

# 2023/24 Groundwater quality monitoring



# Contents

- [2023/24 Groundwater quality monitoring](#)
  - [Contents](#)
- [Disclaimer](#)
- [Programme overview](#)
  - [Monitoring network](#)
- [Methods](#)
  - [Analytical methods](#)
  - [Groundwater connectivity](#)
  - [Sampling notes](#)
- [Results](#)
  - [Groundwater nitrate-nitrogen](#)
  - [Detection of \*E. coli\* bacteria](#)
  - [Saline intrusion](#)
  - [Dissolved reactive phosphorus](#)
  - [Dissolved metals](#)
  - [Major ion chemistry](#)
- [Resources](#)
  - [Access to monitoring data](#)
  - [Useful links](#)
  - [References](#)
- [Appendix](#)
  - [Monitoring details](#)
  - [Data tables](#)
  - [Groundwater nitrate-nitrogen concentrations](#)
  - [Detection of \*E. coli\* bacteria](#)
  - [Saline intrusion](#)
  - [Groundwater dissolved reactive phosphorus concentrations](#)
  - [Groundwater dissolved metal concentrations](#)
  - [Groundwater chemistry: major ion concentrations](#)

## Disclaimer

This report has been prepared by Knowledge and Insights staff of Greater Wellington (GW) and as such does not constitute Council policy.

In preparing this report, the authors have used the best currently available data and have exercised all reasonable skill and care in presenting and interpreting these data. Nevertheless, GW does not accept any liability, whether direct, indirect, or consequential, arising out of the provision of the data and associated information within this report. Furthermore, as GW endeavours to continuously improve data quality, amendments to data included in, or used in the preparation of, this report may occur without notice at any time.

GW requests that if excerpts or inferences are drawn from this report for further use, due care should be taken to ensure the appropriate context is preserved and is accurately reflected and referenced in subsequent written or verbal communications. Any use of the data and information enclosed in this report, for example, by inclusion in a subsequent report or media release, should be accompanied by an acknowledgement of the source.

For the latest available results go to the [Greater Wellington environmental data hub](#).

This report may be cited as: GW 2024. 2023/24 Groundwater quality monitoring report. Greater Wellington.

## Programme overview

Groundwater in the Wellington region is used extensively for drinking water, stock supply, irrigation and industry. Groundwater also provides baseflow to rivers, streams and wetlands, or forms natural springs or seeps where it discharges at the ground's surface. The protection of these surface water ecosystems requires careful management of the quality and quantity of the underlying groundwater.

To assist with the sustainable management of groundwater resources in the Wellington region, Greater Wellington conducts regular monitoring of groundwater quality at 83 sites across the region, shown on the map below. Key indicators of groundwater contamination (typically arising from land use intensification and/or on-site wastewater disposal systems), along with general chemistry results, are presented in this report:

- [Nitrate-nitrogen](#) - a key indicator of groundwater contamination typically arising from land use intensification and/or on-site wastewater disposal systems. Nitrate in groundwater can affect its quality for drinking-water supply. The Drinking Water Standards for New Zealand (DWSNZ) sets a Maximum Acceptable Value (MAV) for nitrate at 50 mg/L (equivalent to nitrate-nitrogen of 11.3 mg/L), based on a risk to bottle-fed babies ([Water Services \(Drinking Water Standards for New Zealand\) Regulations 2022](#)).
- [E. coli bacteria](#) - a key indicator of groundwater contamination by microorganisms, some of which can cause diseases. Faecal bacteria from livestock, onsite wastewater discharges, stormwater and other sources can contaminate groundwater. Any detection of 1 cfu/100 ml exceeds the [DWSNZ](#).
- [Saline intrusion](#) - a key indicator for seawater contamination in coastal wells. The difference in conductivity between seawater and fresh groundwater is very marked, making it a useful indicator.
- [Dissolved reactive phosphorus](#) - Dissolved reactive phosphorus is a nutrient that can affect surface water quality.
- [Dissolved metals](#) - Dissolved metals can affect the quality of groundwater for drinking-water supply and can be indicators of groundwater contamination by anthropogenic activities.
- [Chemistry](#) - Major ion chemistry can provide information about the recharge sources of the groundwater, residence time in the aquifer and groundwater flow patterns.

## Monitoring network

Groundwater quality monitoring wells are spread across the region, with the total number of wells in each of the five Whaitua (main river) catchments listed below:

- Ruamāhanga - 49 (10 of which are not included in this report due to 3-yearly sampling).
- Kāpiti Coast - 13.
- Te Whanganui-a-Tara (Wellington and Hutt Valley) - 15.
- Wairarapa Coast - 1.
- Te Awarua-o-Porirua - 0.

