore, by far **the best way to manage the risk of microbiological contamination is to provide treatment**. That way you can be confident that your water is safe, regardless of whether conditions change without your knowledge.

Sampling vs Treatment

If you opt to rely on sampling rather than treatment to manage the microbiological safety of your well, any positive *E. coli* result should trigger the need to install treatment, and water should be boiled before drinking until a suitable treatment system can be installed.

Chemical contaminants

There are many chemicals that can contaminate groundwater and many industrial or agricultural activities that could be a source of chemical contaminants. The Environment Canterbury website has a contaminated land tool, the Listed Land Use Register, that can help you identify whether any of these activities have been carried out on or near your property.

The most common chemical contaminants in Canterbury groundwater are:

- **Nitrate:** high nitrate concentrations in groundwater are generally caused by farming activities or wastewater disposal.
- **Arsenic:** Arsenic occurs naturally in parts of Canterbury. It can also come from old sheep dips, pesticides, or industry
- **Iron and manganese:** These metals are common in groundwater. They can cause nuisance staining of sinks and laundry, and at higher concentrations, manganese can pose a health threat
- **Cadmium, lead, and other heavy metals):** These metals are seldom detected in groundwater unless there is a source nearby, such as industry or a landfill
- **Organic chemicals:** These include petrochemicals, industrial solvents, pesticides, and a range of other man-made chemicals. As with heavy metals, they are seldom found in groundwater unless there is a source nearby

Maps for areas of high arsenic, iron, manganese and nitrate are provided at the back of the document.



Taking a water sample at a wellhead

How do you test for chemical contaminants?

If possible, we recommend that you do a full chemical test when you purchase a property or drill a new well as an initial screening for contaminants. It is prudent to do a follow up test 6 – 12 months after the initial test to see if anything has come through after more regular use of the well that may not have shown up in the initial test.

The Ministry of Health has information on registered laboratories.

Most recognised laboratories will offer a standard test suite for parameters to look for in drinking-water.

The results of the tests are compared to the Drinking-Water Standards for New Zealand, in particular the Maximum

Acceptable Values (the MAV). If anything is found at a concentration greater than the MAV, the water should not be consumed and a suitable treatment system used or an alternative source found.

If something is found at a concentration less than the MAV but more than 50% of the MAV, then more regular testing should be carried out to track whether the concentration increases over time. The testing should be done approximately quarterly to capture any seasonal variations.

The Waimakariri District Council standard test suite can be found [here](https://www.waimakariri.govt.nz/services/water-services/water-supply/drinking-water-testing):

<https://www.waimakariri.govt.nz/services/water-services/water-supply/drinking-water-testing>

Maximum acceptable values for microbiological and chemical parameters

The following table explains the MAV (maximum acceptable values), GV (guideline values) and health consequence of some common contaminants to be mindful of:

To determine what the MAV of a certain parameter is, the Drinking-water Standards for New Zealand should be referred to:

<https://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2018>

Parameter	MAV	Notes
<i>E. coli</i>	<1 per 100mL	Any trace of <i>E. coli</i> indicates that the water has been affected by faecal contamination and is not safe to drink.
Total Coliforms	No MAV	There is no MAV for total coliforms, as total coliforms alone are not considered unsafe. However, they are an indicator of living organisms in the water supply, and suggest that the supply is not secure and is at risk of microbiological contamination occurring in the future.
Nitrate	50 mg/L as nitrate (NO ₃ ⁻) Note this is equivalent to 11.3 mg/L as nitrate-nitrogen. It is important when looking at results to understand which unit has been used to avoid confusion.	Sometimes high amounts of nitrate can enter groundwater through activities such as fertilisers, animal wastes, unreticulated sewage disposal and industrial and food processing waste. Nitrate levels above the MAV can pose a risk to babies less than six months old who are formula fed, or the unborn foetus of pregnant women. Adults with rare metabolic disorders may also be at risk.
Arsenic	0.01 mg/L	Arsenic can be naturally occurring in some groundwater sources, or can be introduced as a result of some industrial activities. Long term exposure to arsenic above the MAV can lead to cancer and skin lesions.
Iron	0.2 mg/L GV can cause laundry staining and other aesthetic issues	Iron and manganese are more likely to cause aesthetic (taste, odour, staining) issues rather than health issues, but still need to be considered to avoid these aesthetic problems.
Manganese	0.4 mg/L MAV 0.04 mg/L GV can cause laundry staining 0.10 mg/L GV can cause taste issues	
Other (Heavy metals, organic chemicals etc)	Seek specialist advice, depending on parameter detected	

Treatment systems

Most of the contaminants that you might find in your private well can be treated.

