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Waimakariri District Council
Assessment of Drinking Water Services

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Prepared for

Waimakariri District Council

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Executive summary

This report presents a district-wide Assessment of Drinking Water Services for Waimakariri District Council (WDC), prepared to meet the requirements of Section 69 of the Local Government (Water Services) Act 2025. It evaluates current and future access to safe, sufficient, and reliable drinking water across all communities, including Council-managed, private, and self-supplied sources.

The Waimakariri District has a current population of approximately 69,800 (Stats NZ, 2025a), of which:

- 81% are supplied by WDC reticulated systems
- 6% are supplied by the Hurunui District Council Ashley Rural Water Supply
- 13% (approximately 9,100 people) rely on private or self-supplied sources.

Council supplies serve the majority of urban populations and are generally well-managed, treated, and monitored. In contrast, private and self-supplies are geographically widespread, particularly in rural and lifestyle areas, and form a significant but poorly understood component of the district's drinking water supplies.

Drinking water in the district is sourced almost entirely from groundwater, with only limited reliance on surface water (e.g. Ashley Rural Water Supply and the Glentui scheme).

- Groundwater availability is generally sufficient to meet current demand.
- However, allocation limits are nearing capacity, typically 85–95% allocated, with the Kowai zone already over-allocated (~103%).

This means that while water resources are currently adequate, future growth will be constrained by allocation limits, requiring careful planning, demand management, and potential alternative supply approaches.

According to StatsNZ's medium growth projections from 2018 Census data[1], the district is expected to grow to approximately 86,400 by 2048. Daily water demand is projected to increase from ~21,100 m^3/day to ~27,600 m^3/day. Most growth is expected to connect to Council supplies, increasing pressure on reticulated systems. While total water demand growth can theoretically be accommodated within current allocation limits, this is uncertain due to competing uses (e.g. irrigation) and potential future regulatory changes.

Council-managed supplies are generally compliant with drinking water standards with widespread use of chlorination and UV disinfection and no confirmed cases of illness linked to Council supplies. Occasional compliance gaps due to operational or data issues, not systemic failures.

At a district scale, groundwater quality is generally good, but with localised variability. Key contaminants of concern include:

[1] All future population projections are based on the 2018 Census as this provides greater resolution at the Statistical Area 2 level. SA2 level projections from the 2023 Census are being progressively released by Stats NZ and are not yet available for the Waimakariri District.

- Nitrate (increasing in some areas)
- *E. coli* (microbial risk, especially in shallow wells)
- Arsenic (natural)
- Iron and manganese (mainly aesthetic issues in coastal areas)

While exceedances of drinking water standards are limited overall, monitoring shows elevated and increasing nitrate trends in some areas, localised high iron and manganese concentrations in the coastal area near Woodend Beach, and occasional exceedances in private wells.

The assessment identifies several key risks across the district:

Risks to Water Quality

- Nitrate contamination from agricultural land use
- Microbial contamination (particularly for shallow or poorly protected wells)
- Localised natural contaminants (arsenic, iron, manganese). Woodend Beach Holiday Park is a site with known source water quality concerns. Testing found manganese and iron above the aesthetic values, and this may be an issue that is common to the surrounding properties that are self-supplied. Due to the difficulty and expense associated with treating these parameters, this may be an area to investigate connecting to a Council supply.

Risks to Supply and Availability

- High groundwater allocation levels limiting new takes
- Population growth increasing demand
- Dependence on groundwater-only supply systems

Risks to Private and Self-Supplies

- Limited data on location, treatment, and condition of private supplies. This should improve once all drinking water supplies are registered with Taumata Arowai.
- Many supplies likely to have little or no treatment (estimated ~5,800 people without treated water).
- Greater vulnerability to contamination, drought, and supply failure.

Key areas of focus include improving information on non-Council supplies which will improve as supplies that meet the definition of a drinking water supplier register with Taumata Arowai. WDC will work collaboratively with Taumata Arowai and Environment Canterbury to support safe and reliable private water supplies and self-supplies. A focus for WDC will be planning for growth in high-demand areas and working with Environment Canterbury as it continues to monitor and protect groundwater quality and availability.

1. Introduction

This Assessment of Drinking Water Services has been prepared for Waimakariri District Council (WDC) to meet section 69 of the Local Government (Water Services) Act 2025 (New Zealand Government, 2025). The Act requires all territorial authorities to assess community access to drinking water services across their district by 1 July 2026.

This assessment covers all communities in the Waimakariri District, including those supplied by Council-managed reticulated networks, private supplies, and self-supplies. It considers the safety, quality, sufficiency, and availability of drinking water services and identifies key risks to the access of safe drinking water.

1.1 Purpose of assessment

This assessment aims to identify key risks and vulnerabilities for access to safe and reliable drinking water across the Waimakariri District to support future planning and prioritisation. Section 69 of the Local Government (Water Services) Act 2025 states the following requirements for this assessment:

2. An assessment of drinking water services must—

(a) identify each community that receives a drinking water service; and
(b) describe the nature of existing drinking water services to the community; and
(c) describe the characteristics of the community; and
(d) assess the extent to which the community is currently receiving, and will continue to receive, a sufficient quantity of drinking water, including a consideration of—
i. the community's existing access to drinking water services; and
ii. any reasonably foreseeable risks to the community's access to drinking water services in the future; and
iii. the current and estimated future demands for drinking water services within the community; and
(e) describe the safety and quality of drinking water currently being supplied to the community, using information collected and made available by the Water Services Authority and any other organisations that the territorial authority considers relevant; and
(f) identify and assess any other public health risks relating to the drinking water services supplied to the community; and
(g) based on the assessment under paragraphs (b) to (f),—
i. assess the consequences if the community loses access to drinking water services in the future, or is provided with drinking water services that are deficient in any way, including the implications for that community's public health; and
ii. outline a plan to provide for the community's ongoing access to drinking water services.

…

5. For the purposes of this section,—

(a) the scope of each assessment must include—
i. communities that receive drinking water services from the territorial authority or another water service provider; and

ii. communities that do not receive drinking water services from the territorial authority or another water service provider; and

iii. all types of water supply arrangements, including communities (and households within those communities) that do not receive water supply services supplied by network reticulation; and

(b) territorial authorities need not assess drinking water services that are owned or operated by a department within the meaning of section 5 of the Water Services Act 2021; and

(c) an assessment may be carried out—

i. by the territorial authority; or

ii. on the authority's behalf by another appropriate organisation in the authority's district, including another water service provider or an iwi, hapū, or other Māori organisation.

1.2 Scope

This assessment covers all communities within the Waimakariri District. The scope includes:

- **Council supplies:** Areas serviced by WDC's or Hurunui District Council's reticulated drinking water network, which supplies treated drinking water across the district, particularly to areas of higher population density.
- **Private supplies:** Areas serviced by non-Council drinking water supplies. These include self-supplied marae, community halls, commercial or industrial facilities, and shared private supplies that meet the definition of a drinking water supplier under the Water Services Act 2021.
- **Self-supplied houses:** Domestic houses or groups of houses with fewer than 25 people that are not connected to a drinking water network. They rely on private bores or wells, roof water collection (rainwater tanks), springs, or other self-supply arrangements.

This assessment includes:

- Current and projected water demand based on population data and growth projections
- Regional groundwater and surface water availability, allocation status, and water quality
- High-level assessment of drinking water quality, safety, and public health risks
- Identification of key risks and potential consequences of loss of supplies, including possible mitigation or contingency measures.

The assessment excludes:

- Drinking water supplies that are owned or operated by a department within the meaning of Section 5 of the Water Services Act 2021 (i.e. government departments and agencies e.g. self-supplying public schools).
- Site-specific or detailed assessments of individual drinking water supplies or properties, including determining the water source for all properties in the district.
- Verification of drinking water quality, treatment, or compliance for individual supplies.
- Community assessments on a more localised scale than Statistical Area 2 (refer Section 2.2).
- Detailed health impact or water quality assessments for individual sources or supplies.
- Any plans or recommendations for new or upgraded infrastructure.

- Detailed assessment of private water supplies as the requirement for pre-existing supplies to register has been extended to 15 November 2028.

2. Methods and Sources

The approach for this assessment followed these key stages:

- Identify communities in the Waimakariri District using available population data and describe community characteristics.
- Identify the drinking water supplies and describe the nature of drinking water services for each community.
- Assess water quantity and availability across the district, including current allocation status and future demand based on population growth.
- Assess drinking water quality and safety risks using available compliance information, monitoring data, and public health information.
- Assess key drinking water risks, vulnerabilities, and consequences of loss of supply.

2.1 Data sources

This assessment has been prepared using a range of existing data sources and publicly available information. The key sources are summarised in Table 2-1, followed by a brief description of how each source has been used.

Table 2-1: Summary of key data sources

Source organisation	Data / information	Use in assessment
Waimakariri District Council (WDC)	▪ GIS data ▪ Private water supplies known to Council staff ▪ Annual drinking water compliance monitoring report	Used to identify communities serviced by WDC's reticulated network and private water supplies known to WDC staff, describe community land use and zoning, assess compliance and quality of Council-managed supplies, and project future water demand.
Hurunui District Council	▪ GIS data ▪ Annual drinking water compliance monitoring report ▪ Ashley Rural Water Safety Plan	Used to identify communities in Waimakariri District serviced by Hurunui District Council's reticulated network and assess compliance and quality of Council-managed supplies.

Source organisation	Data / information	Use in assessment
Taumata Arowai	■ Public register of drinking water supplies (registered suppliers under the Water Services Act 2021) ■ Relevant information on other known community supplies	Used to identify registered and some potential non-registered private drinking water suppliers.
Environment Canterbury	■ State of the environment monitoring data (groundwater and surface water) ■ Groundwater allocation status and limits	Used to describe regional groundwater and surface water quality and quantity and assess availability and allocation status of water sources.
Health NZ - Te Whatu Ora	■ Information on waterborne illness rates in the district.	Used to identify and assess public health risks associated with drinking water services.
Statistics New Zealand	■ Statistical Area 2 (SA2) boundaries ■ Deprivation index data ■ Population census data and growth projections.	Used to define community boundaries, describe community characteristics (population and deprivation), and estimate current and future water demand.

2.2 Delineation of communities

For the purposes of this assessment, communities were delineated using Statistical Area 2 (SA2) data which is defined by Statistics NZ. These typically contain 1,000 to 3,000 residents and aim to capture similar area types (Stats NZ, 2025b). It was decided that SA2 area sizes were the most appropriate for this assessment, to capture variations throughout the district.

Some areas of higher population density were combined due to their similarity in land use types and having a common drinking water supply (e.g. the “Rangiora” and “Kaiapoi” communities were created by grouping neighbouring SA2 areas).

Using SA2 data was helpful for linking community boundaries with population and social statistics.

The Local Government Act defines ‘community’ in terms of a physical area under Schedule 6 'Constitution of communities’ section 2(2) that states:

> *The boundaries of a community must coincide with the boundaries of the statistical meshblock areas determined by Statistics New Zealand and used for parliamentary electoral purposes.*

Furthermore, section 2(1) states that an Order in Council or resolution must:

> *(a) fix the boundaries of the community and describe them in a manner that makes them readily capable of identification; and*
>
> *(b) assign a name to the community.*

Based on the above, the use of SA2 data is considered appropriate to assess communities under Section 69 of the Local Government (Water Services) Act 2025.

2.3 Water quality assessment criteria

Water quality data was assessed against the New Zealand Drinking Water Standards' Maximum Acceptable Values (MAVs) and Aesthetic Values (AVs). The following drinking water contaminants of concern in Waimakariri District were the focus of the water quality assessment:

- ***E. coli*** is a type of bacteria that indicates the presence of faecal material in water which is a risk to human health if consumed. Elevated *E. coli* levels indicate an increased likelihood of illness, and therefore a higher risk to drinking water safety. Shallow private wells are most at risk of contamination especially near effluent disposal or animal grazing areas and following wet weather (flooding) events. The Drinking Water Standards (New Zealand Government, 2022) specify a maximum acceptable value (MAV) for *E. coli* of <1 per 100 mL.
- **Nitrate** from human activities, agriculture and horticulture can leach into groundwater, where elevated concentrations can make the water unsafe for drinking. High nitrate levels pose a particular health risk to infants, including an increased risk for bottle-fed babies, and infants with gastrointestinal infections. To manage this risk, the Drinking Water Standards (New Zealand Government, 2022) specify a MAV for nitrate of 50 mg/L (equivalent to 11.3 mg/L as nitrate-nitrogen), based on the protection of infant health.
- **Arsenic** can occur naturally in some groundwater sources and may also be introduced through historical or industrial land uses. Long-term exposure to elevated arsenic concentrations is a chronic health risk, with potential effects including an increased risk of cancer and skin lesions (Health NZ, 2025). The MAV for arsenic is 0.01 mg/L to protect against these long-term health effects.
- **Iron and manganese** are commonly present in groundwater and are more likely to cause aesthetic issues than direct health impacts. Elevated concentrations can cause discolouration of water, staining of laundry, and taste or odour issues with drinking water. In the Aesthetic Values for Drinking Water Notice (Taumata Arowai, 2022), iron has an aesthetic value (AV) of 0.3 mg/L, while the AV for manganese is 0.04 mg/L for staining of laundry and 0.1 mg/L for taste. Manganese also has a MAV of 0.4 mg/L.

Iron, manganese, and arsenic are naturally occurring contaminants in groundwater in some parts of Waimakariri District and therefore may be present in the source water for some drinking water supplies. Nitrate is elevated downgradient of areas of intensive agricultural land use.

3. Community characteristics

3.1 Community boundaries

The Waimakariri District has been divided into 22 communities based on the SA2 data and these community boundaries are shown in Figure 3-1. Rangiora and Kaiapoi are the only communities created by combining SA2 areas.

Figure 3-1: Community boundaries map (left) with a zoomed view of the eastern communities (right)

3.2 Land use and planning zones

Approximately 80% of the Waimakariri District population is concentrated in the eastern part of the district, while the western area is predominantly rural (Waimakariri District Council, 2026). The Waimakariri District Plan zones are shown in Figure 3-2.

Communities in the eastern part of the district are mostly residential zones of varying densities, with some areas of town or local centres and industrial areas. The settlement or residential areas, common in Rangiora, Kaiapoi, Ravenswood, Woodend, Pegasus, and Waikuku Beach, have higher population densities, and are mostly serviced by Council water supplies, where water quality is routinely monitored and treated. Generally, water demand in residential areas is more predictable than in rural areas, particularly as the water supply can be used for other purposes such as stock or irrigation which can be highly variable. Industrial areas, such as in Rangiora, Kaiapoi, and Ravenswood, can experience high peak demands.

Large areas of rural lifestyle zone (described as semi-rural living) surround many of the settlements in the eastern communities, particularly Loburn, Ashley-Sefton, Mandeville, Ohoka, Clarkville, and Fernside. These are characterised by lower population density and limited farming activity (Waimakariri District Council, 2026).

Communities in the western part of the district are mostly rural, with the exception of Oxford, which contains a defined town centre zone surrounded by residential and industrial zoning. Rural zones and large lot sections have lower population densities and are more likely to rely on self-supplied drinking water. These western communities are likely to experience variability in water quality and treatment as monitoring and risk management for self-supplies is the responsibility of individual property owners.