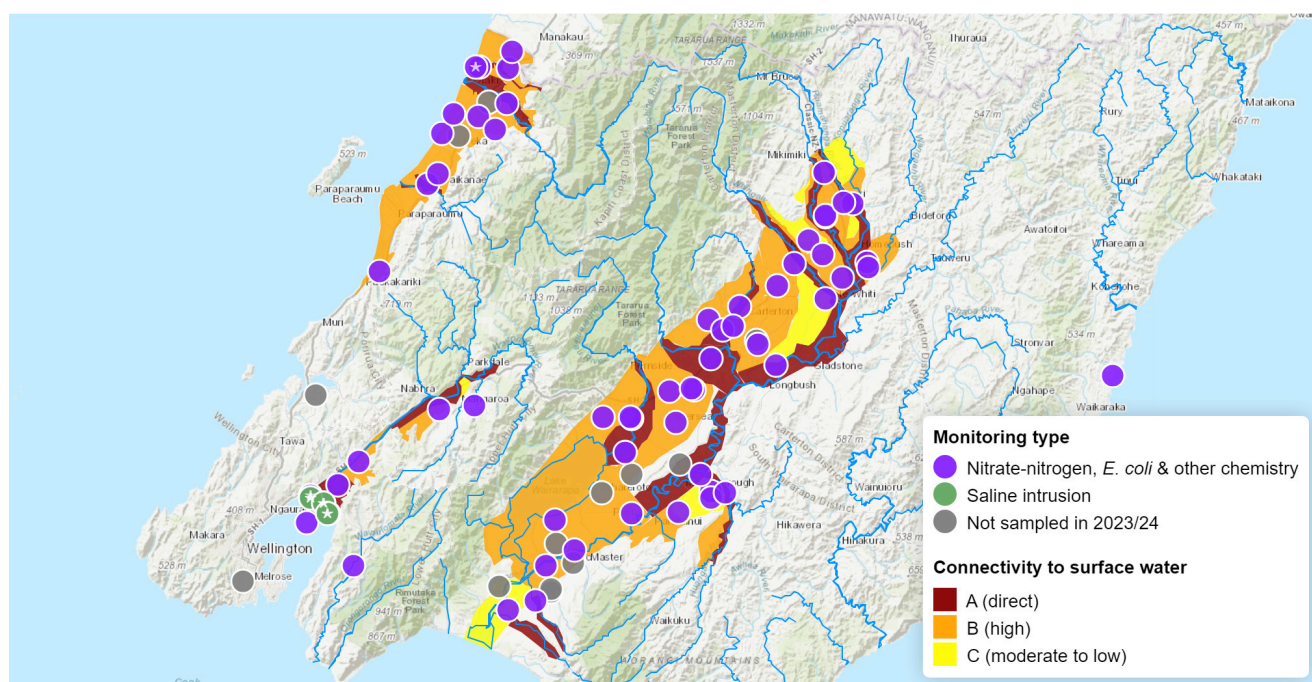


Figure 1: Locations of groundwater quality monitoring sites. See the [methods](#) section for more information on the monitoring network and each “Connectivity to surface water” category. *Note: circles marked with a star (★) have two bores in the same location at different depths.*

More information on each site including bore depth and monitoring frequency can be found in the [Appendix Monitoring details](#) table.

## Monitoring data

Full monitoring data is downloadable in the [Resources](#) section and additional information for each nitrate-nitrogen, *E. coli* and dissolved reactive phosphorus site is available at [Land and Water Aotearoa \(LAWA\)](#). The video at this link explains LAWA groundwater information further: <https://www.youtube.com/embed/dlg6s6tUAiA>.

# Methods

## Analytical methods

Table 1: Water quality sampling methods and detection limits.

Variable	Method	Detection limit
Nitrate + nitrite nitrogen	Total oxidised nitrogen. Automated cadmium reduction, Flow injection analyser. APHA 4500-NO3- I (Modified) Online Edition	0.001 mg/L
Nitrite nitrogen	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO3- I (modified) Online Edition	0.002 mg/L
Nitrate nitrogen	Calculation: (Nitrate-N + Nitrite-N) - Nitrite-N	0.001 mg/L
E. coli	Membrane filtration, Count on CCA agar, Incubated at 44.5°C for 21-24 hours APHA 9222 I (modified) Online Edition	1 cfu/100mL
Dissolved arsenic	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.001 mg/L
Dissolved calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.05 mg/L
Dissolved chromium	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.0005 mg/L
Dissolved iron	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.02 mg/L
Dissolved manganese	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.0005 mg/L
Dissolved magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.02 mg/L
Dissolved lead	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.0001 mg/L
Dissolved reactive phosphorus	Filtered sample, Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) Online Edition	0.004 mg/L
Dissolved potassium	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.05 mg/L
Dissolved sodium	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.02 mg/L
Dissolved zinc	Filtered sample, ICP-MS, trace level. APHA 3125 B Online Edition	0.001 mg/L
Bicarbonate	Calculation: from alkalinity and pH. APHA 4500-CO2 D Online Edition	1.0 mg/L
Chloride	Filtered sample, Ion Chromatography. APHA 4110 B (modified) Online Edition	0.5 mg/L
Sulphate	Filtered sample, Ion Chromatography. APHA 4110 B (modified) Online Edition	0.5 mg/L
pH	pH meter. APHA 4500-H+ B Online Edition	0.1 pH units
Total alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. APHA 2320 B (modified for Alkalinity <20) Online Edition	1.0 mg/L as CaCO3

## Groundwater connectivity

The Greater Wellington [Natural Resources Plan](#) (Chapter 4) provides management categories for differing levels of hydraulic connectivity of groundwater to surface water (GW, 2023). See section 2.3 of [Wairarapa Valley groundwater resource investigation](#) for more detail (Hughes and Gyopari, 2011).

### Category A: Direct hydraulic connectivity

Category A includes areas of the hydrogeological system which exhibit direct connectivity with surface water. Stream flow depletion occurs shortly following the commencement of groundwater abstraction with the depletion effect increasing to a level close to the overall pumping rate and dissipating quickly once pumping stops. As a consequence, a high proportion of the overall volume of groundwater pumped effectively represents induced flow loss from local surface waterways. Due to the immediacy of impact, groundwater abstraction from Category A aquifers can be considered analogous to direct surface water abstraction and managed in terms of the environmental flow and water level regimes established for hydraulically connected surface waterbodies.

### Category B: High hydraulic connectivity

Category B includes those areas of the hydrogeological system where groundwater abstraction may potentially result in significant impacts on surface water but where pumping regulation does not always provide an effective option for mitigating direct stream depletion effects. Category B represents the transition between indirect and direct stream depletion effects where it may be appropriate to manage groundwater takes in terms of either surface water or groundwater allocation depending on localised factors (e.g. local aquifer hydraulic parameters, abstraction rate and location of pumping with respect to surface waterbodies).

### Category C: Moderate to low hydraulic connectivity

Category C covers those areas of the hydrogeological system where groundwater abstraction may contribute to an overall reduction in baseflow discharge at a catchment scale but where active regulation of pumping does not provide effective mitigation of potential effects on surface water. Cumulatively, these takes are more appropriately managed at a catchment or sub-catchment scale through the establishment of volumetric abstraction limits.