It is important that:

1. You purchase the right kind of treatment system for the contaminants you have found or are concerned about.
2. The treatment system meets the right standards so that you know it can be relied upon. Some basic guidance is given below:

Contaminant Type	Common Treatment Methods	Relevant Standards
Microbiological, as indicated by <i>E. coli</i> or total coliforms.	Filtration followed by UV disinfection	Australian / New Zealand Standards: <ul style="list-style-type: none">• AS/NZS 4348:1995 and AS/NZS 3497:1998 Or equivalent international standards such as: <ul style="list-style-type: none">• NSF/ANSI 55-2002 Class A• DVGW Technical Standard W294;• oNORM M5873-1
Nitrate or Arsenic	Reverse Osmosis / Ion Exchange	No Australian/ New Zealand standard – seek specialist water treatment advice
Other	Seek specialist advice	

Note that some filters may only treat taste aspects, but not provide microbiological treatment. Make sure that your treatment system is fit for purpose.

It should also be noted that treatment systems will only remain effective if they are maintained correctly. You should ensure regular maintenance is carried out as per the equipment supplier’s recommendations.



Good design of your wellhead can protect against contamination

Well head protection

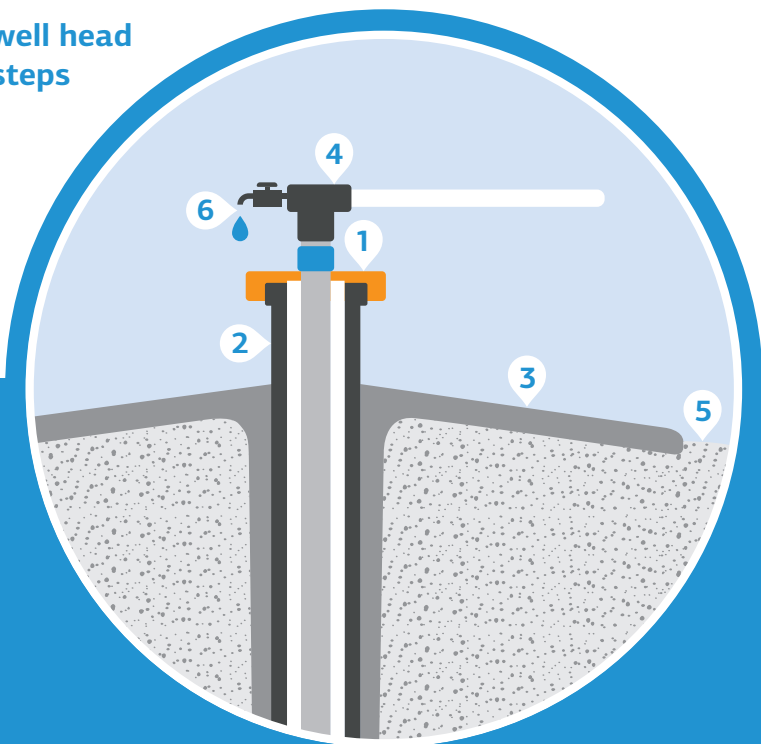
There are generally two ways that your well head could lead to contamination of your supply:

1. Contaminated surface water entering down the outside of the well casing,
or
2. Contaminants entering via the well head structure itself.

These risks can be managed as follows:

- **Grouting:** The outside of the well casing should be grouted to ensure that the water from the surface cannot travel down the outside of the casing. This should ideally be done at the time of drilling, but if you are not sure if this has been done, this can be done retrospectively by a drilling company.
- **Casing:** The well casing should extend above the ground surface to ensure that surface runoff water cannot flow directly into the top of the well.
- **Concrete Apron:** A concrete apron should be constructed that ensures that water flows away from the well casing itself and does not pond around the well head.
- **Backflow Preventer:** A backflow preventer should be installed on the well head to stop any potential contaminants from travelling back down the well riser into the aquifer.
- **Fencing:** The land surrounding the well head should be fenced off to prevent livestock from accessing this immediate area. It is recommended that at least a 5m perimeter surrounding the well be fenced off.
- **Maintenance:** Ensure that the condition of the well head protection is maintained over time.