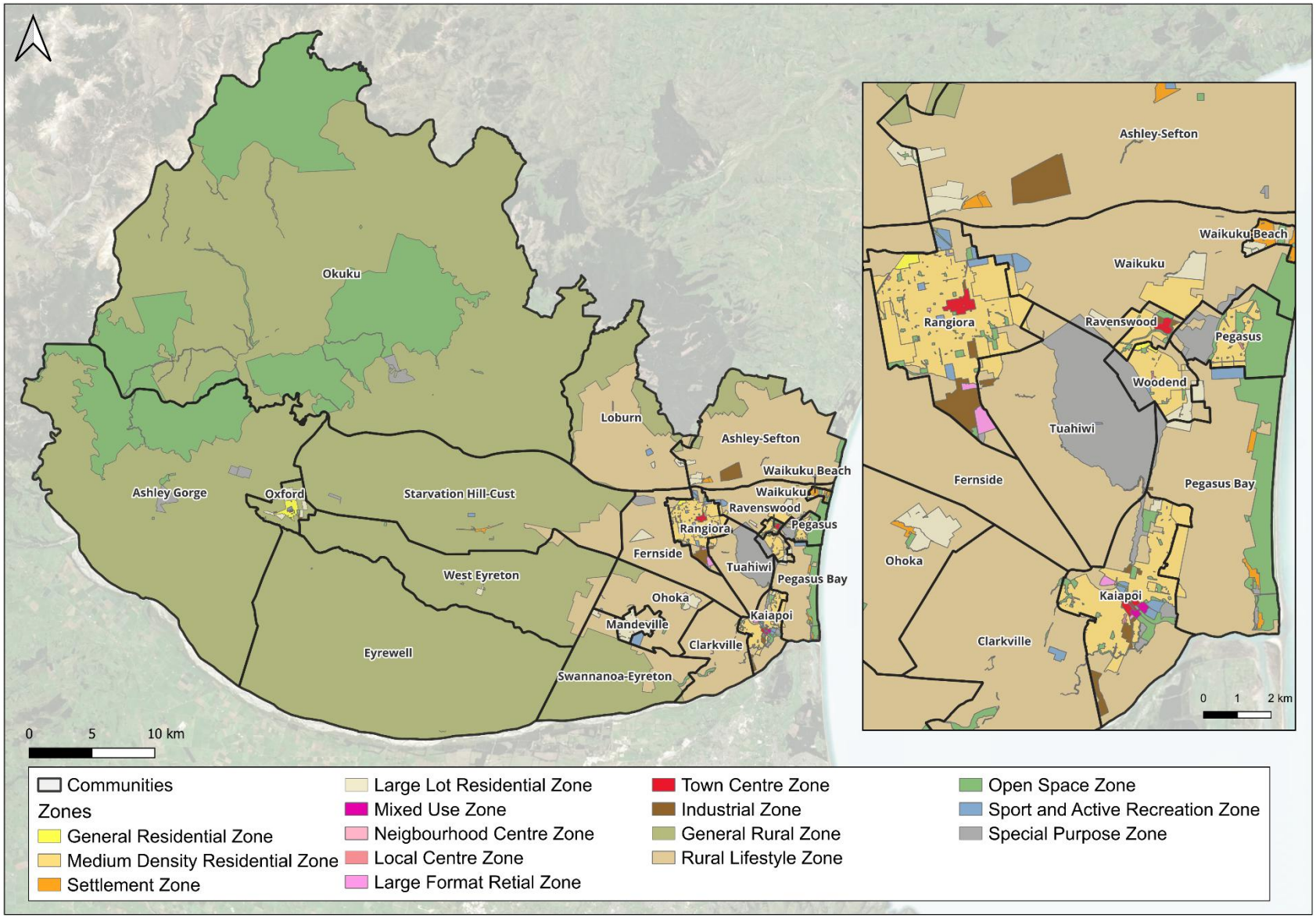

Figure 3-2: District plan zones in the Waimakariri District

The district's land use patterns in Figure 3-3 broadly align with the district plan zoning with more lifestyle blocks in the east and widespread dairy farming in the west. Dairy farming is also common in southern communities such as Eyrewell and Swannanoa-Eyreton. These communities mostly rely on self-supplied drinking water, typically from wells, which may be vulnerable to contamination from nearby stock or poorly sealed wellheads. Intensive land use, particularly dairy farming, can also contribute to increased nitrate concentrations in groundwater.

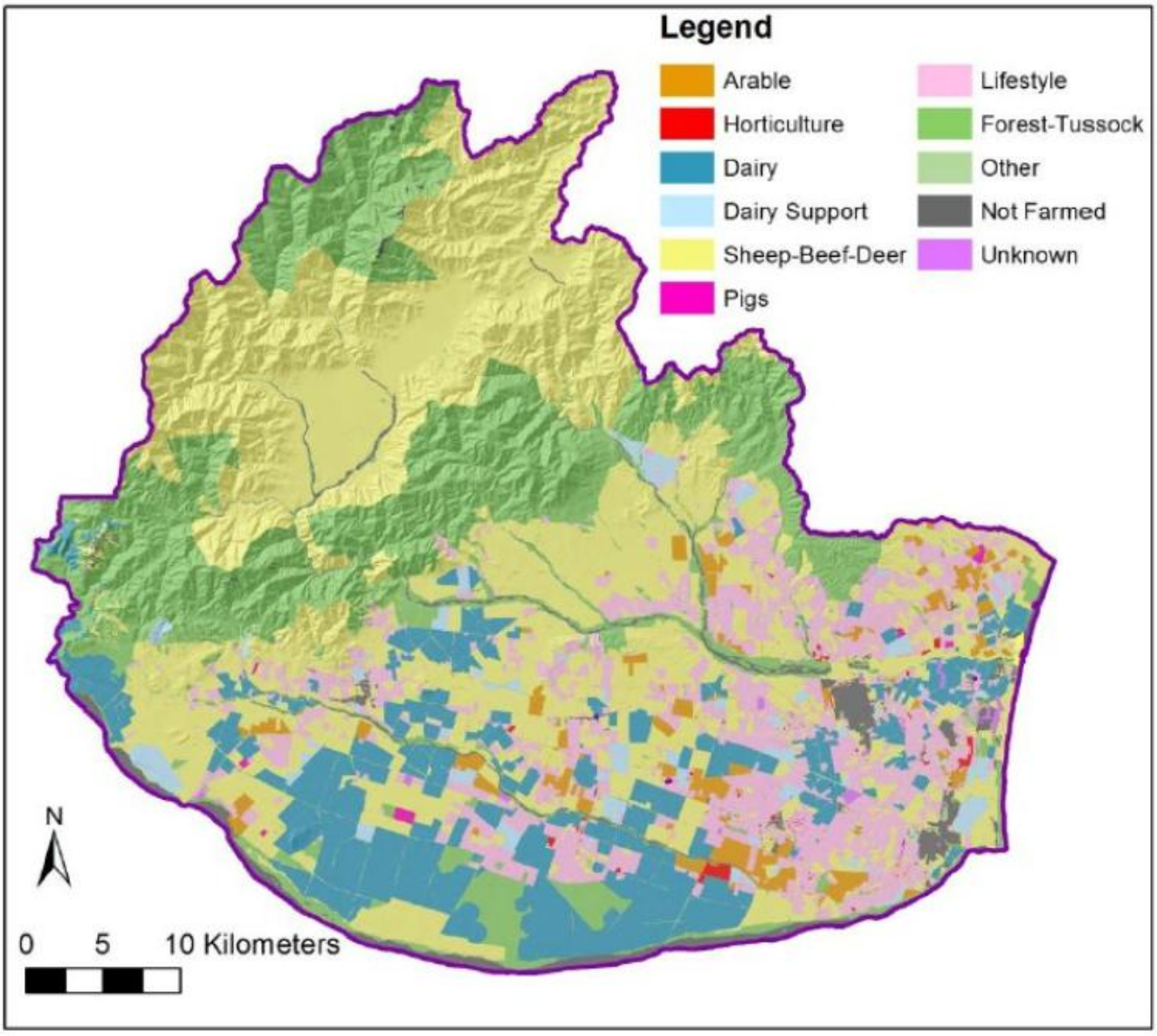

Figure 3-3: Land use in Waimakariri District in 2016 (Environment Canterbury, 2019)

There is an irrigation and stockwater supply that services a large proportion of the rural area between Oxford and Rangiora. The purpose of this supply is for irrigation and stock drinking purposes only. There is no known use of this supply for potable drinking water purposes.

3.3 Deprivation index and population

The deprivation index is a measure Statistics NZ generates that shows how socio-economically disadvantaged an area is compared with others. It combines information such as income, employment, housing, education, and access to transport and communication for people living in that area. A lower value indicates less relative deprivation, while a higher value indicates greater relative deprivation.

Figure 3-4 shows the deprivation index, population density, and community population for all communities in the district, with the size of the bubble indicating the size of population of each community. The cluster of lower density communities is displayed in greater detail in Figure 3-5.

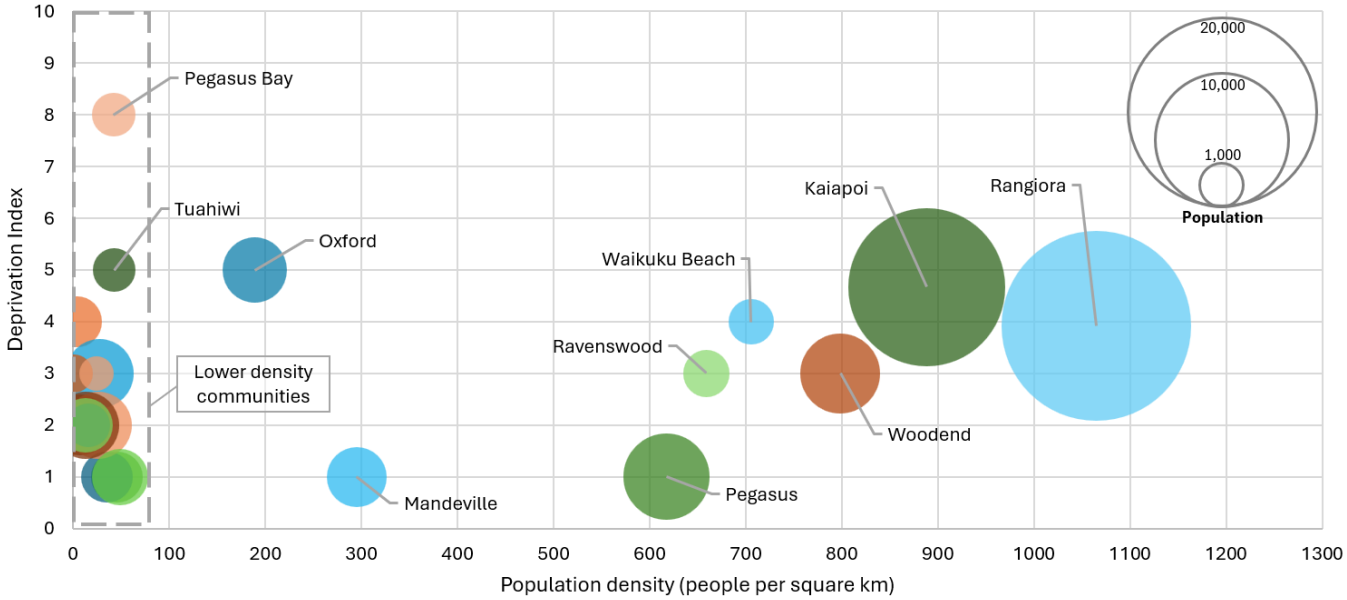

Figure 3-4: Deprivation index and population density by community

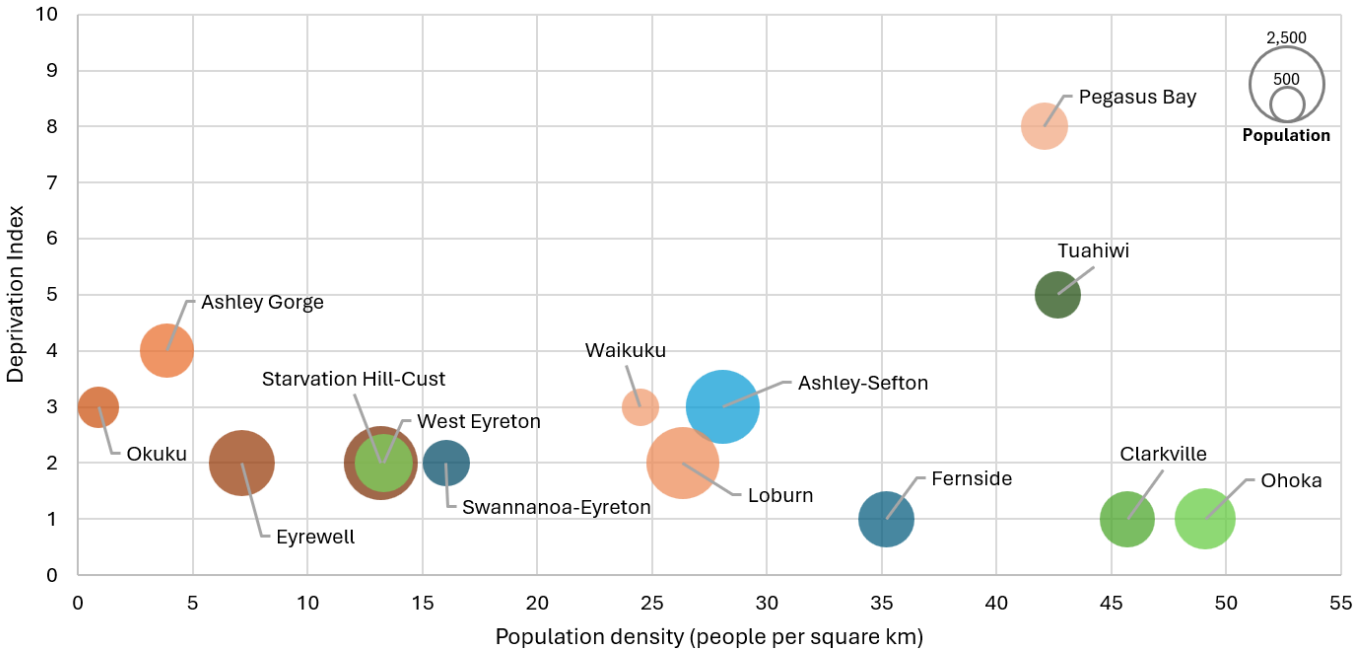

Figure 3-5: Deprivation index for communities of lower population density (zoomed view of Figure 3-4)

The communities with the highest deprivation index are Pegasus Bay (8), followed by Oxford, Tuahiwi and Kaiapoi (5), then Ashley Gorge, Rangiora and Waikuku Beach (4). Private supplies in areas with greater deprivation could be prioritised for support, including public health, infrastructure investment, and ensuring essential services like safe drinking water are affordable and reliable.