## Sampling notes

During the 2023/24 monitoring period, thirteen wells had missed samples. Brief explanations are listed below:

- BP32/0103: annual sample not taken, no access to the pump
- BQ31/0047: annual sample not taken, no access to the pump
- R25/5190 : September 2023, December 2023, March 2024, June 2024 - Data removed. Samples affected by water treatment system or alternative water supply, not representative of groundwater
- R26/6587 : September 2023 - non-operational pump system
- R26/6587 : December 2023 - sample point disconnected
- R27/1265 : March 2024 - insufficient aquifer pressure
- R27/6418 : September 2023 - pumps down for maintenance
- R27/6833 : December 2023 - school closed for holidays, no access
- S25/5125 : June 2024 - pump removed, no longer in use
- S25/5256 : September 2023, December 2023, March 2024, June 2024 - non-operational pump system, no power, site to be discontinued
- S25/5322 : March 2024, June 2024 - no access
- T26/0087 : June 2024 - non-operational pump system
- T26/0430 : December 2023, March 2024 - spring dry
- T26/0489 : June 2024 - no access

Two additional out-of-schedule samples were taken from well T27/0063 for a research study.

Saline intrusion monitoring - some data has been removed due to sensor faults and other maintenance:

- R27/7215: Jul 26 2023 15:15 to Jul 28 2023 11:45
- R27/7215: Jan 16 2024 00:15 to Jan 24 2024 08:45
- R27/7215: Oct 25 2023 08:45 to Oct 27 2023 13:00
- R27/7154: Jul 25 2023 13:15 to Jul 28 2023 11:45
- R27/7154: Dec 30 2023 23:00 to Jan 23 2024 09:30
- BQ32/0611: Nov 2 2023 12:15 to Dec 6 2023 13:15

Previous changes to Groundwater Quality State of the Environment (GQSoE) network and monitoring frequency:

- R27/7153: Conductivity sensor disconnected from service. Monitoring continued in new well BQ32/0611 in 2022/23.
- BQ32/0611, BQ32/0612 and BQ32/0613 added to the saline intrusion monitoring network in 2022/23.



- S27/0156 has been officially removed from the GQSoE network and replaced by BP33/0056 in 2021/22.
- BP33/0056, BP33/0057, BP34/0229 and BP34/0236 were added to the network in 2021/22.
- BN32/0062, BN32/0063, and BN33/0032 were added to the GQSoE network in 2020/21.
- BQ31/0041 and BP32/0102 were added to the GQSoE network in 2019/20.
- The following ten wells have been reduced to annual sampling as they are in confined aquifers and have not shown seasonal variation or significant trends over an extended period: R25/5100, S25/5200, R25/5135, S26/0568, S27/0495, S27/0435, S27/0442, S27/0607, S27/0588 and S27/0594.
- An additional ten wells have been reduced to three-yearly sampling as; they are in confined aquifers, have not shown seasonal variation, long term monitoring indicates that water quality at these bores is similar to annual/quarterly sites, and age dating suggests groundwater at these bores have mean residence times greater than 100 years: S27/0585, S27/0615, BQ33/0032, S27/0602, S27/0268, S27/0283, S27/0344, S26/0576, S27/0433 and S26/0705.
- The following bores have been officially removed from the GQSoE network due to loss of access: Removed 2018/19 - R25/5164, S26/0756, S27/0846 and S27/0614. S26/0824 was decommissioned and replaced with BP34/0216 in December 2019.

# Results

Each results section presents maps of monitoring results benchmarked against groundwater quality guidelines where applicable. Full tabulated data for each guideline are available in the [Appendix data tables](#) section.

## Groundwater nitrate-nitrogen

Nitrate-nitrogen is a key indicator of groundwater contamination typically arising from land use intensification and/or on-site wastewater disposal systems. Nitrate-nitrogen in groundwater can affect its quality for drinking-water supply. See the [LAWA nitrate factsheet](#) for more information.