**For a secure well head
follow these steps**



1. Well cap

Install a secure well cap and seal between the casing and any hoses or cables going down the well.

2. Well casing

Ensure the well casing is elevated at least half a metre above the ground surface

3. Concrete apron

Seal between the well casing and the surrounding ground with a concrete apron. if you're drilling a new well, install a bentonite seal around the casing.

4. Back-flow preventer

Install a back-flow preventer to stop contaminants siphoning back into your well

5. Area around well

Keep the area around the well head clear of animals, pesticides, fertilisers, compost and rubbish.

6. Sample point

Have your groundwater supply tested if you suspect a problem with the water quality.

Drilling a New Private Well

Planning a new well

If you have a property that has no water supply, the first thing to consider is whether you can connect to a public supply, or whether you will need to provide your own source of water.

It would always be recommended to connect to the public supply if this is possible, as a well-managed public water supply will be safer than a private well. You should contact Waimakariri District Council to see if a connection to the public supply is possible.

If a connection to a public supply is not possible, then the next best source of water may be from a well (depending on the area and availability of good groundwater sources).

Determining where a good source may be found

You will have a higher chance of finding a good groundwater source if there is evidence of other nearby properties with good wells in the area. There are a few places you can look to help inform yourself of where water sources have been found, and the suitability of the water for drinking:

- **Drillers:** Local drilling contractors will likely have knowledge on where suitable water sources have been found
- **This brochure:** Included in the back of this brochure are maps of the Waimakariri District showing where key chemical parameters have been

found in water sources, and at what level. While each value presented may only represents the sample at a particular time, this should give some idea of what contaminants may be more or less likely to be found in a given area

- **Well search database:** You can look at bore logs using the Environment Canterbury Well Search database to see what depth water has been found at, and potentially water quality information
- **Local Knowledge:** Get to know your neighbours and ask how they source their water, and whether they have any water quality results from their own supply
- **Flood Levels:** A well may be more prone to contamination during a flood event. You should plan your well so that it is not located in a flood prone area, as this could put the well at additional risk if it becomes inundated
- **Surrounding sources of contamination:** Think about where your well is located in relation to other activities that may introduce contaminants into the groundwater system. Common ways this could occur are via septic tanks, historic contaminated sites, ponds, or any other farming or industrial activity or process that may cause contaminants to be discharged to ground. It is advisable to avoid wells in the vicinity of these types of activities, or if these activities have existed, to ensure the well is located

upstream from them. As a very general rule of thumb, groundwater follows surface topography and flows downhill, but this may vary near rivers or where the topography is complex.

Checking consenting requirements

The Land and Water Regional Plan (published by Environment Canterbury) is the key document that sets out where bores can and can't be drilled, whether a consent is needed to drill the well, and whether water can be taken from the well as a permitted activity without a consent, or whether a consent is required.

A link to the full Land and Water Regional Plan document can be found at www.eplan.ecan.govt.nz

Key sections are:

- 5.103 – 5.110: Sets out requirements for drilling wells.
- 5.113 – 5.114: Sets out requirements to be allowed to take groundwater without the need for a consent.

Drilling a well

Once you have decided where you want your well, what depth you are targeting, and what the consenting requirements are, you will need to engage a driller. It is important that whoever does this is suitably qualified and experienced, and that care is taken during the drilling process.

Rule 5.103 of the Land and Water Regional Plan (LWRP) states that installing a bore or gallery is a permitted activity if:

- the bore or gallery is installed by a member of the CRC bore installers programme; and
- all the other conditions of rule 5.103 of the LWRP are met.

A list of drillers on the CRC bore drillers programme can be found here (follow link then click tab “current members of the CRC bore installers programme”): <https://www.ecan.govt.nz/do-it-online/resource-consents/crc-bore-installers-programme/>

Well head protection

Once you have a well drilled, you then need to consider the well head arrangement and how this is managed to protect your water supply from potential contamination. Information on well head protection is included in ‘Managing an Existing Private Well’.

Purchasing a Property with a Private Well



What to consider when purchasing a new property?

Anyone purchasing a new property should enquire about the water supply. You can request a LIM from Waimakariri District Council, which will include whatever information Council holds on the water supply.

In order to gain more knowledge on the water supply, it is recommended that further questions be asked from the seller, such as:

- Does the water come from a public supply or a private well?

If the answer is that it is from a private well then the following information should be obtained:

- How deep is the well?
- Is the well head sealed, and the surrounding area fenced to protect it from livestock?
- Is the water from the well pumped to a tank, and what is the condition of

the tank?