3.4 Future population projections

Projected population growth across the district is key for assessing the increasing demands on water infrastructure. 2023 Census data is used to represent the current population (Stats NZ, 2024). This is compared with future population projections, which are based on the 2018 Census data (published in 2023), as this is the most recent available data at the Statistical Area 2 level (Stats NZ, 2023). Table 3-1 summarises the population estimates with the corresponding percentage change for each community.

All communities are predicted to grow, and the total district population is predicted to increase by over 20,000 people over the 25 year period. The communities with the greatest predicted percentage increases are Fernside (170% increase) and Waikuku (132% increase, made up of the communities Waikuku, Waikuku Beach, and Ravenswood). The increase in the Waikuku group of communities will predominantly be driven by the Gressons Road Outline Development Plan which will include approximately 1,500 new residential sections. The land for this development is already zoned residential and lies between Ravenswood and Gressons Road (see Appendix C for a map of planned development areas).

The overall percentage increase for Rangiora is only 24% but the total population increase is 4,485 people, which is more than the total population increase in either of the Fernside or Waikuku communities.

Mandeville and Ohoka are grouped in the 2048 population estimate in Table 3-1. The growth is assumed to be split evenly across the two areas, moderately high at 34%.

Table 3-1: Comparison of 2023 and 2048 population across communities

Communities	2023 population	2048 population	Percentage change
Okuku	762	970	27%
Ashley Gorge	1,311	1,430	9%
Oxford	2,235	2,670	19%
Starvation Hill-Cust	2,397	2,900	21%
Loburn	2,352	2,740	16%
Eyrewell	1,947	2,500	28%
West Eyreton	1,530	1,600	5%
Ashley-Sefton	2,439	3,010	23%
Fernside	1,374	3,710	170%
Waikuku *	624	6,610	132%
Waikuku Beach *	1,071		
Ravenswood *	1,152		
Mandeville **	1,878	4,760	34%
Ohoka **	1,671		
Swannanoa-Eyreton	990	1,240	25%
Tuahiwi	969	1,120	16%
Woodend	3,390	4,370	29%
Pegasus	3,915	4,910	25%
Clarkville	1,377	1,630	18%
Pegasus Bay	990	1,360	37%
Rangiora (aggregated total)	18,855	23,340	24%
Kaiapoi (aggregated total)	13,017	15,480	19%
Waimakariri District Total	**66,250**	**86,400**	**30%**

Source: Statistics NZ for current and future population

* In the 2018 census (when the 2048 population projection was created), “Waikuku” represented what is now the Waikuku, Waikuku Beach, and Ravenswood SA2 areas.

** In the 2018 census (when the 2048 population projection was created), “Mandeville-Ohoka” was not yet split into Mandeville and Ohoka.

3.5 Drinking water supplies

The extents of known drinking water supply areas are shown in Figure 3-6. This includes WDC supplies, the Hurunui District Council Ashley Rural Water Supply, and private water supplies known to WDC staff. Council-supplied areas were mapped using GIS data from WDC, while the Ashley Rural Water Supply service area was defined using the extent of the Hurunui District Council water supply distribution network. Note that if a property is connected to a water supply, the full land parcel is mapped as being serviced.

Taumata Arowai also provided information about drinking water supplies across Canterbury (see Appendix A). However, the data provided about private or non-registered supplies did not include addresses or spatial extent. As a result, no additional private supplies could be mapped in Figure 3-6 based on this information.

From the Water Services Delivery Plan (Waimakariri District Council, 2025), the population serviced by WDC supplies is 56,500 (red area in Figure 3-6) and the Hurunui District Council Ashley Rural Water Supply serves another 4,200 people (blue area in Figure 3-6). With a current population of 69,800 (Stats NZ, 2025a), this means 81% of the population are served by WDC, 6% are served by the Ashley Rural Water Supply, and the remaining 13% (approximately 9,100 people) are either self-supplied or connected to private supplies.

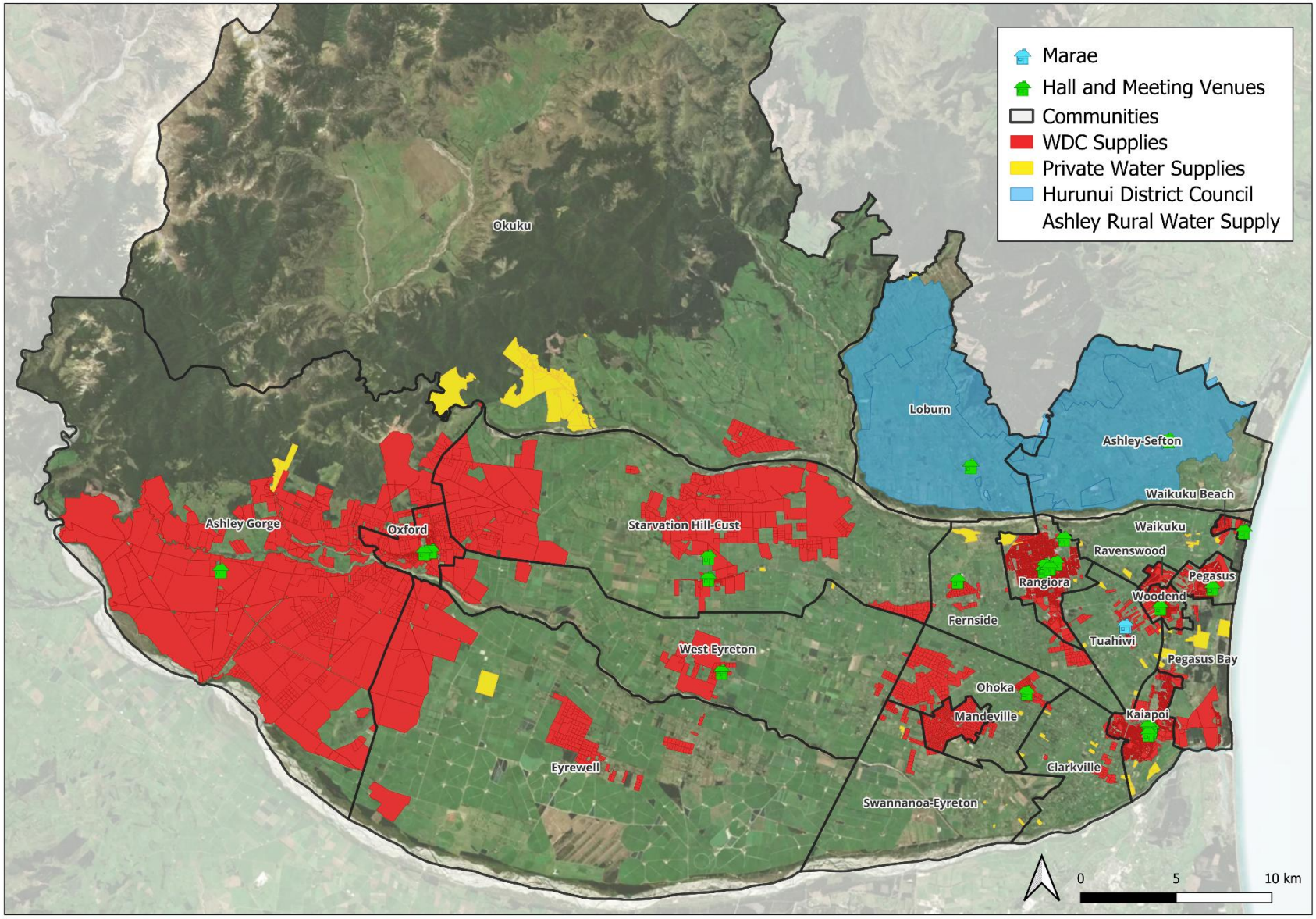

Figure 3-6: Map of communities and serviced areas (Council supplies and known private supplies)

Using the data from Figure 3-6, the typical types of drinking water supply for each community are described in Table 3-2. Refer to Figure B1 in Appendix B for the location and extent of each of the Council water supplies.

Table 3-2: Communities and how they typically supply their drinking water

Community	Description	Council supply name
Okuku	Mostly self-supplied, likely with bores. Partly Council-supplied.	Garrymere
Ashley Gorge	The majority of the area is Council-supplied with very few buildings outside the network. One known private supply.	Oxford Rural No 1 Oxford Rural No 2
Oxford	Majority Council-supplied, some self-supplied.	Oxford Urban
Eyrewell, West Eyreton, and Starvation Hill-Cust	Some areas are Council-supplied. The majority of the area is self-supplied buildings, some likely from roof water (aerial imagery shows tanks around collections of buildings with no nearby wells). Each of these three communities have one known private supply.	Poyntzs Road West Eyreton Cust Summerhill
Swannanoa-Eyreton	The majority of area is self-supplied, commonly by private wells. There are five known small private supplies, and seven small Council-supplied areas.	Mandeville
Loburn and Ashley-Sefton	The Hurunui District Council Ashley Rural Water Supply supplies almost the whole area. There are some self-supplied buildings in the east of Ashley-Sefton, most with nearby wells, some appear to have rainwater tanks.	Hurunui District Council Ashley Rural Water Supply
Mandeville	The area is higher density and is almost fully Council supplied. The few properties outside of Council area may be self-supplied with both wells and roof water.	Mandeville
Ohoka	Most of the area is self-supplied, generally with private wells nearby. There are two small Council-supplies and one known private supply.	Ohoka Mandeville
Fernside	The majority of the area is self-supplied, commonly with private wells nearby with some signs of rainwater tanks. There are some Council supplied areas, including the most densely populated area, and one known private supply. Majority of area is self-supplied, commonly with wells nearby, some sign of rainwater tanks.	Fernside
Rangiora	Mostly Council-supplied with two known private supplies. There are a few self-supplied buildings with nearby wells.	Rangiora
Waikuku	The majority is self-supplied with wells and some rainwater tanks. There are nine small known private supplies, and a small Council supply.	Waikuku Beach

Community	Description	Council supply name
Waikuku Beach, Ravenswood, and Pegasus	Majority Council-supplied, some self-supplied.	Waikuku Beach Woodend & Tuahiwi
Woodend	Majority Council-supplied, some self-supplied.	Woodend
Pegasus Bay	Several private supplies (north), partially Council-supplied (south). Some self-supplied.	Pines & Kairaki
Tuahiwi and Clarkville	Most of the area is self-supplied buildings (likely with nearby private wells). Partially Council-supplied with several small private supplies. Tuahiwi community includes Tuahiwi Marae which has the infrastructure to be self-supplied (or a private supply) but is possibly connected into the Council supply – this is being investigated.	Woodend & Tuahiwi Kaiapoi
Kaiapoi	The majority is Council-supplied with several private supplies (south). There are a few self-supplied buildings, some with nearby wells.	Kaiapoi

The halls and meeting venues that are known by WDC and captured in Figure 3-6 are all serviced by Council supplies. Halls or meeting venues not connected to Council supplies are likely to be private water supplies.

As of 2026, WDC owned 39 active wells for drinking water supplies. With the exception of Springbank, the wells only serve Council supplies. The WDC operations team identified 32 primary and operational wells that currently service the Council water supplies. The remaining wells may be used infrequently as a backup or are no longer regularly used. Hurunui District Council's Ashley Rural Water Supply is serviced from nine closely spaced wells which abstract groundwater that is hydraulically connected to the Ashley River. These primary and operational Council wells are shown in Figure 3-7.

Outside these serviced areas, buildings and households rely on self-supplying drinking water. The spatial distribution of active consents for wells where the purpose is either domestic supply only, or domestic and stockwater use is shown in Figure 3-8. This dataset is sourced from Environment Canterbury's active drinking water well database. This figure illustrates the widespread reliance on self-supplied groundwater throughout the district.