### Human health

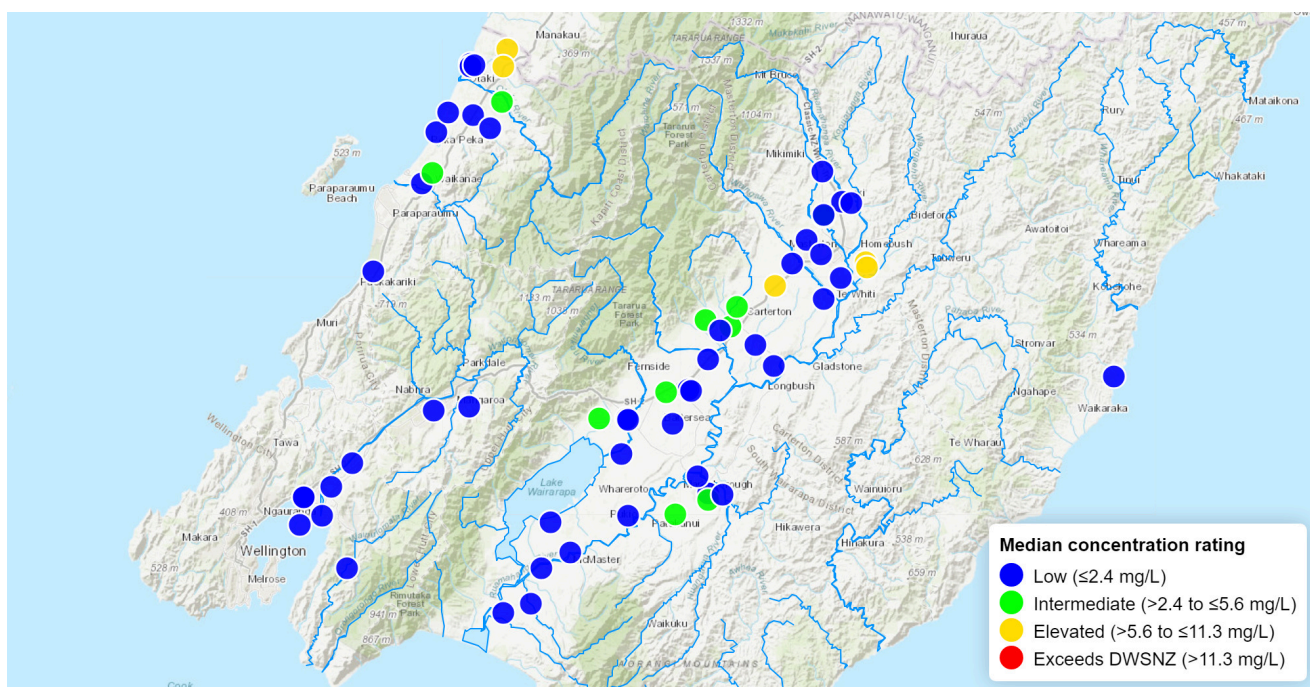


Figure 2: Groundwater nitrate-nitrogen concentrations are evaluated in terms of likely human influence, as excess concentrations can have negative health effects. Sites with annual median concentrations above the [Drinking Water Standards for New Zealand](#) Maximum Acceptable Value (MAV) of 11.3 mg/L nitrate-nitrogen are flagged as ‘Exceeds DWSNZ’, and concentrations above half of this MAV are highlighted as ‘Elevated’.

Table 2: Summary of nitrate-nitrogen concentration ratings.

Concentration rating	No. Sites
Low ( $\leq 2.4$ mg/L)	47
Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	10
Elevated ( $> 5.6$ to $\leq 11.3$ mg/L)	5
Exceeds DWSNZ ( $> 11.3$ mg/L)	0
Total sites	62

## Ecosystem health

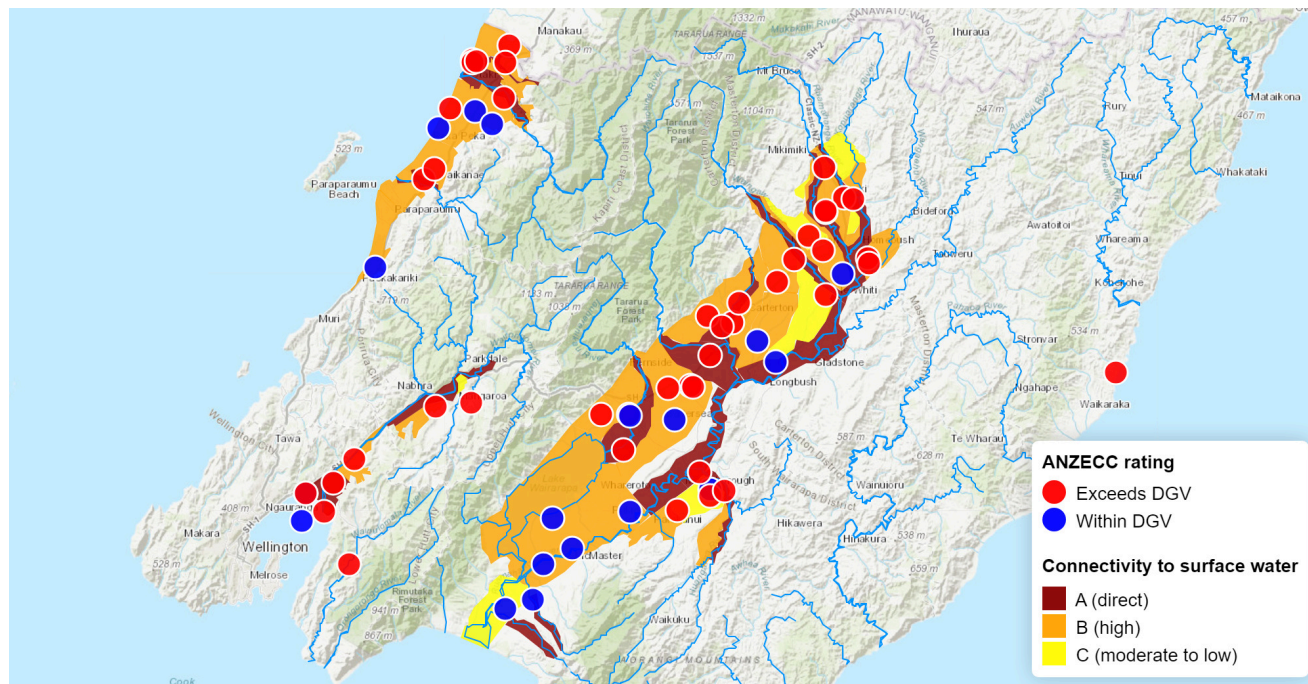


Figure 3: Groundwater discharges from aquifers into a number of surface water bodies throughout the region and there is the potential that groundwater high in nitrate-nitrogen could contribute to the decline of surface water quality. The [2000 Australia New Zealand Guidelines for Fresh and Marine Water Quality](#) (ANZECC) define default guideline values (DGVs) for the 80th percentile of nitrate-nitrogen based on second-level [River Environment Classification](#) (REC) class reference conditions. Annual median groundwater nitrate-nitrogen concentrations are evaluated against these DGVs. Shallow groundwater within Connectivity Category A (direct) poses a greater risk from groundwater nitrate-nitrogen to ecosystem health in the surface water system than groundwater within other Connectivity categories. See [groundwater connectivity](#) for more information on surface water connectivity categories.

Table 3: Summary of nitrate-nitrogen ANZECC ratings.