- What type of treatment system do they have (if any) and has it been regularly maintained?
- How regularly is the well tested, and are the results available?
- What state is the well in? Are there any records of maintenance of the well or pump?
- Does the well have an Environment Canterbury well number (if so, additional information about the well may be available through the Well Search page on Environment Canterbury's web site (<https://ecan.govt.nz/data/well-search/>)).

Answers to these questions will help you to determine how safe the water supply is. If the seller is not able to demonstrate that the water is safe and that sufficient treatment is in place, the need for any upgrades to the water supply should be considered before making an offer on the property.



Who to contact for further information?

Drinking-water safety is the joint responsibility of the territorial authority (Waimakariri District Council), the Regional Council (Environment Canterbury) and the local health board (Canterbury District Health Board). Please refer below for which agency to contact for different issues or questions:

Environment Canterbury:

Manages the quality of both surface and ground water quality in the water body or aquifer. This is achieved by managing who can take water from the ground or a surface water body, and what can be discharged into or onto the ground or land/water surface.

They hold information on existing bores such as depth, yield and in some cases quality.

Waimakariri District Council:

For public supplies, WDC manages the quality of the water coming out of the tap. This is through management of the supply, storage and distribution network.

For private supplies, WDC ensures that there is a potable water supply, through the issuing of a resource consent for subdivision of land (which will specify how water is to be sourced) and issuing of a building consent for new dwellings. These however only confirm that there is a potable water source at the time of issuing the consent.

District Health Board:

Manage the impact of the water quality on public health, and can give advice on the health impacts of water quality.

Waimakariri District groundwater quality maps:

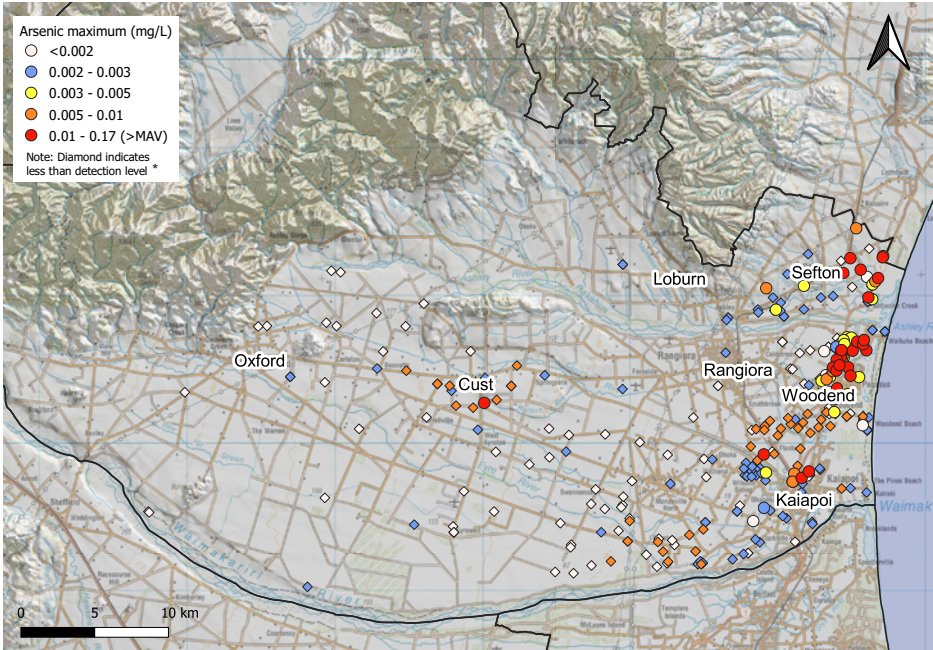
This information is to illustrate the likely groundwater quality that might be found. However water quality in your well may vary from the information provided and groundwater quality also changes over time.

The data included in these groundwater quality maps is limited to the maximum contaminant result for each well sampled, between January 1990 and June 2020. Wells included are within the Waimakariri District, for any well use, all depths, active and inactive wells. The data is limited to that

in the Environment Canterbury groundwater quality database or the Waimakariri District Council source database, provided by Environment Canterbury on 23/06/2020.