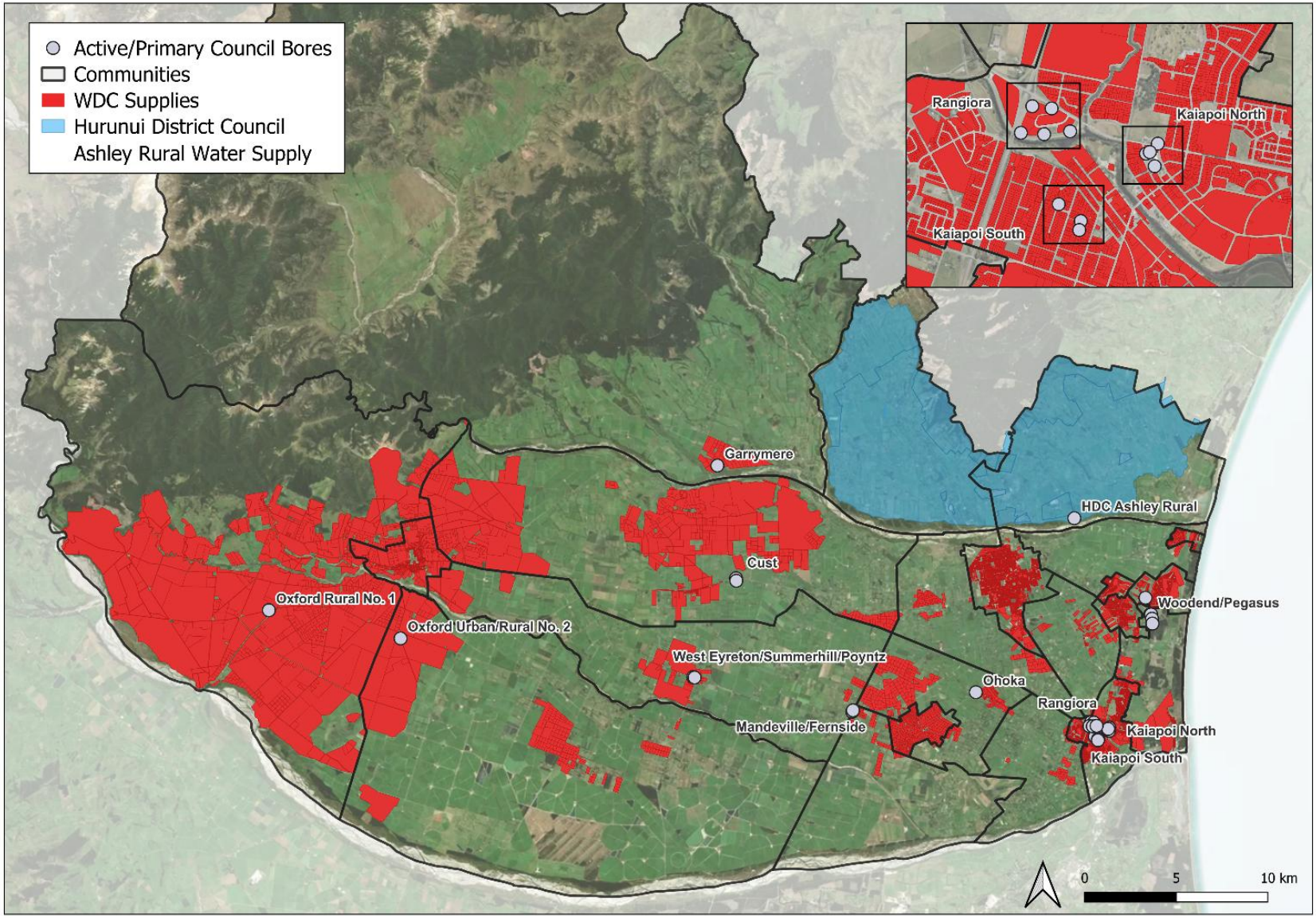

Figure 3-7: Primary drinking water wells serving Council water supplies

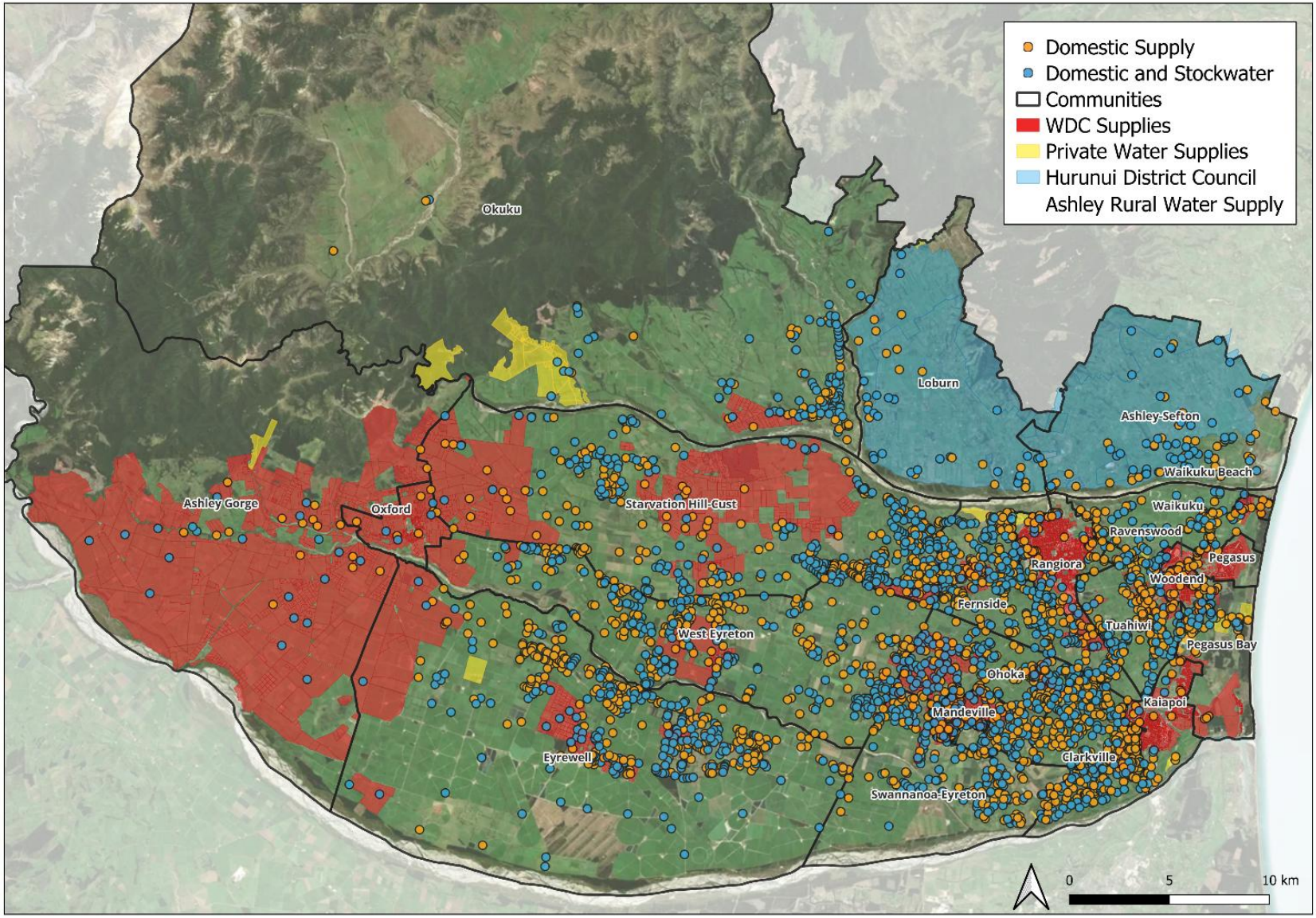

Figure 3-8: Active domestic drinking water supply wells in the Waimakariri District

4. Quantity and allocation

4.1 Groundwater

Groundwater is widely used for public and private domestic, irrigation, and commercial supplies in the Waimakariri District (Environment Canterbury, 2016a). The district is designated as the Waimakariri Water Zone under the Canterbury Water Management Strategy (CWMS) (Figure 4-1), where groundwater is the major source of drinking water. The significant regional surface water bodies both contribute to, and depend on, the aquifer system. Maintaining groundwater quality for domestic consumption of the existing population is identified as the most important outcome in the Canterbury Water Management Strategy (2011).

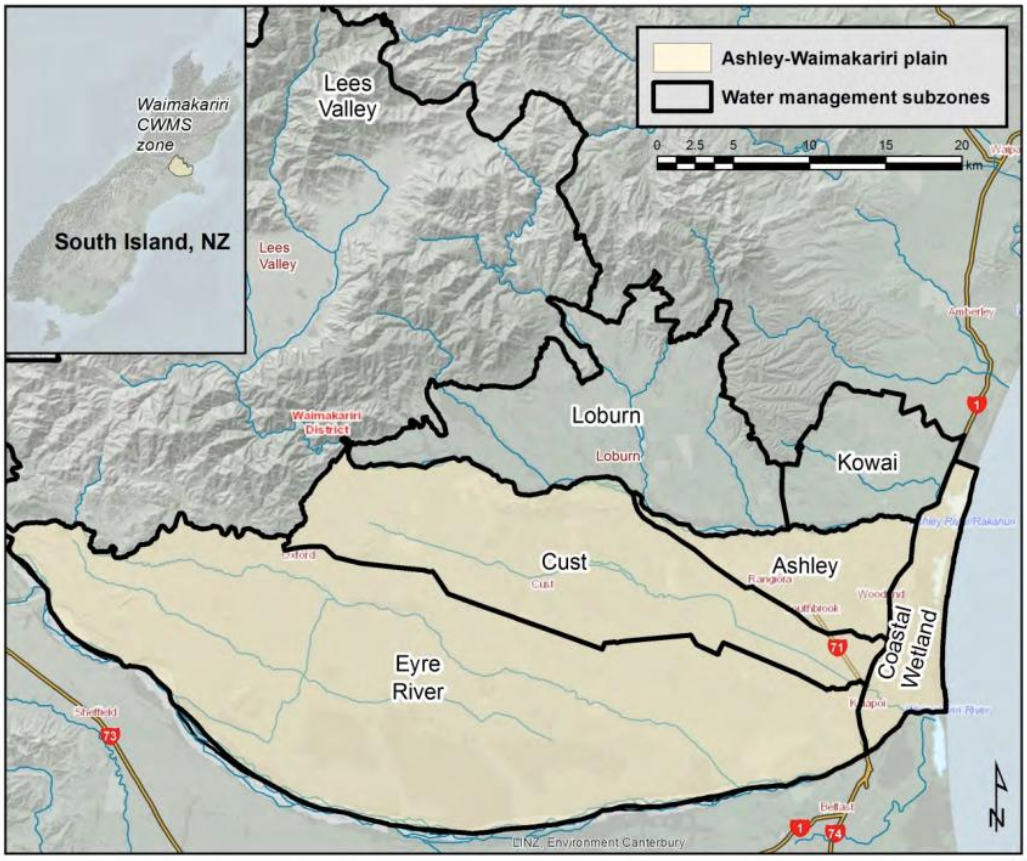

Figure 4-1: Location of the Waimakariri Water Zone and water management subzones (Environment Canterbury, 2018)

Most accessible groundwater in the Waimakariri Water Zone is hosted in unconsolidated alluvial deposits (i.e., gravel, sand and silt deposited by rivers) across the Ashley-Waimakariri plains. Groundwater levels are generally deeper in the Eyrewell Forest area and shallower adjacent to the Eyre River and the coast. These alluvial aquifers are hydraulically connected to surface water systems, with groundwater discharging along the gaining reaches of rivers, to spring-fed streams, and to the sea (Environment Canterbury, 2016a).

In the upper plains, groundwater is hosted in thick gravel deposits overlying bedrock. In the lowland area, east of approximately Mandeville, these gravel deposits are interspersed with fine-grained marine and estuarine sediments, which thicken and become more continuous near the coast. As the gravel deposits pinch out to the east, upwelling of deep groundwater occurs naturally at the coast. The presence of fine-grained sediments creates locally confined conditions, resulting in artesian conditions with some deeper wells free flowing (Etheridge & Wong, 2016).

North of the Ashley River / Rakahuri groundwater is also hosted in alluvial deposits in the Loburn and Kowai subzones (Figure 4-1). However, aquifers in these areas are generally less productive, with lower well yields than those on the Ashley-Waimakariri plains. Steeper topography, increased surface runoff and low permeability loess deposits (a hard, fine-grained windblown deposit), limit groundwater recharge. Higher yields are typically only found in the coastal part of the Kowai subzone where the Ashley alluvial fan extends north towards Saltwater Creek. Groundwater is also present in older sedimentary deposits, such as the deeper units of the Kowai Formation and the inland margins of the Waimakariri zone, although these resources are not widely used at present (Environment Canterbury, 2016a).

The centre of Lees Valley contains shallow alluvial deposits that host groundwater, likely hydraulically connected to the surrounding rivers in the valley. The bedrock surrounding and underlying the valley is relatively impermeable, forming a barrier to groundwater flow, and effectively hydraulically isolates the valley from the aquifers on the plains. All groundwater in Lees Valley discharges to the Ashley River / Rakahuri and flows as surface water through Ashley Gorge (Environment Canterbury, 2016a).

4.1.1 Aquifer sources

The Coastal Confined Gravel Aquifer System forms a relatively narrow band of confined gravel aquifers near the coast between the Ashley and Rakaia rivers. It is bounded by the coastal marine area, Banks Peninsula, and to the west by the extent of confining sediments approximately three metres thick. The aquifer system consists of at least five permeable, saturated gravel layers, separated by less permeable layers of sediments (confining layers).

- Unconfined / semiconfined aquifers: Situated further inland (west of the coastal zone), these are shallower, unconfined gravel aquifers that are more directly connected to, and influenced by surface rainfall and river recharge.
- Specific formations: The Springston Formation aquifer is highly connected to the Waimakariri River, which provides a major source of recharge to the surrounding groundwater system.
- Burwood Gravels: These deeper gravel layers are also tapped in areas such as Kaiapoi for municipal water supply (Environment Canterbury, 2025).

The Waimakariri Water Zone is divided into five Groundwater Allocation Zones (GAZs): Eyre River, Cust, Ashley, Loburn, and Kowai, as shown in Figure 4-2. Environment Canterbury defined groundwater allocation limits for these zones in 2004 and updated one of them in 2012. Allocation limits define the maximum amount of groundwater abstraction permitted within a GAZ over the course of a year. The purpose of these limits is to allow groundwater abstraction and the associated economic and social benefits to occur, without causing significant adverse effects.

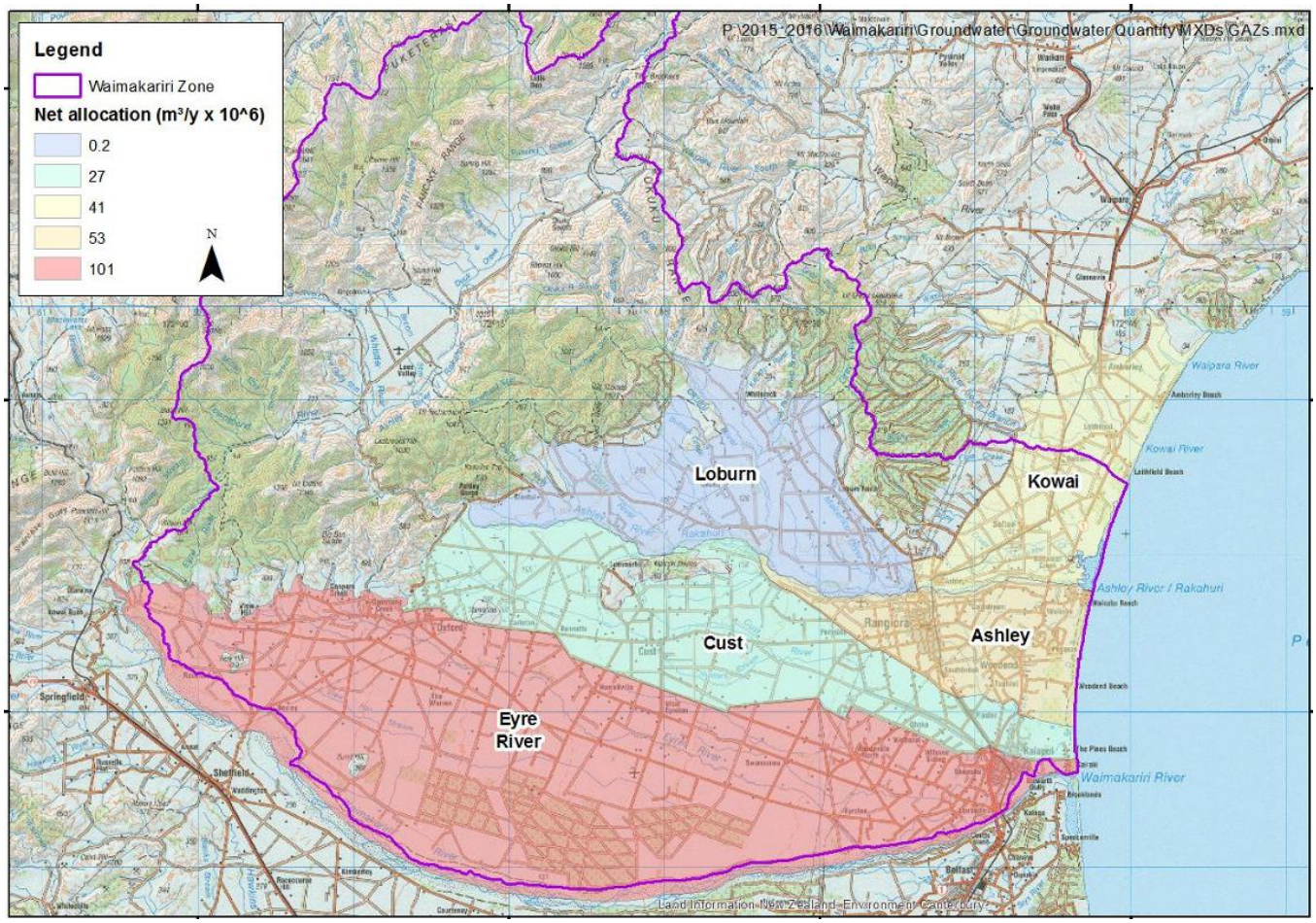

Figure 4-2: Groundwater allocation zones and allocation limits (Environment Canterbury, 2018)

4.1.2 Groundwater allocation

The groundwater allocation limits for the Eyre River, Cust, Ashley, Loburn, and Kowai GAZs allow 50% of the average year land-surface recharge to be taken (Table 4-1). Intermittent stream recharge from the Ashley River / Rakahuri was included for the Ashley GAZ. Although surface water and groundwater are thought to be highly connected across the plains (Dodson, et al., 2012), the study concluded that abstracting groundwater would ultimately affect surface water flows, and so the recommended allocation limit of 99.07 million m³/year was adopted for the Eyre River GAZ.