Connectivity	ANZECC rating	No. Sites
A (direct)	Exceeds DGV	11
	Within DGV	2
B/C + unknown	Exceeds DGV	33
	Within DGV	16
Total sites	Exceeds DGV	44
	Within DGV	18

## Aquatic toxicity

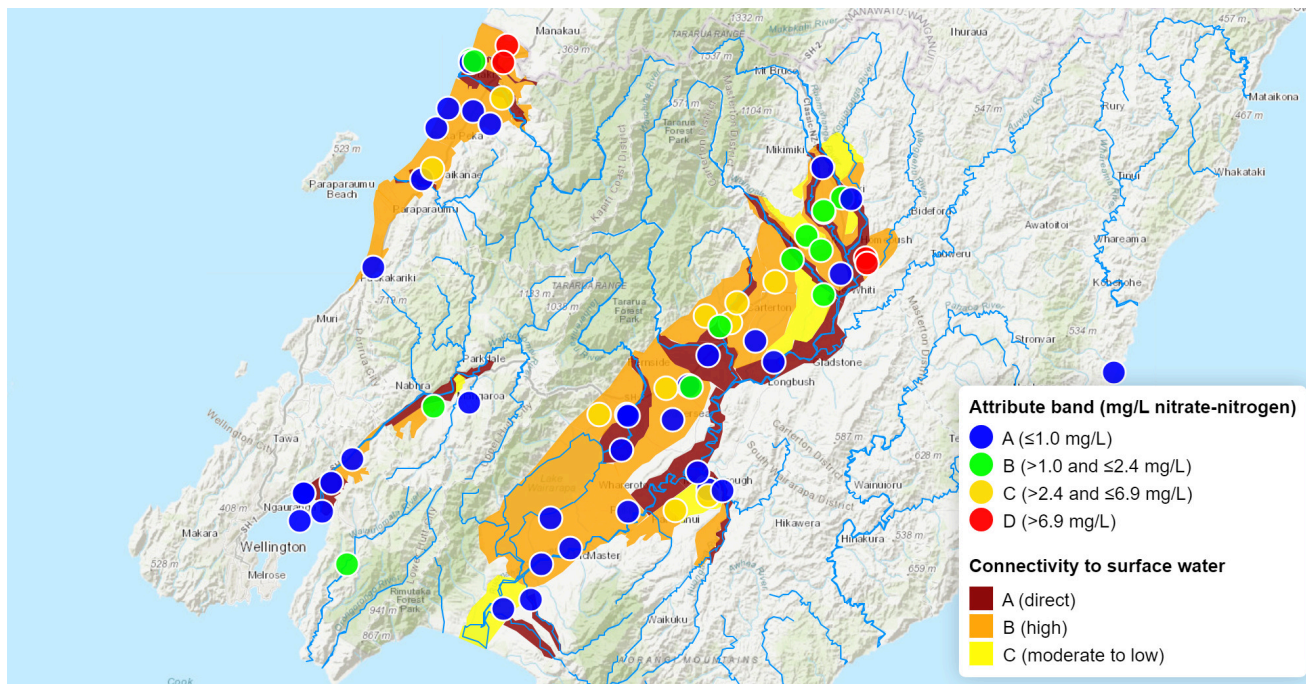


Figure 4: The National Policy Statement on Freshwater Management (NPS-FM) classes river water nitrate-nitrogen concentrations into four attribute bands based on nitrate toxicity effects on aquatic life (MfE 2023). The NPS-FM sets a National Bottom Line for nitrate toxicity of 2.4 mg/L nitrate-nitrogen. Annual median nitrate-nitrogen concentrations above this threshold (Bands C and D) are deemed a high risk to aquatic life. Median groundwater nitrate-nitrogen concentrations are evaluated against these bands. Shallow groundwater within Connectivity Category A (direct) poses a greater risk from groundwater nitrate-nitrogen to aquatic life in the surface water system than groundwater within other Connectivity categories. See groundwater connectivity for more information on surface water connectivity categories.

Table 4: Summary of nitrate-nitrogen toxicity attribute bands.

Connectivity	Attribute band	No. Sites
A (direct)	A/B (≤2.4 mg/L)	11
	C/D (>2.4 mg/L)	2
B/C + unknown	A/B (≤2.4 mg/L)	36
	C/D (>2.4 mg/L)	13
Total sites	A/B (≤2.4 mg/L)	47
	C/D (>2.4 mg/L)	15

## Trends

Ten and fifteen year trends in nitrate-nitrogen concentrations are presented on the [LAWA website](#). See the [LAWA trend factsheet](#) for details on how the trends are calculated.

## Detection of *E. coli* bacteria

*E. coli* is a key indicator of groundwater contamination by microorganisms, some of which can cause diseases. Faecal bacteria from livestock, onsite wastewater discharges, stormwater and other sources can contaminate groundwater. See the [LAWA factsheet](#) for more information.