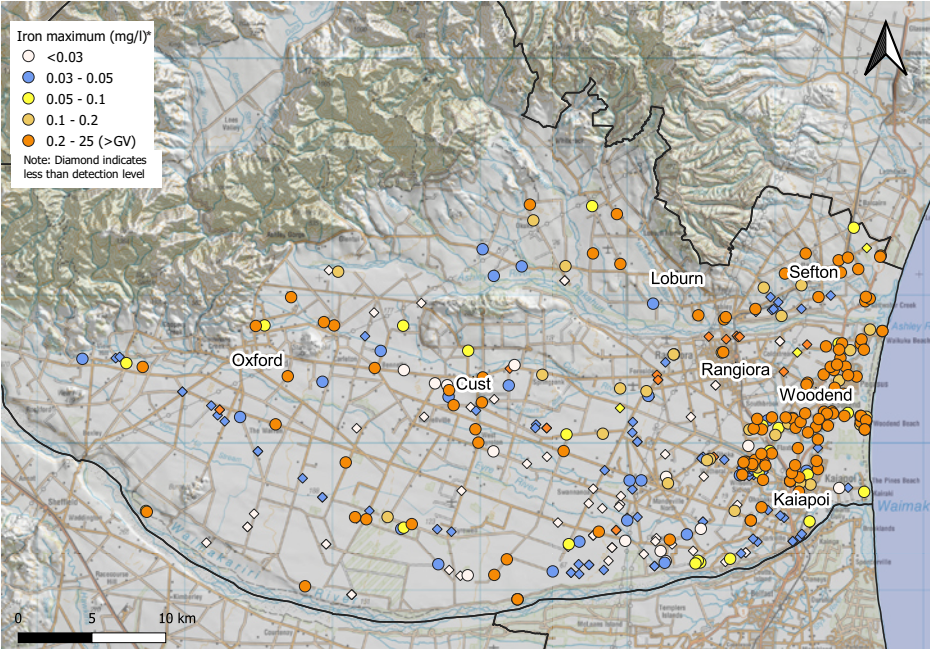
The Maximum Acceptable Value (MAV) and Guideline Value (GV) are set by the Drinking Water Standards for New Zealand (2005, amended 2018). If a MAV is exceeded, this means that the water is considered unsafe to drink. If a GV is exceeded, this means that there may be some aesthetic issues with the water.

Arsenic Maximum

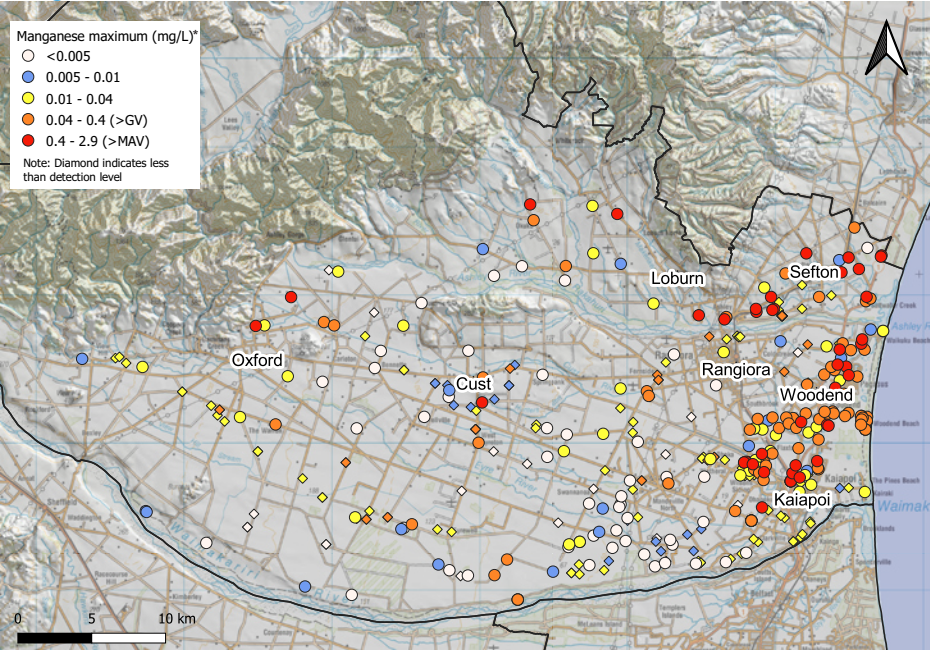


* Detection level is the lowest amount in a sample that the laboratory process can detect. Detection levels can change depending on the analysis technique.