Determining how much water has been allocated in the Waimakariri Zone on an annual basis is not straightforward. Many of the water take consents issued before 2004 did not have an annual volume limit specified in the consent conditions. Previous estimates used several different methods, making comparisons or tracking over time difficult. As determination of sustainable water abstraction is refined, allocation limits have been reduced between 2016 and 2025 (Table 4-1). As of March 2026, groundwater allocation zones are approaching capacity with allocation levels above 90% of the revised limits for three out of five zones, including the Kowai zone which is currently over-allocated. This indicates limited capacity for new consents in most areas.

Table 4-1: Groundwater allocation by zone

Groundwater Allocation Zone	2016 allocation limit (million m^3/yr)[2]	2025 allocation limit (million m^3/yr)[3]	Currently allocated[4]	Unallocated volume (million m^3/yr)
Eyre River	99.1	99.07	95%	4.95
Cust	56.3	20.13	84%	3.22
Ashley	29.4	15.40	91%	1.39
Loburn Fan	40.8	0.12	89%	0.01
Kowai	17.4	9.36	103%	-0.28
Total	**243.0**	**144.08**		**9.29**

Assuming an annual consumption of 94.9 m³ per annum per person (based on 260 L/person/day as discussed in Section 4.3), the unallocated volume could in theory provide enough water for almost 98,000 people. However, the groundwater allocation is shared with other uses, such as irrigation for farming, so it is reasonable to assume that 20% will be available for Council water supplies. Therefore, the unallocated volume available to Council would only provide the drinking water for approximately 20,000 people (this excludes adjustments for water losses and commercial and industrial consumption). There is a risk that Environment Canterbury could continue to adjust the allocations downwards, which may result in aquifers being fully allocated and no new consents being issued.

4.2 Surface water

Drinking water supplies in Waimakariri District are sourced almost entirely from groundwater, abstracted from a network of shallow and deep aquifers. While drinking water supplies in the District rarely directly abstract surface water, surface water remains an important component of supply availability through its contribution to groundwater recharge.

Two exceptions to the predominantly groundwater-sourced supplies were identified. The Glentui Private Community Water Supply is surface water-fed and is sourced from an unnamed stream in the Glentui Valley, while the Ashley Rural Water Supply relies on wells that are hydraulically connected to the Ashley River.

Across the plains of the Waimakariri Water Zone east of the foothills, interactions between surface water and groundwater are complex and spatially variable due to the presence of highly permeable alluvial gravels. Rivers and streams typically lose flow as they leave the hill catchments onto the plains; these losses then contribute to recharge of the groundwater aquifer system. Groundwater then resurfaces further towards the coast, maintaining stream flow in lowland and spring-fed streams. In some systems, the presence and extent of dry reaches reflect a combination of upstream inflows and reduced groundwater levels, particularly in areas around Rangiora (Environment Canterbury, 2016b).

[2] The current state of groundwater quantity in the Waimakariri Zone (2016) (Environment Canterbury, 2018)
[3] Canterbury Land and Water Regional Plan (Environment Canterbury, 2025)
[4] According to a snapshot of the State of the Environment and groundwater allocation data from 6/03/2026 which may be subject to change

Long-term flow analysis for the Waimakariri Groundwater Zone (1972–2016) indicates changes in surface water flows that may influence groundwater-dependent drinking water supplies. Since the commissioning of the Waimakariri Irrigation Limited (WIL) supply in 2000, baseflows in some lowland spring-fed streams have increased due to higher groundwater recharge from irrigation, water race losses, and the discharge of excess irrigation water to streams. These flows now form part of the current baseline flow regime in these areas, creating a reliance on the continued operation and effectiveness of the WIL supply.

In contrast, baseflows in the Ashley River / Rakahuri, measured upstream of abstractions at the Ashley River Gorge recorder, show a declining trend associated with reduced catchment rainfall. This river system is considered sensitive to climatic variability, which may increase the likelihood of reduced flows and associated source water quantity risk (Environment Canterbury, 2017).

The Glentui Private Community Water Supply is particularly vulnerable to surface water availability, as flows in the source stream are rainfall-dependent (Glentui Private Community Water Supply Scheme Incorporated, 2019). Extended dry periods may therefore pose a risk to the reliability of this supply.

4.3 Water demand

Drinking water demand has been estimated using an average daily demand of 319 L/person/day, or 260 L/person/day when system leakage is excluded (Waimakariri District Council, 2025). Urban values were used as they represent 94% of the population. The results of these calculations are shown in Table 4-2.

Table 4-2: Water demand estimations based on current and future population projections

Community	2023 population	Estimated demand including leakage (m^3/day)	Estimated demand excluding leakage (m^3/day)	Percentage growth	Predicted 2048 population	Predicted 2048 demand including leakage (m^3/day)	Predicted 2048 demand excluding leakage (m^3/day)
Okuku	762	243	198	27%	970	309	252
Ashley Gorge	1,311	418	341	9%	1,430	456	372
Oxford	2,235	713	581	19%	2,670	852	694
Starvation Hill-Cust	2,397	765	623	21%	2,900	925	754
Loburn	2,352	750	612	16%	2,740	874	712
Eyrewell	1,947	621	506	28%	2,500	798	650
West Eyreton	1,530	488	398	5%	1,600	510	416
Ashley-Sefton	2,439	778	634	23%	3,010	960	783
Fernside	1,374	438	357	170%	3,710	1,183	965
Waikuku	624	199	162	132%	6,610	2,109	1,719
Waikuku Beach	1,071	342	278				
Ravenswood	1,152	367	300				
Mandeville	1,878	599	488	34%	4,760	1,518	1,238
Ohoka	1,671	533	434				
Swannanoa-Eyreton	990	316	257	25%	1,240	396	322
Tuahiwi	969	309	252	16%	1,120	357	291
Woodend	3,390	1,081	881	29%	4,370	1,394	1,136
Pegasus	3,915	1,249	1,018	25%	4,910	1,566	1,277
Clarkville	1,377	439	358	18%	1,630	520	424
Pegasus Bay	990	316	257	37%	1,360	434	354
Rangiora	18,855	6,015	4,902	24%	23,340	7,445	6,068
Kaiapoi	13,017	4,152	3,384	19%	15,480	4,938	4,025
Waimakariri District	**66,250**	**21,134**	**17,225**	**30%**	**86,400**	**27,562**	**22,464**

The predicted population increase of the district is over 20,000 people which results in an increase in water demand of just over 5,200 m³/day (excluding allowances for losses and commercial and industrial growth). This increase in daily demand equates to approximately 2.0 million m³/year. This increase is well within the combined unallocated annual abstraction limits for the district.

The communities with the greatest relative population increases will likely increase demand on Council supplies rather than on private or self-supplying water supplies. The community with the greatest predicted percentage increase in population is Fernside. The most densely populated area in Fernside (large lot residential) is Council-supplied, although it is a large community with rural areas that self-supply. Most of Fernside is currently zoned Rural Lifestyle Zone. Development in Fernside will most likely require a plan change as growth in Rangiora spreads westward. It is therefore reasonable to assume that the majority of growth areas will be connected to Council supply.

Waikuku (made up of the communities Waikuku, Waikuku Beach, and Ravenswood) is also predicted to have a percentage increase in population. Waikuku Beach and Ravenswood are both densely populated and almost fully Council supplied. The Waikuku community differs by being mostly self-supplied with some private supplies. WDC plans to connect up the Waikuku village area when growth occurs in the Gressons Road Outline Development Plan area to the north of Ravenswood.

Rangiora has the largest total population increase of 4,485 people. Therefore, it has the largest estimated increase in water demand from 6,015 to 7,445 m^3/day.

Mandeville and Ohoka are grouped in the 2048 projections. Mandeville is more densely populated and fully Council supplied. Ohoka has larger property sizes and is partly self-supplied. Moderate growth is predicted for these communities, and the growth is assumed to be split evenly across the two areas.

Communities with the smallest predicted population increases are West Eyreton and Ashley Gorge. These are more rural and lower density. West Eyreton is mostly self-supplied, while Ashley Gorge is almost entirely Council supplied.

Many communities like Eyrewell, Swannanoa-Eyreton, Clarkville, and Okuku are predominantly self-supplied and are projected to grow (18-28%). The greatest growth may be within Council-supplied areas, but these higher risk self-supplied areas in the district should also be a focus for future planning.

As has been mentioned in Section 4.1.2., if Environment Canterbury continues to revise the groundwater allocations downward, obtaining new consents for groundwater abstraction may become an issue. Currently Council has and continues to develop back-up wells for improved resilience, thus there is some redundant capacity. There is also scope for water conservation and demand management to reduce losses and defer the need for new abstraction consents to meet demand related to growth in some of Council's supply areas. WDC may want to consider if further investigation into water resources is required.

5. Water quality

5.1 Groundwater quality

The current state of groundwater quality in the Waimakariri CWMS zone report (Environment Canterbury, 2016a) provides a 2016 baseline assessment of groundwater quality across the district, including the Cust, Eyre River, Ashley, Coastal Wetland zones, and the Loburn and Kowai subzones. The report identified initial concerns around elevated nitrate-nitrogen levels in the Eyre River, Cust, Loburn and Kowai subzones.

The Ashley River subzone is recharged from the river, which has very low conductivity and nutrient concentrations, making the groundwater in this area some of the highest quality in the Waimakariri zone. In contrast, groundwater quality in the downlands of the Kowai subzone is generally lower than in other areas due to limited recharge through loess soils, thinner, lower permeability aquifers which contribute to higher groundwater conductivity and high concentrations of naturally occurring dissolved iron, manganese, and arsenic above MAV in some wells.

Reducing groundwater conditions are found in parts of the Coastal Wetland subzone, where low dissolved oxygen is associated with elevated iron and manganese, and very low nitrate-N concentrations. Arsenic is also naturally present at levels above the MAV in some wells in this area.

Groundwater quality is variable in the Cust subzone. Some wells show elevated iron and manganese concentrations typically associated with reducing conditions, and nitrate-N concentrations in groundwater are some of the highest in the District with occasional exceedances of the MAV. In the Eyre River subzone groundwater quality is generally better with lower concentrations of arsenic and manganese, and lower nitrate-N concentrations than in the Cust subzone. Shallow wells near the river tended to have lower concentrations of nitrate-N (likely due to dilution), but some wells between the rivers have higher concentrations and the two long-term monitoring wells in the subzone show increasing trends over several years. Iron and manganese exceeded the AV in some wells and the MAV for manganese in one well.

Environment Canterbury's annual groundwater quality survey sampled a mix of 36 private and public wells in the Waimakariri CWMS zone (Environment Canterbury, 2024). It found only two samples that were above the MAV for *E. coli* among a suite of five critical determinands. There were several samples that were outside the AV range for pH (9 locations), manganese (4), and iron (5). No wells exceeded the aesthetic values for chloride, sodium, or sulphate. No arsenic levels above the MAV were detected. While no wells exceeded the MAV for nitrate-N concentrations, nine wells exceeded half of the MAV, with results between 5.66 mg/L and 11.3 mg/L. Some of the wells tested across the district showed an increasing trend in nitrate-N concentrations over the last 10 years.

Additionally, results from the WDC 2024 private well study (Waimakariri District Council, 2024) compared four areas with the MAV for nitrate-N (red line) or half of the MAV (red dashed line) as shown in Figure 5-1. The study found one well (located in Cust) which exceeded the MAV, and 50% of the wells in Eyreton, 67% in Cust, 34% in Carleton, and 11% in Swannanoa were found to exceed half of the MAV.

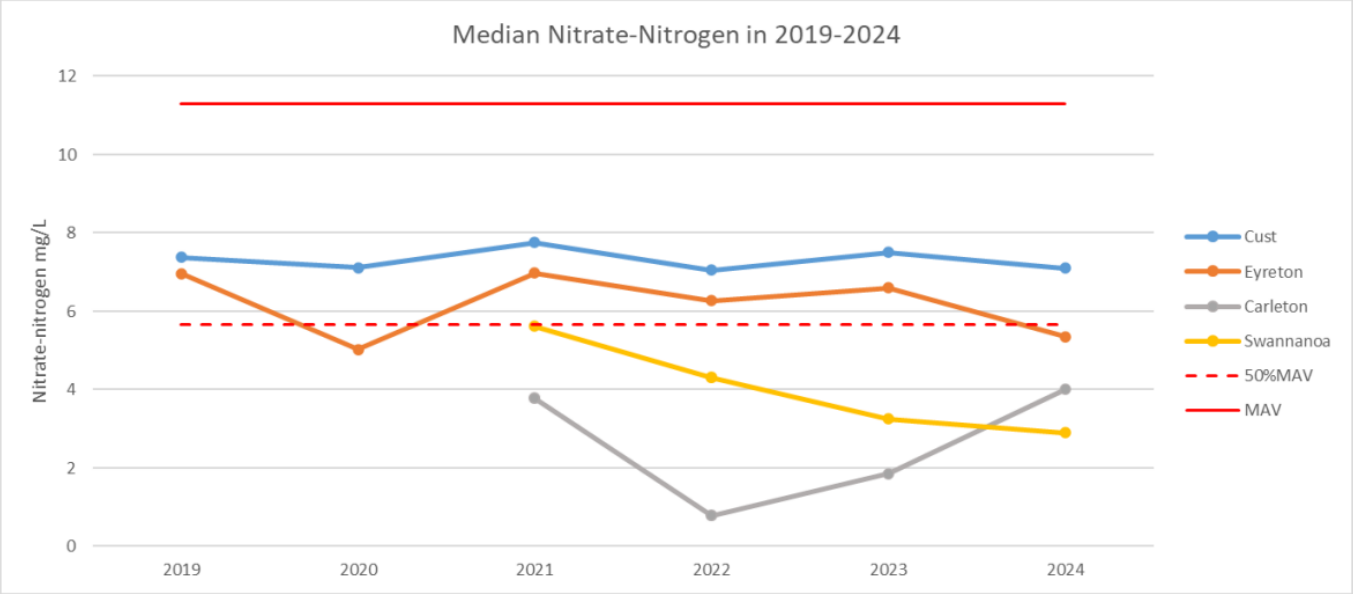

Figure 5-1: Median nitrate-nitrogen measured in the WDC private well study (Waimakariri District Council, 2024)

The nitrogen leaching susceptibility, shown in Figure 5-2, classifies soils based on soil type, the capacity of the soil to store water, and the potential for denitrification which is associated with anaerobic conditions (Manaaki Whenua – Landcare Research, 2025). Some communities with a large area of high or very high nitrogen leaching susceptibility include Pegasus Bay, Pegasus, Waikuku Beach, and Okuku. Communities with some areas high or very high susceptibility include Eyrewell, Swannanoa-Eyreton, Kaiapoi, Waikuku, and Starvation Hill-Cust.