## Drinking Water Standards New Zealand

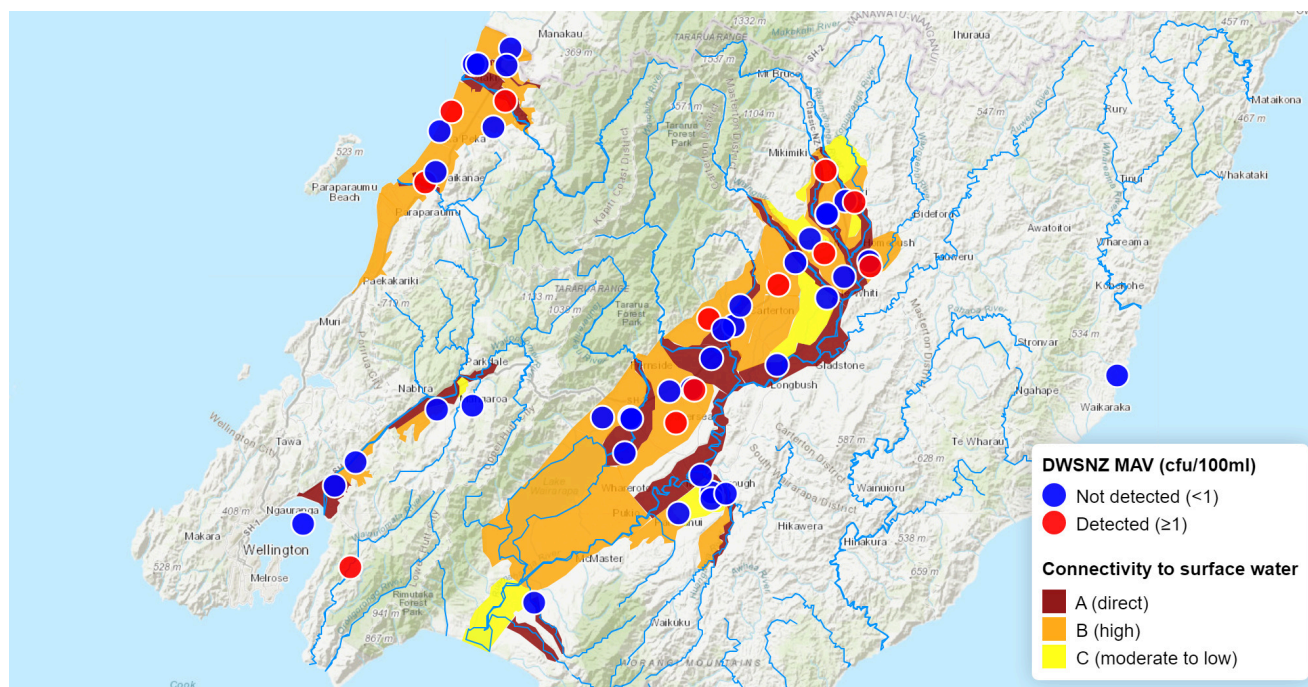


Figure 5: *E. coli* is an indicator of faecal contamination in drinking water. The [Drinking Water Standards for New Zealand \(DWSNZ\)](#) sets a Maximum Acceptable Value (MAV) for *E. coli* in drinking water supplies of less than 1 in 100 mL of sample. Shallow groundwater within Connectivity Category A (direct) poses a greater risk to water quality in the surface water system than groundwater within other Connectivity categories. See [groundwater connectivity](#) for more information on surface water connectivity categories.

Table 5: Summary of *E. coli* DWSNZ MAV ratings.

DWSNZ MAV (cfu/100mL)	No. Sites
Detected (≥1)	12
Not detected (<1)	39
Total sites	51

## Saline intrusion

Conductivity is a key indicator for seawater contamination in coastal wells, as the difference in conductivity between seawater and fresh groundwater is very marked. See the [LAWA factsheet](#) for more information.

Greater Wellington and Wellington Water monitor the Waiwhetu Aquifer at three locations on the Petone foreshore; near to Petone wharf ('Tamatoa'), McEwan Park, and Port Road in Seaview. There is more than one monitoring bore at each of these sites because we monitor different depths in the aquifer. This is because saltwater is denser than freshwater, and may enter the aquifer near to its base. More information on the Petone Saline Intrusion Monitoring network can be found here: [Greater Wellington – Waiwhetu Aquifer](#).

The charts below show daily average conductivity in  $\mu\text{S}/\text{cm}$  (—) with warning thresholds in dashed red (---) set by GWRC that may reflect the onset of saline intrusion. Thresholds have not yet been set for two newer monitoring wells. See the [monitoring details](#) table for more information on the bores below. Gaps in the data are due to sensor faults and/or other maintenance.

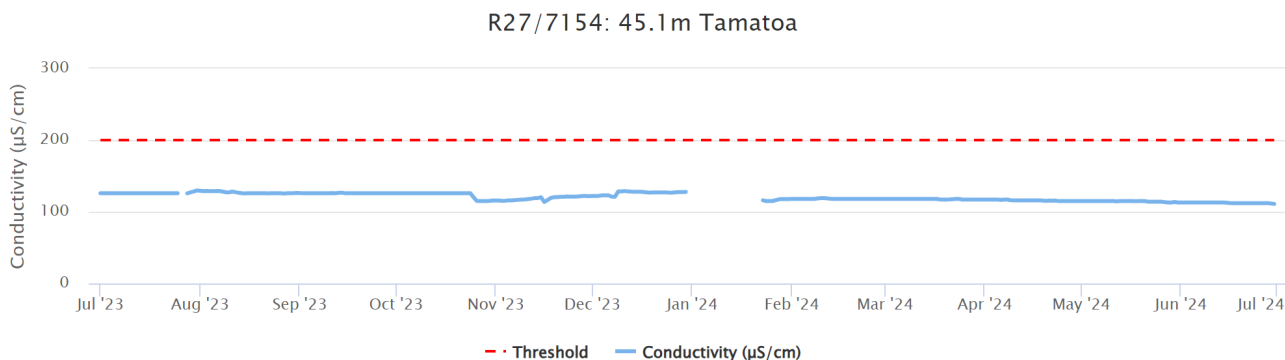


Figure 6: Conductivity results for Te Whanganui-a-Tara 45.1m deep groundwater bore R27/7154 at Tamatoa, the warning threshold is 200  $\mu\text{S}/\text{cm}$ .



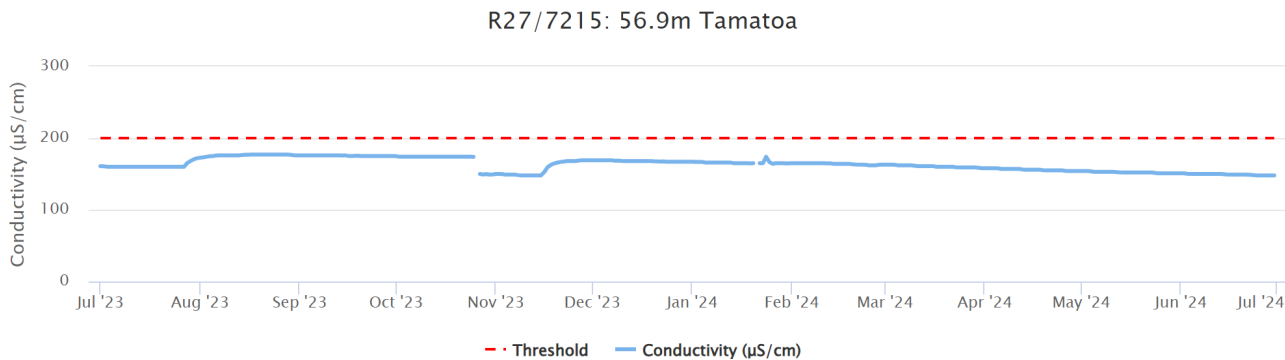


Figure 7: Conductivity results for Te Whanganui-a-Tara 56.9m deep groundwater bore R27/7215 at Tamatoa, the warning threshold is 200 µS/cm.