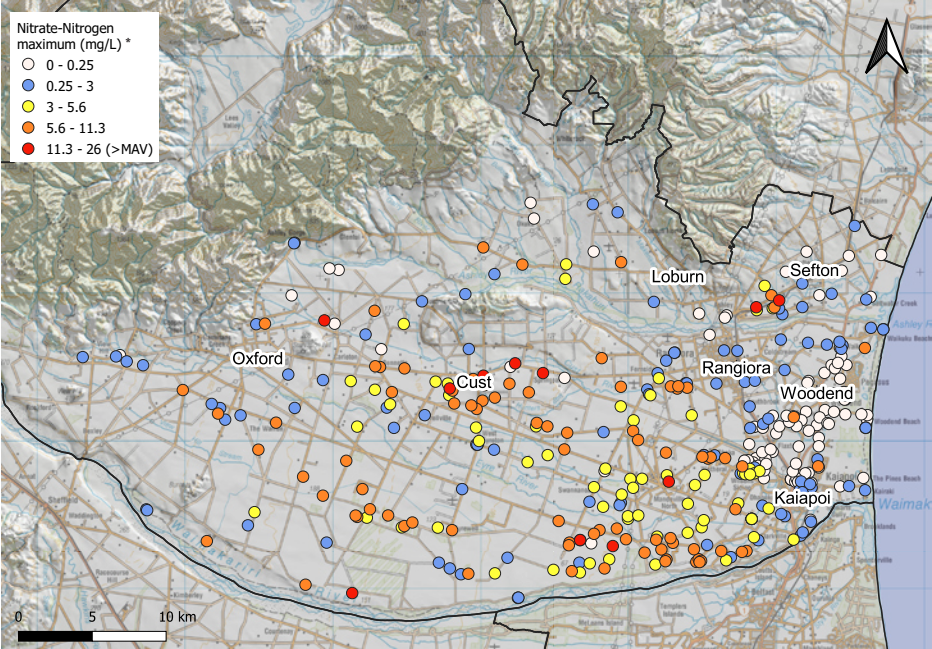
Iron Maximum



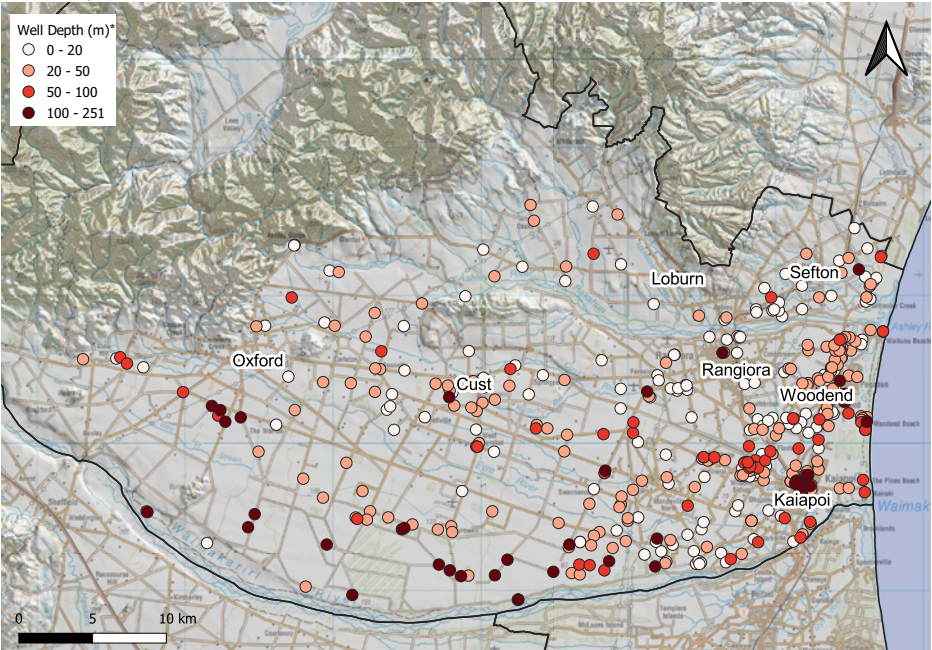
Manganese Maximum



Nitrate-Nitrogen Maximum



Well Depth



For more information please contact

Sophie Allen

Water Environment Advisor

Waimakariri District Council

Phone: 0800 965 468 (0800 WMK GOV)

Email: sophie.allen@wmk.govt.nz

201207166358



Find out more at waimakariri.govt.nz