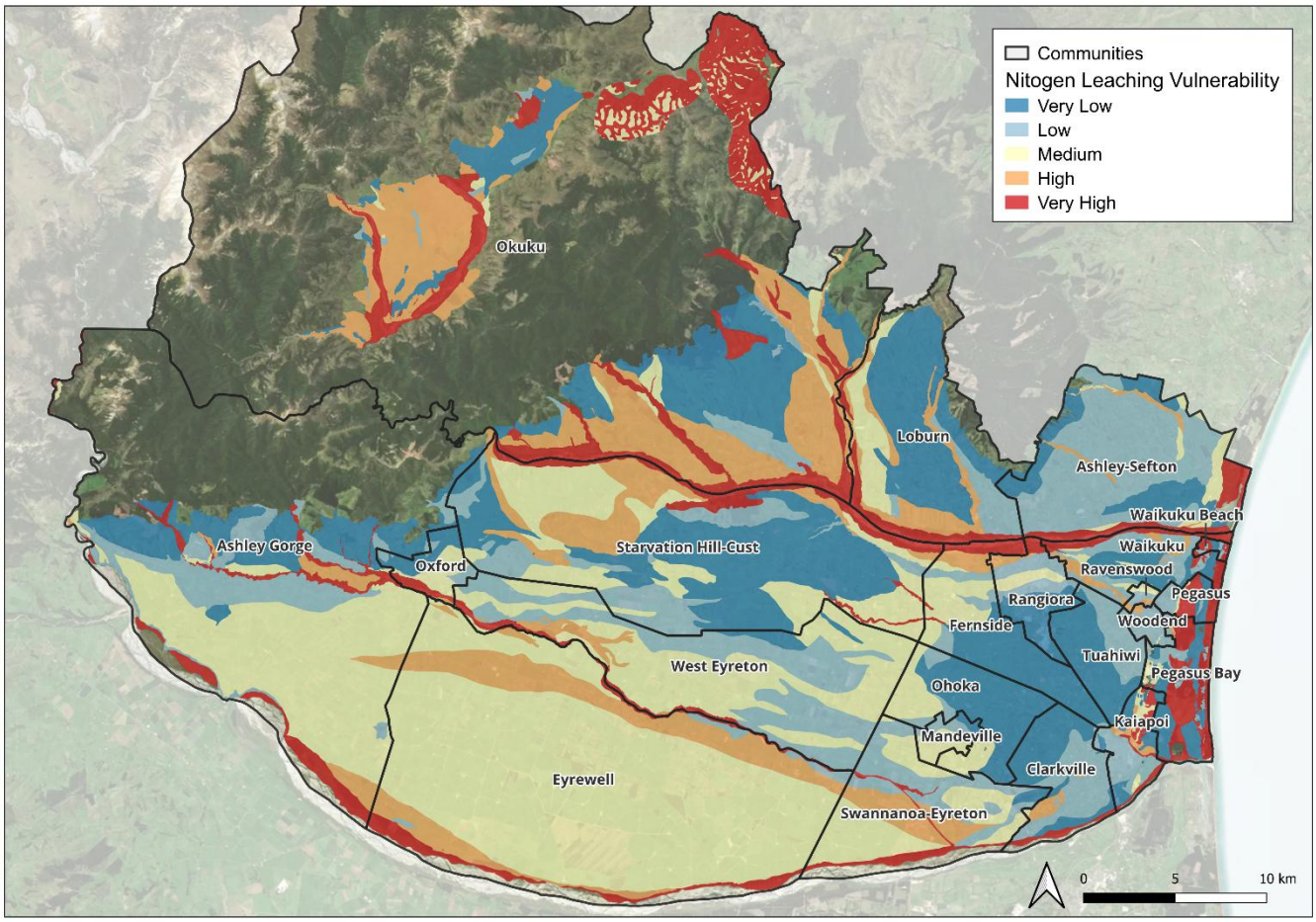

Figure 5-2: Nitrogen leaching susceptibility in the Waimakariri District

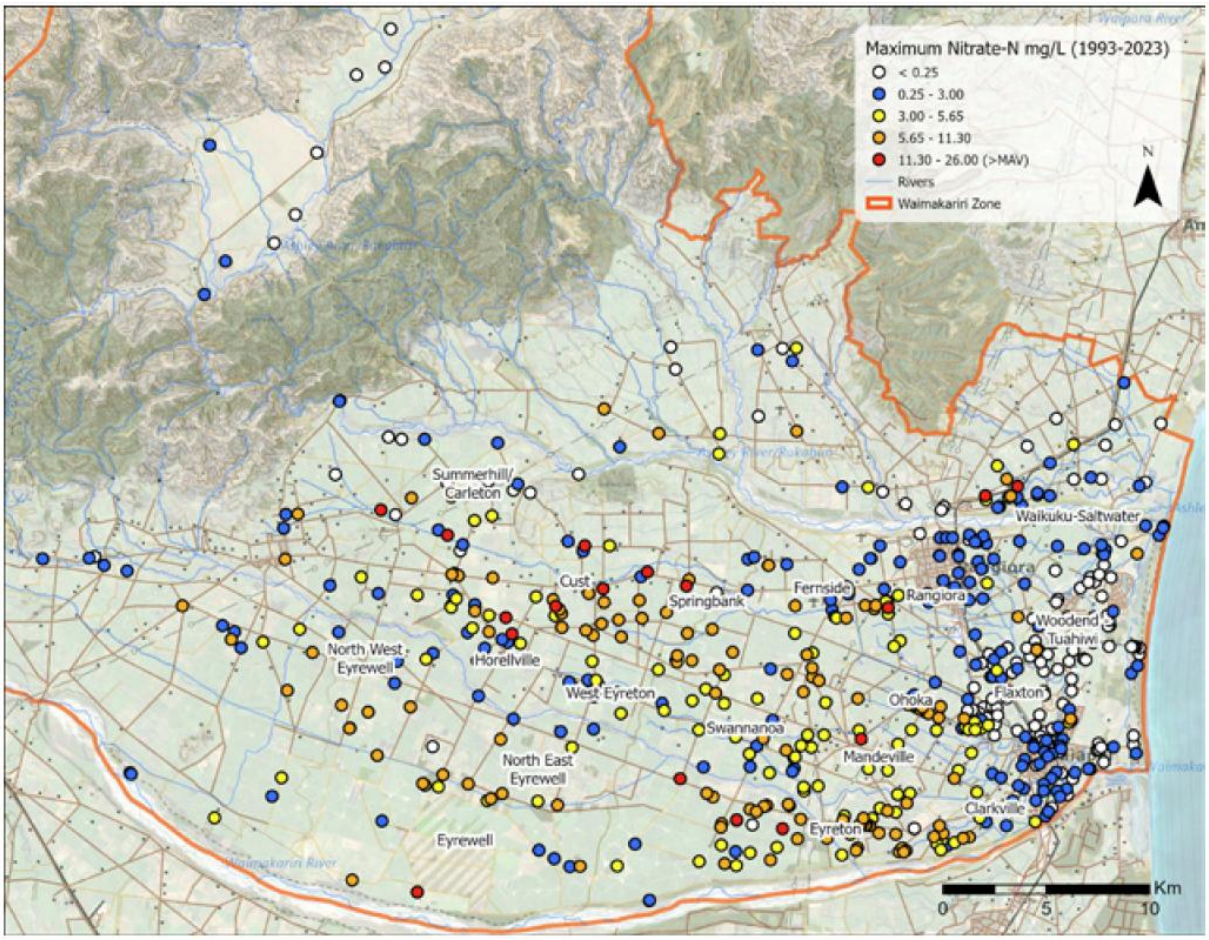

Figure 5-3: Maximum nitrate-nitrogen results for wells sampled between 1993-2023 in the Waimakariri District (Waimakariri District Council, 2025). Data source: Environment Canterbury

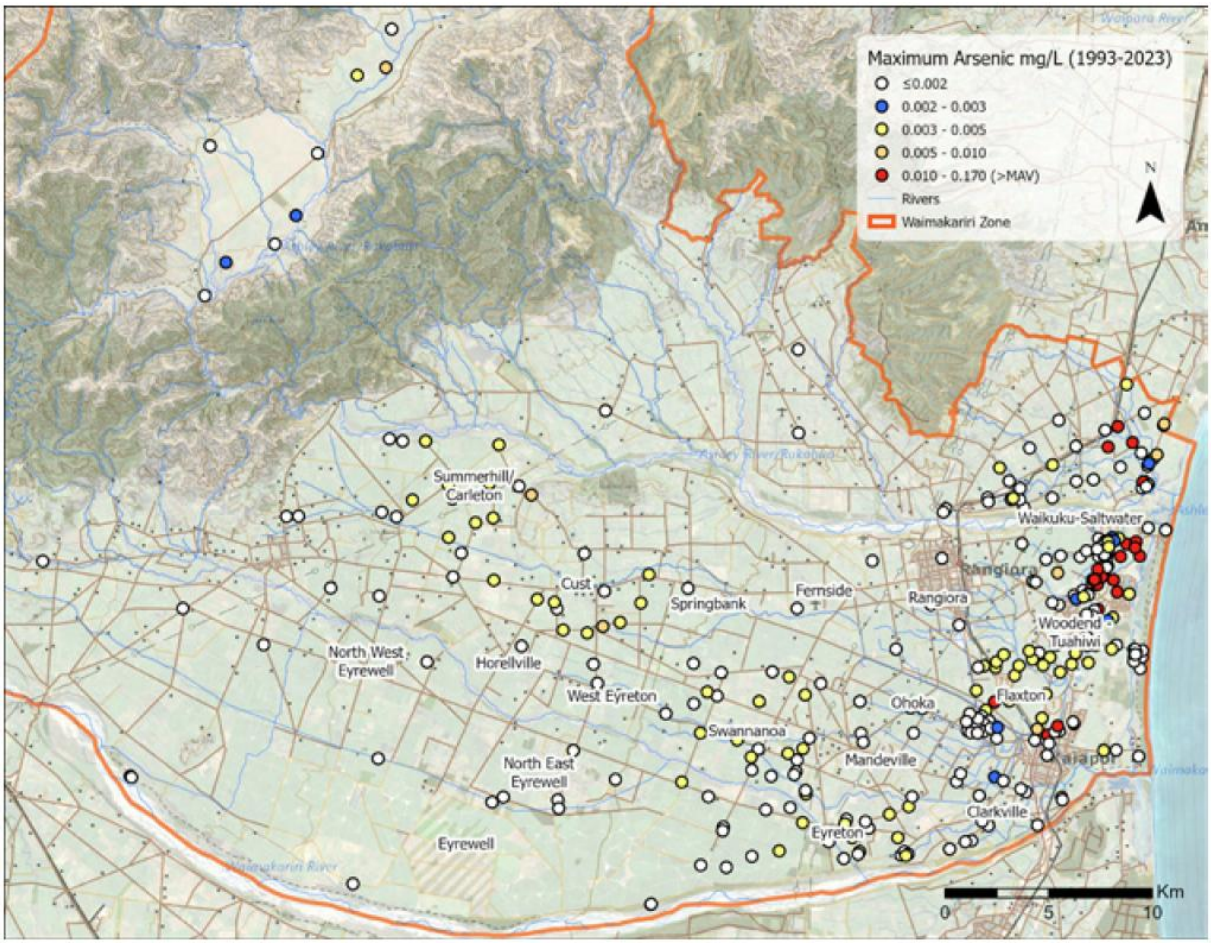

Figure 5-4: Maximum arsenic results for wells sampled between 1993-2023 in the Waimakariri District (Waimakariri District Council, 2025). Data source: Environment Canterbury

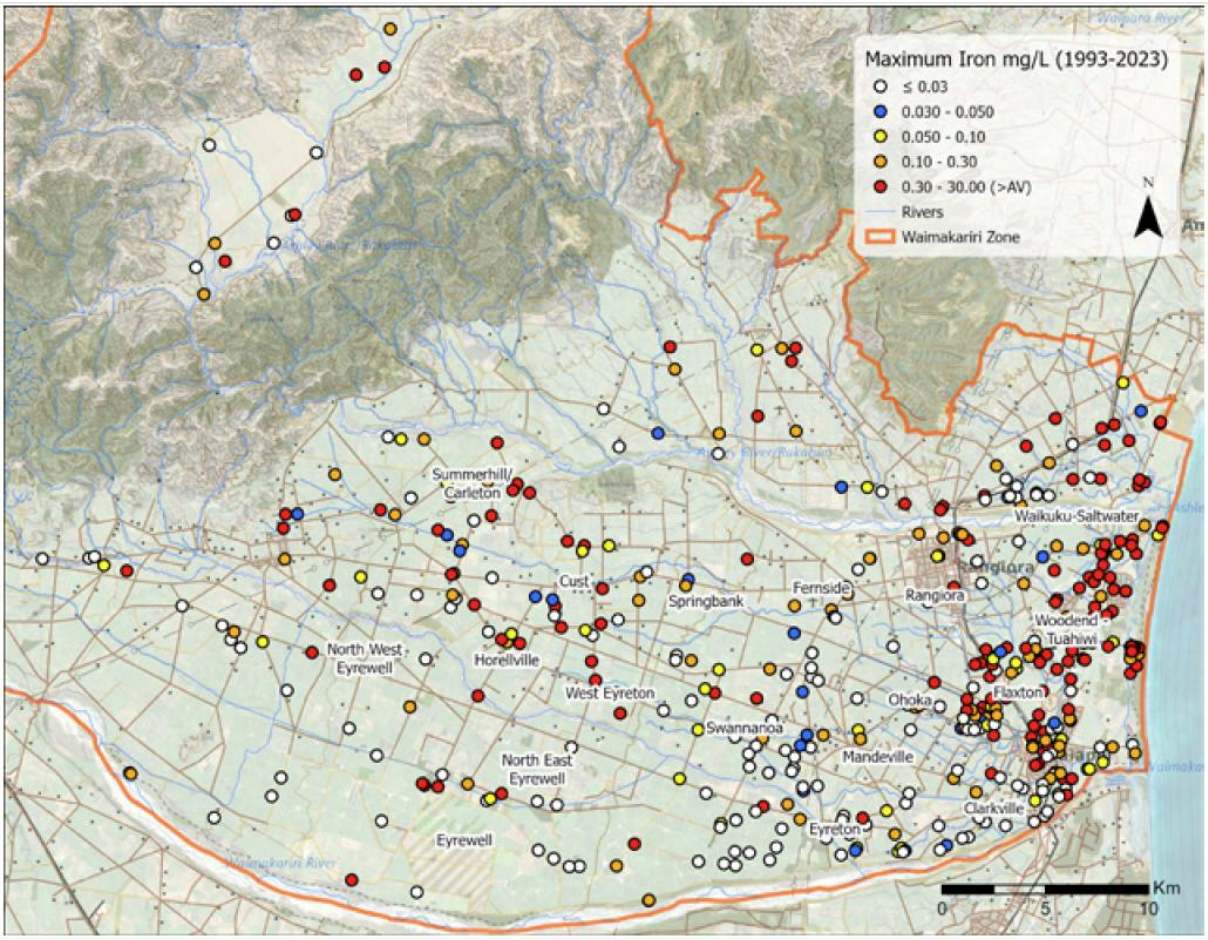

Figure 5-5: Maximum iron results for wells sampled between 1993-2023 in the Waimakariri District (Waimakariri District Council, 2025). Data source: Environment Canterbury