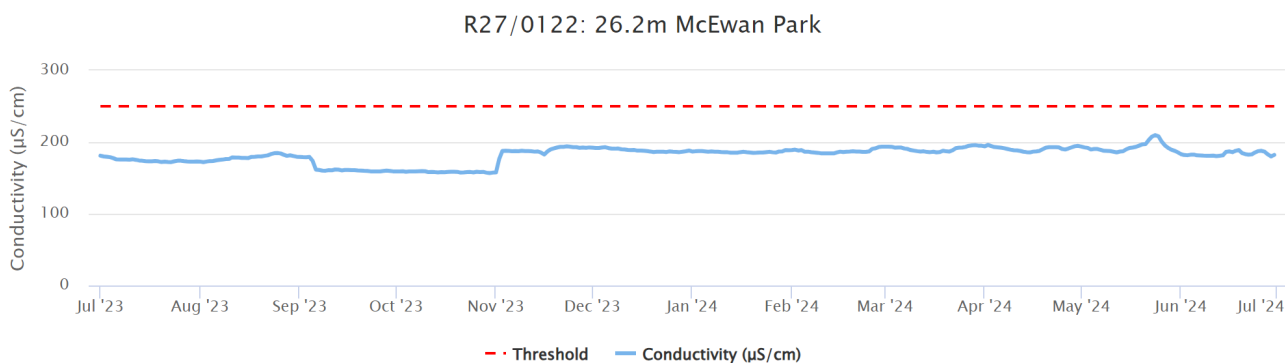


Figure 8: Conductivity results for Te Whanganui-a-Tara 26.2m deep groundwater bore R27/0122 at McEwan Park, the warning threshold is 250 µS/cm.

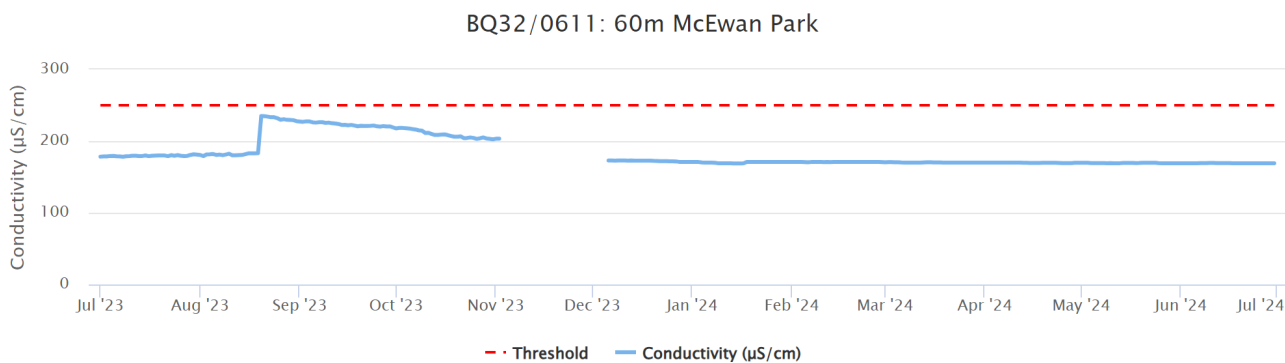


Figure 9: Conductivity results for Te Whanganui-a-Tara 60m deep groundwater bore BQ32/0611 at McEwan Park, the warning threshold is 250 µS/cm.

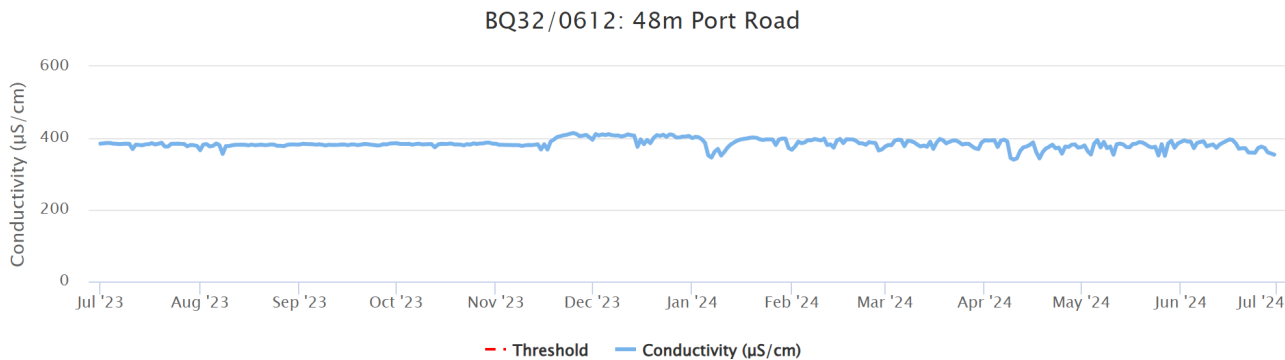


Figure 10: Conductivity results for Te Whanganui-a-Tara 48m deep groundwater bore BQ32/0612 at Port Road, no warning threshold has been set for this well.