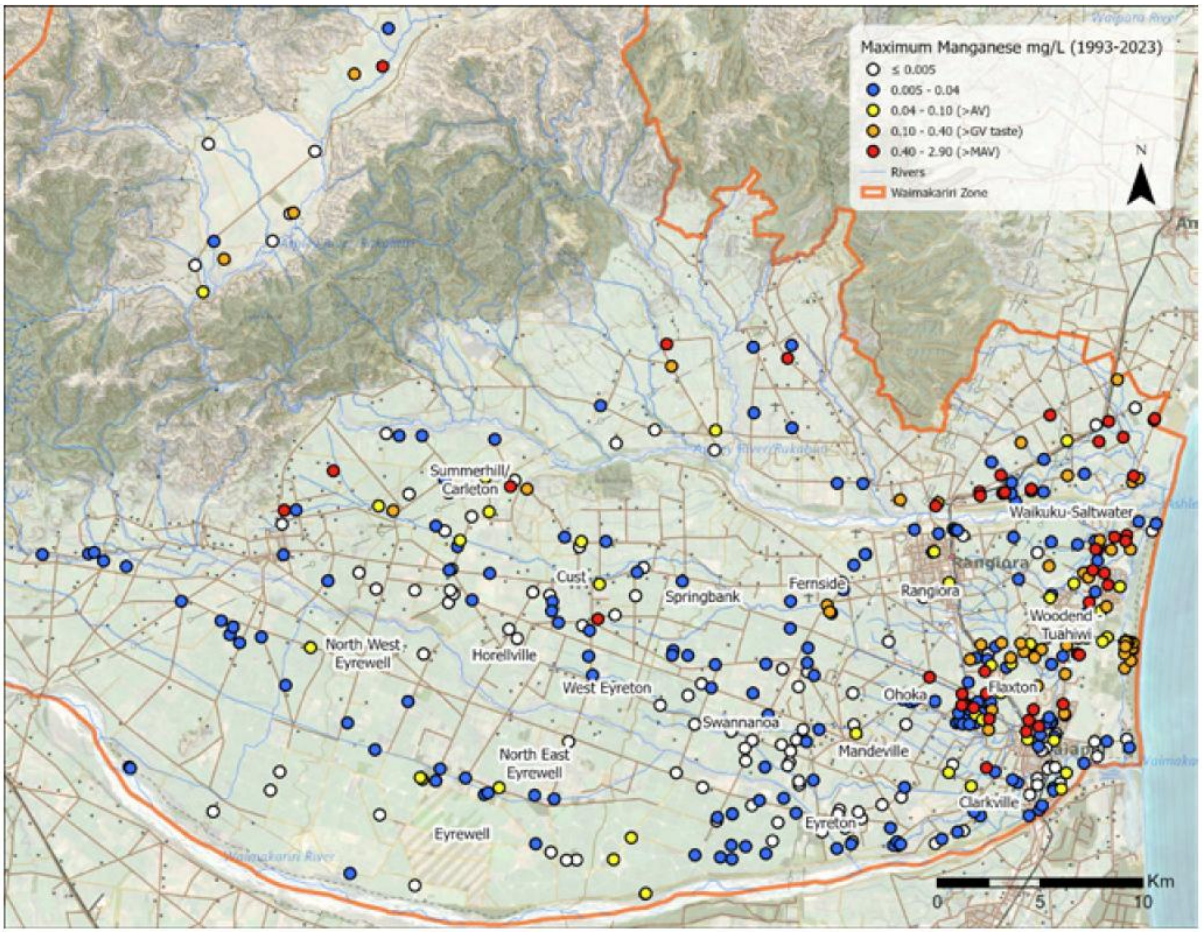

Figure 5-6: Maximum manganese results for wells sampled between 1993-2023 in the Waimakariri District (Waimakariri District Council, 2025). Data source: Environment Canterbury

Drinking water protection zones have been established around community supply wells to minimise the risk of contamination to drinking water supplies (Figure 5-7). These zones identify areas most sensitive to contamination, with their size and extent representing the underlying vulnerability of the aquifer and groundwater flow pathways. Land-use activities within these areas are more tightly controlled to protect water quality.

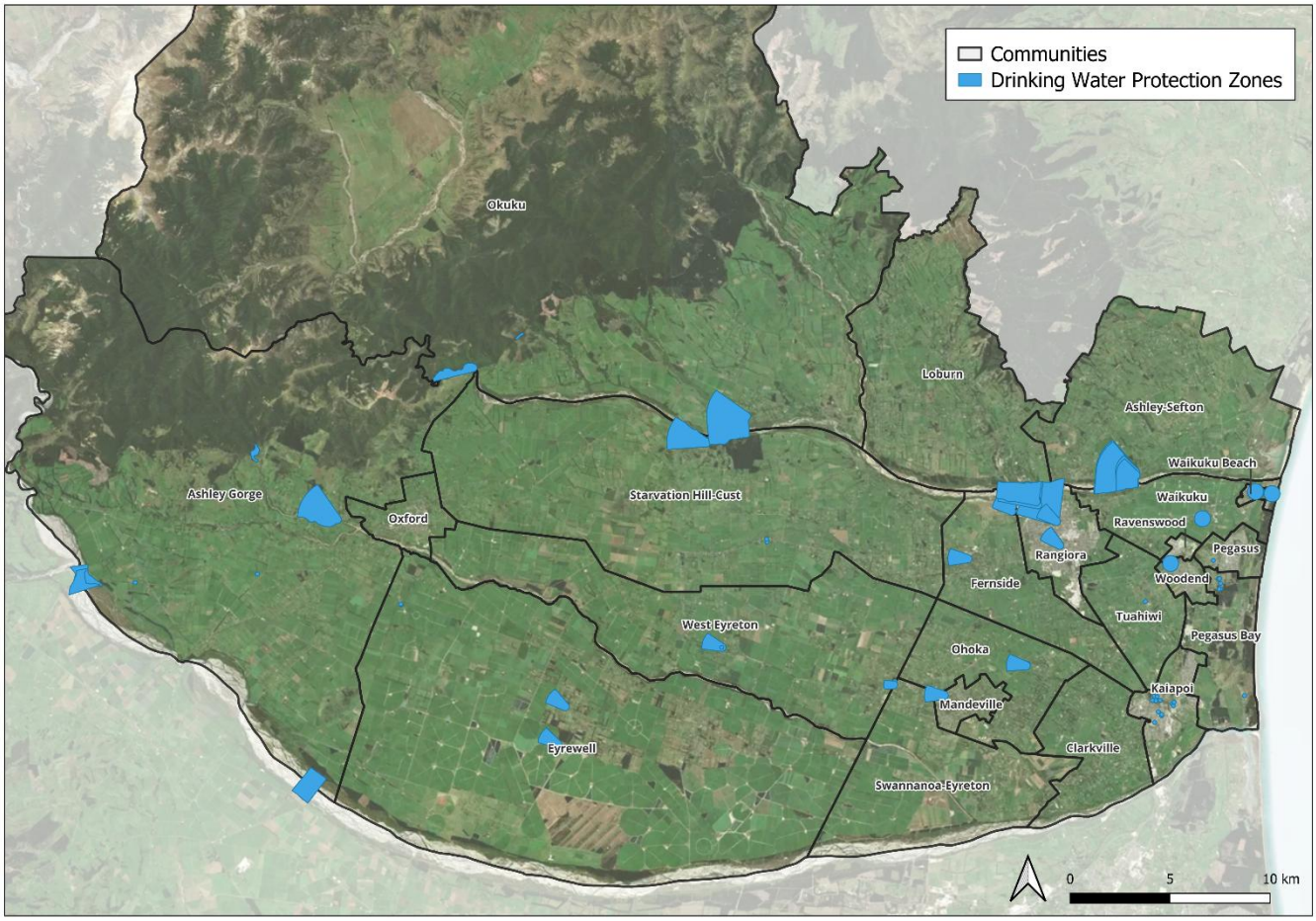

Figure 5-7: Drinking water protection zones (Environment Canterbury, last updated in 2021)

5.2 Surface water quality

Surface water quality in the Waimakariri District varies significantly between the upper reaches of the Ashley / Rakahuri and Waimakariri rivers and the lower-lying spring-fed streams and drains across the coastal and plains areas, where water quality is more heavily influenced by intensive land use and urban runoff. In the foothills where private and self-supplied surface water sources are more common due to limited groundwater availability and reticulated supply, regional monitoring generally indicates low nutrient and bacterial concentrations. However, these headwater areas can experience elevated sediment concentrations during rainfall events due to erosion and runoff, which may affect water clarity and treatability. During summer months, the upper catchments can also be affected by cyanobacterial growth, particularly under warm, low-flow conditions, which may affect drinking water supplies abstracted directly from surface water.

In contrast, lowland streams generally show persistently elevated nutrients, sediment, and microbial indicators due to intensive land use and urban runoff, which impact ecosystem health and recreational

use. Surface water in the Waimakariri is closely connected to groundwater systems that provide drinking water supplies across the district, meaning degraded surface water quality can increase risks to drinking water through groundwater recharge, particularly where shallow aquifers or river-recharged supplies are used.

5.3 Treatment of drinking water supplies

5.3.1 Council supplies

WDC is working to meet its drinking water treatment obligations under the Water Services Act 2021. Following the transfer of regulation to Taumata Arowai and the introduction of higher drinking water standards in November 2021, all WDC water supplies are now chlorinated and have UV disinfection installed. Compliance results for each treatment plant and distribution zone for the period 1 July 2024 to 30 June 2025 are summarised in Table 5-1. WDC installed UV disinfection at Rangiora and West Eyreton in the latter half of 2025. Where full compliance was not achieved, this was primarily due to operational factors such as data outages, commissioning of new UV systems, or limitations in chlorine contact time.

Table 5-1: WDC compliance with the Drinking Water Quality Assurance Rules 1 July 2024 – 30 June 2025 (Waimakariri District Council, 2025)

Community	Water Supply	Bacterial Compliance	Protozoal Compliance	Distribution Zone Compliance	Key Reasons for Not Meeting Full Compliance	Improvements and expected performance for 2025-26
Starvation Hill-Cust	Cust	Almost met 99.5%	Almost met 99.5%	All met (100%)	Data outages	100 % compliance
Okuku	Garrymere	All met 100%	All met 100%	All met (100%)	-	100 % compliance
Kaiapoi	Kaiapoi	Darnley–Partially met 93.8%	Darnley–Partially met 41.9% (100% since commissioning)	All met (100%)	Data outages, UV only operational from Feb 2025	UV installation complete 100 % compliance
		Peraki–Partially met 92.6%	Peraki–Partially met 59.7% (99.1% since commissioning)		Data outages and UV only operational from Jan 2025	UV installation complete 100 % compliance
Mandeville and Ohoka	Mandeville	Almost met 99.7%	Almost met 99.7%	All met (100%)	Data outages	100 % compliance
Ohoka and Clarkville	Ohoka	Almost met 98.7%	All met (100%)	All met (100%)	Insufficiently sized reservoir to meet Chlorine contact time for part of the period and data outages	UV installation complete 100 % compliance
Ashley Gorge and Eyrewell	Oxford Rural 1	All met (100%)	All met (100%)	All met (100%)	-	100 % compliance
Ashley Gorge and Starvation Hill-Cust	Oxford Urban and Rural 2	Partially met 93.9%	Partially met 66.3% (100% since commissioning)	Rural–All met 100%	No on-site reservoir to meet Chlorine contact time for part of the period. UV only operational from November 2024	UV installation complete 100 % compliance
				Urban–All met 100%		
Woodend and Pegasus and Tuahiwi	Woodend–Pegasus	All met (100%)	All met (100%)	Woodend–All met 100%	-	100 % compliance
				Pegasus–All met 100%		
Rangiora	Rangiora	Almost met 98.8%	None met 0%	All met 100%	Insufficiently sized reservoir to meet Chlorine contact time for part of the period. Data outages and UV not yet operational during this period.	UV installation complete 100 % compliance
Waikuku Beach	Waikuku Beach	Waikuku Beach–All Met 100%	Waikuku Beach–All Met 100%	All met 100%	-	100 % compliance
		Campground–All met 100%	Campground–All met 100%			

Community	Water Supply	Bacterial Compliance	Protozoal Compliance	Distribution Zone Compliance	Key Reasons for Not Meeting Full Compliance	Improvements and expected performance for 2025-26
West Eyreton	West Eyreton	Partially met 90.2%	None met 0%	Poyntzs–All met 100%	Insufficiently sized reservoir to meet Chlorine contact time for the entire period. Data outages and UV not yet operational during this period.	UV installation complete 100 % compliance

General note: ongoing improvements to the control systems have largely resolved all known data outage issues.

5.3.2 Private supplies

Information was provided by Taumata Arowai to support this assessment about the district's publicly registered drinking water supplies (including notifications of unsafe water, advisories, compliance monitoring, and water quality results) and the known information about other community supplies that are not registered. This information is limited as the requirement for pre-existing supplies to register has been extended to 15 November 2028.

Publicly available data from Taumata Arowai is shown in Table A1 and A2 in Appendix A. From the non-Council water suppliers, there are three publicly registered supplies (all groundwater sourced including two networked supplies and one self-supplied building). There are two supplies with registration that has lapsed. There is no spatial data or addresses provided for these supplies, so these were not all able to be mapped.

According to data provided by Taumata Arowai, two of the registered service providers have both a protozoa barrier and bacterial treatment. None of the registered private service providers in the district have residual disinfection. There is currently no readily available data on the treatment status of unregistered private water supplies.

The Glentui Private Community Water Supply has a drinking water safety plan from 2019, now noted as lapsed from Taumata Arowai. The plan will have to be updated and lodged with Taumata Arowai which will confirm whether the upgrades that were planned for 2020 are now operational. As of 2019, the supply would draw up to 150,000 L/day from a small stream sourced by spring inflows in the Glentui Valley (exact location unknown). It is gravity fed, supplies domestic residences, farms, lifestyle blocks, and a large recreation and conference centre (Glentui Meadows) with a reticulated network owned and managed by the community. The storage capacity is only 1-2 days, and there are plans for more disinfected storage (target of up to 4 days). There is high turbidity and microbiological contamination in the raw water. There were upgrades in 2019 to improve treatment (installed but pre-commissioning upon the report submission). Other planned improvements include UV, cartridge filters, catchment protection, water storage of up to 4 days, and a monitoring system. When the supply registers and provides an updated drinking water safety plan, there will be more up to date information about the risks and treatment.

There are five networked supplies that are registered with Taumata Arowai but are not verified and have no acceptable solution status or drinking water safety plan. There is no confirmed treatment plant for any of these five supplies. This information is not published on the Taumata Arowai website, but there will be more information about them to Taumata Arowai and to the public as they register.

From the list of notifications of unregistered private supplies that exceeded a chemical or bacterial parameter provided by Taumata Arowai, none that listed sufficient information to link to a location in the Waimakariri District. This information could provide useful insight to understand where parameters were exceeded if coordinates or addresses were captured.

Woodend Beach Holiday Park is a site with known source water quality concerns. Testing found elevated manganese (0.178 – 0.185 mg/L where the AV is 0.1 mg/L for taste and 0.04 mg/L for staining) and iron (0.35 mg/L which exceeds AV of 0.3 mg/L). This can cause issues with discolouration, staining laundry, and a metallic or poor taste. Iron and manganese in the groundwater may be an issue that is common to the surrounding properties that are self-supplied. Due to the difficulty and expense

associated with treating these parameters, this may be an area to investigate connecting to a Council supply.

5.3.3 Self-supplied

Most self-supplied drinking water (less than 25 people) supplies in the Waimakariri District will be using groundwater abstracted from either private or shared wells. Groundwater is generally preferred in the district due to the widespread availability and reliability of groundwater compared to surface water or roof water. Evidence from the Hawke's Bay Private Drinking Water Supplies project (O'Brien, et al., 2022) indicates that most private well supplies have little or no treatment, despite groundwater being vulnerable to both microbial and chemical contamination depending on well depth, construction, and local hydrogeological conditions. Where treatment is present, it is mostly limited to cartridge filtration and, less frequently, ultraviolet disinfection.

Self-supplied roof water supplies are much less common, due to the dry climate. They are more likely to be used in the foothills and more rural parts of the Waimakariri District, where access to groundwater is limited or not practical and annual rainfall is higher. These supplies typically serve individual dwellings and rely on rainfall captured from the roof and stored in on-site tanks. As with self-supplied well water, roof water supplies are often untreated, with many systems lacking filtration or disinfection. As a result, water quality is highly dependent on roof condition and tank maintenance with no barriers in place to manage microbial contamination from birds and vermin on the roof.

Treatment of non-Council supplies in the Waimakariri District could be approximated using the Hawke's Bay case study (O'Brien, et al., 2022) as there is a similar reliance on groundwater. Assuming a similar proportion of treatment (only 33% of supplies were treated) for the Waimakariri population on non-Council supplies (9,100 people), approximately 6,100 people in Waimakariri would not have access to treated drinking water.

5.4 Public health risks

Information was requested from the National Public Health Service (Te Whatu Ora) regarding any notifiable public health cases linked to drinking water supplies in the Waimakariri District. They advised that illness data cannot be provided at a level of detail that identifies specific water supplies. Additionally, it is difficult to confirm a direct link between illness and a specific water supply and is often identified only as a probable source.

The notifiable public health cases from the National Public Health Service, Te Whatu Ora, from 2023-2026 were:

- No cases of notified enteric disease confirmed to be linked to a WDC water supply (confirmation is typically very difficult to achieve)
- 2 separate Yersiniosis cases with a private supply as the "probable" source
- 1 Salmonellosis case with a private supply as the "probable" source
- 3 person family with campylobacter where a private supply was identified as the "probable" source following contamination after a rainfall event

- A handful of other cases in which water has not been identified as a probable source, but the affected individuals were known to have self-supplied drinking water at home
- No public supplies in the District were identified as confirmed or probable sources of notified enteric diseases in this time period

This data indicates that efforts to reduce public health risks should prioritise private or self-supplied drinking water sources rather than Council supplies. This could include public messaging on the testing, treatment and protection of private or self-supplied drinking water, particularly in rural areas. This is consistent with a wider pattern observed throughout New Zealand.

To help manage this risk, Council has published a booklet on Managing a Private Bore Supply (refer https://www.waimakariri.govt.nz/services/3-waters/water-supply/private-bore-water-supplies).

6. Consequences of loss of supply

Groundwater is the source for the vast majority of drinking water supplies in the Waimakariri District. In the Hawke's Bay Private Drinking Water Supplies project, 42% of participants did not have an alternative water supply that they could connect to if they lost access to their water supply (O'Brien, et al., 2022). Addressing this may include investment to improve the safety and security of the water supply, or to extend the Council's water supply where possible, or to provide an additional water supply. Lack of alternative supplies reduces resilience and may leave households without access to safe and sufficient drinking water, requiring external support or investment to restore supply security.

If a community loses access to a drinking water supply, a potential temporary alternative would be supplying tankered water. Measures such as water restrictions could be put in place if there are early indications of aquifer depletion (although groundwater availability seems sufficient throughout the district). Water treatment systems could be implemented to target elevated chemical parameters. Identifying any early indications of issues and reacting to these signs could minimise the need for WDC to provide alternate sources of drinking water.

With relatively plentiful groundwater in the district and no reports of water supplies at risk of ceasing to supply (as far as WDC is aware), the available groundwater source appears sufficient for the current and future drinking water demands. A more detailed investigation could be useful into the exact bores relating to Council supplies and the impact on water draw compared to consent limits if one or more bores are out of service. This was outside the scope of this assessment but would allow WDC to understand the resiliency of each supply and which supplies are already taking close to the maximum.

If nitrate levels in drinking water increased above the MAV and where there are no alternate sources of low nitrate water immediately available to households, private or self-supplies may need to add treatment of drinking water or convert to or augment with roof water. Under bench treatment with ion exchange and reverse osmosis are effective for removing nitrate from drinking water, although costly. Larger supplies, such as council supplies, may explore surface water sources, a different depth or aquifer source, or blend multiple water sources to remain within limits. Reducing nitrate contamination through improved farming practices is an objective of Environment Canterbury as set out in the Land and Water Regional Plan (Environment Canterbury, 2025).

Drinking water networks are vulnerable to catastrophic events such as earthquakes, floods, and extended power outages, which could disrupt supply, damage treatment plants, and compromise water quality. Shallow groundwater is particularly susceptible to contamination following flood events. To improve resilience, WDC has increased the redundancy of supply, providing back up power supply for critical infrastructure and considering storage capacity to help to minimise impacts to drinking water supplies after an event. The priorities for supply, critical users and communication channels are set out in the WDC drinking water safety plans and emergency response plan.

7. Conclusions and recommendations

Groundwater resources in the Waimakariri District are generally sufficient to meet current and future demand, with no reported loss of supply. However, potential future reductions in groundwater allocation limits by Environment Canterbury may make it more challenging to obtain consents for additional wells. Further investigation of individual water takes, well supplies, and resource consents would be useful for improving understanding of supply resilience.

Maintaining high drinking water quality should be prioritised to ensure public health. Council managed supplies continue to demonstrate improving treatment performance (Table 5-1). However, there is currently a significant knowledge gap regarding the number, location, and treatment standards of private supplies. As registration with Taumata Arowai progresses there will be more information available, providing a better understanding of drinking water across the district. It is also important that WDC is kept informed of any poor water quality results, loss of supply, and any other relevant information or risks, so this information can be communicated to affected communities.

While this high-level district assessment indicates the groundwater quality is generally good, there is still potential for key contaminants including nitrate, *E. coli*, arsenic, iron and manganese to be elevated at individual property level – particularly for communities and households reliant on self-supplied sources. The WDC Private Well Study (2019–2024) showed a significant proportion of wells that exceeded half of the MAV for nitrate, particularly in areas such as Cust and Eyreton, indicating elevated concentrations and potential increasing trends. Iron and manganese levels exceed AVs in the coastal part of the district as measured at Woodend Beach Holiday Park, indicating the need for further investigation of groundwater quality in the surrounding area.

Private supplies or self-supplied water is common throughout the district and represents a large (around 13%) but poorly understood component of drinking water services. There is currently limited information available about the location of wells, their purpose (whether it is for drinking), and the level of treatment provided. This creates challenges for risk management and communication, particularly where there are concerns about water quality. Self-supplied buildings often also have limited storage and redundancy, increasing vulnerability to supply disruptions (such as during droughts), contamination, or periods of high demand.

Improving understanding of self-supplied buildings is recommended, including gathering more information about their distribution, condition and risks. Community engagement can be more effective than a desktop assessment to understand the current water supply risks, vulnerabilities, and issues (O'Brien, et al., 2022).

Feedback from Health NZ – Te Whatu Ora indicates that private or self-supplies are likely more vulnerable to poor or inadequate drinking water supply, so a recommended key area of focus is targeted public messaging around testing, treatment and protection of private self-supplies, particularly in rural areas. Existing resources, such as WDC's Managing a Private Water Supply Well Booklet (Waimakariri District Council, 2025) or Secure Groundwater Bores and Wells for Safe Household Water (Te Whatu

Ora, 2019) provide good information for self-suppliers on how to decrease the risk of contamination and recommended treatment processes.

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Appendix A

Drinking Water Supply Information from Taumata Arowai

Table A1: Public information about registered Council water supplies (Taumata Arowai, 2025)

Supply ID	Supply Name	Supply Type	Community	Registration Status	Acceptable Solution	Source Type	Supply Owner and Operator	Population	# of bores
CUS001	Cust	Networked supply	Cust	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	335	1
GAR001	Garrymere	Networked supply	Garrymere	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	105	1
KAI003	Kaiapoi	Networked supply	Kaiapoi	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	14,285	7
MAN009	Mandeville	Networked supply	Mandeville	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	2,473	2
OHO001	Ohoka	Networked supply	Ohoka	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	350	1
OXF101	Oxford Rural 1	Networked supply	Oxford Rural 1	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	1,093	2
OXF103	Oxford Urban - Rural 2	Networked supply	Oxford Urban, Oxford Rural 2	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	3,128	2
RAN001	Rangiora	Networked supply	Rangiora	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	19,615	6
WAI011	Waikuku Beach	Networked supply	Waikuku Beach	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	1,200	3
WES004	West Eyreton	Networked supply	Summerhill, West Eyreton, Poyntz Road, West Eyreton	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	1,010	2
PEG001	Woodend-Pegasus	Networked supply	Pegasus, Woodend	Registered	No	Groundwater (Well or Bore)	Waimakariri District Council	10,780	6

Supply ID	Supply Name	Supply Type	Community	Registration Status	Acceptable Solution	Source Type	Supply Owner and Operator	Population	# of bores
ASH002	Ashley Rural	Networked supply	Ashley/Sefton/ Loburn.	Registered	No	Groundwater (Well or Bore)	Hurunui District Council	4,390	1

Table A2: Public information about registered non-Council water supplies (Taumata Arowai, 2025)

Supply ID	Supply Name	Supply Type	Community	Registration Status	Acceptable Solution	Source Type	Supply Owner and Operator	Population	# of bores
CLA003	Clarkville Te Kura ki Waimātao	Self-supplied building	Clarkville Te Kura ki Waimātao	Registered	Yes	Groundwater (Well or Bore)	Clarkville Te Kura ki Waimātao		1
WC00206	Clemence Drilling Contractors	Water carrier service		Lapsed	No		Clemence Drilling Contractors		
GLE017	Glentui Private Community Water Supply Scheme Incorporated	Networked supply	Glentui Water	Lapsed	No	River, Stream, Creek	Glentui Private Community Water Supply Scheme Incorporated	72	N/A
RAN017	Rangiora Eco Holiday Park	Networked supply	Rangiora Eco Holiday Park	Registered	No	Groundwater (Well or Bore)	Mission Downs Trust	100	1
WAI213	Waikuku Village Subdivision	Networked supply	Waikuku Village Subdivision	Registered	Yes	Groundwater (Well or Bore)	Waikuku Village Limited	39	1

Appendix B

Waimakariri Water Supply Maps

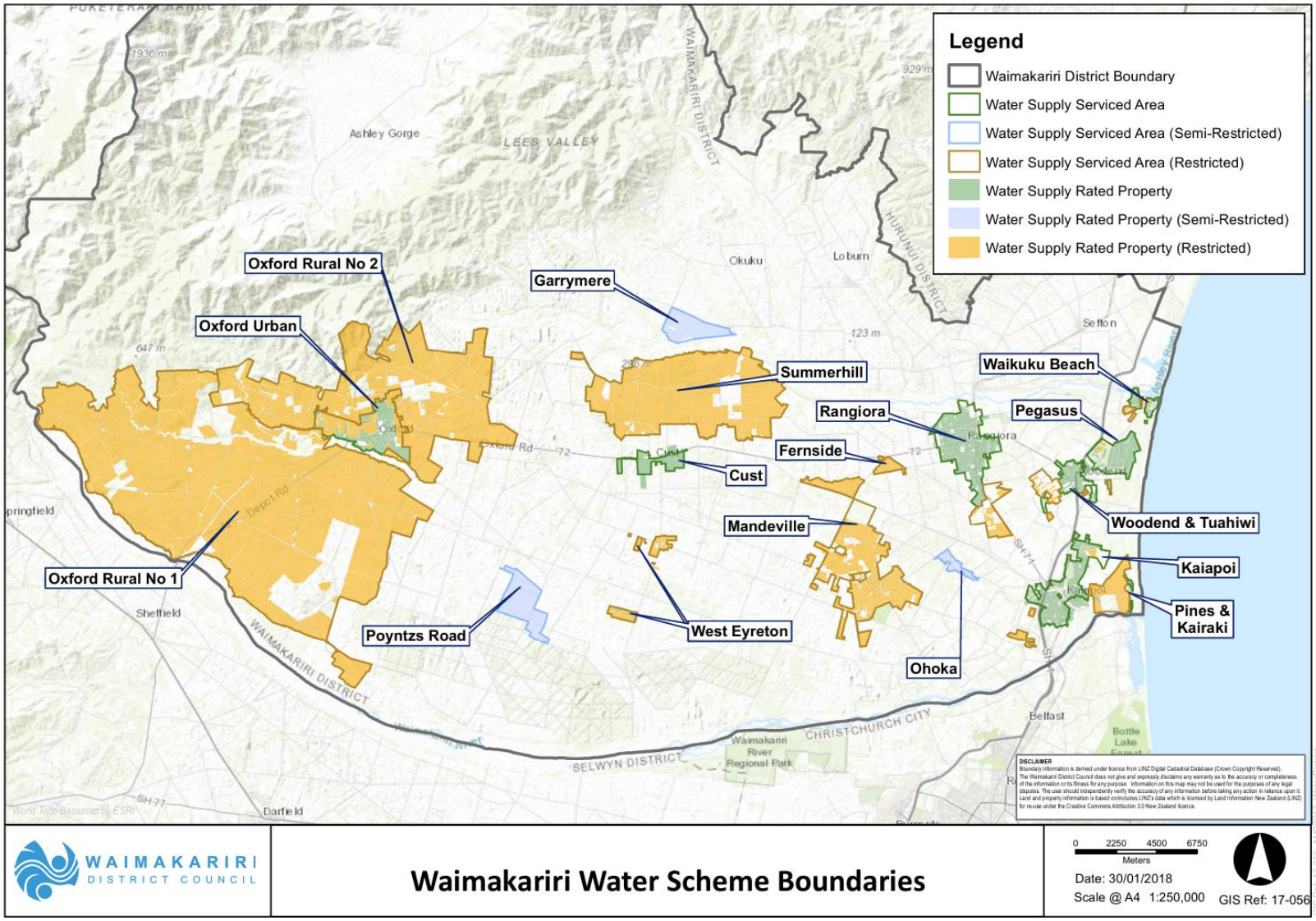

Figure B1: WDC water supply boundaries and serviced areas (Waimakariri District Council, 2019)

Appendix C

Growth Areas in the Waimakariri District

Figure C1: Greenfield Priority Areas and the infrastructure supported boundary (Waimakariri District Council, 2018)

Figure C2: Waimakariri 2048 development snapshot (Waimakariri District Council, 2018)

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