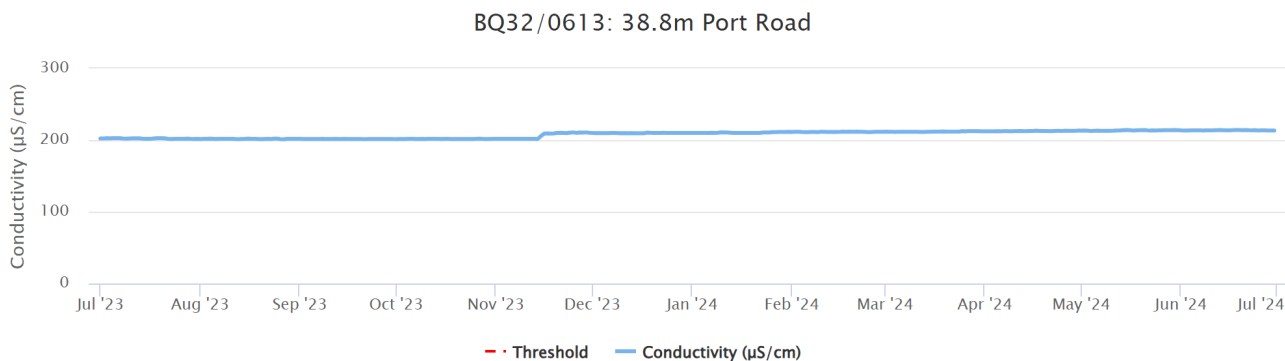


Figure 11: Conductivity results for Te Whanganui-a-Tara 38.8m deep groundwater bore BQ32/0613 at Port Road, no warning threshold has been set for this well.

## Dissolved reactive phosphorus

Groundwater discharges from aquifers into a number of surface water bodies throughout the region and there is the potential that groundwater high in dissolved reactive phosphorus could contribute to the decline of surface water quality. Phosphorus may be derived from soil, rocks and minerals in the aquifer as water passes through them, as well as from anthropogenic sources including agricultural and industrial activities. See the [LAWA phosphorus factsheet](#) for more information.

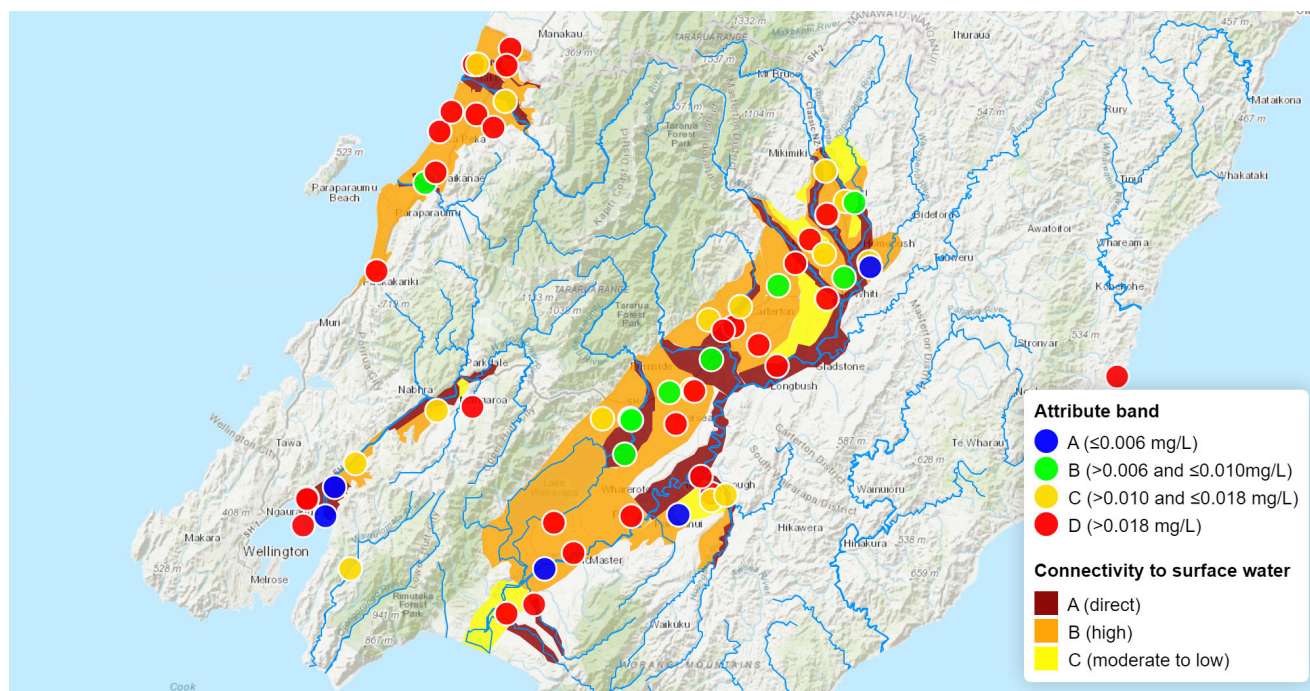


Figure 12: The [National Policy Statement on Freshwater Management \(NPS-FM\)](#) classes river water dissolved reactive phosphorus concentrations into four attribute bands based on river ecosystem health. Annual median groundwater dissolved reactive phosphorus concentrations are evaluated below against these bands. Shallow groundwater within Connectivity Category A (direct) poses a greater risk from groundwater dissolved reactive phosphorus to ecosystem health in the surface water system than groundwater within other Connectivity categories. See [groundwater connectivity](#) for more information on surface water connectivity categories.

Table 6: Summary of dissolved reactive phosphorus concentration attribute bands.

Connectivity	Attribute band	No. Sites
A (direct)	A ( $\leq 0.006$ mg/L)	0
	B ( $> 0.006$ and $\leq 0.010$ mg/L)	4
	C ( $> 0.010$ and $\leq 0.018$ mg/L)	5
	D ( $> 0.018$ mg/L)	4
B/C + unknown	A ( $\leq 0.006$ mg/L)	5
	B ( $> 0.006$ and $\leq 0.010$ mg/L)	5
	C ( $> 0.010$ and $\leq 0.018$ mg/L)	11
	D ( $> 0.018$ mg/L)	29
Total sites	A ( $\leq 0.006$ mg/L)	5
	B ( $> 0.006$ and $\leq 0.010$ mg/L)	9
	C ( $> 0.010$ and $\leq 0.018$ mg/L)	16
	D ( $> 0.018$ mg/L)	33

## Dissolved metals

Several dissolved metals and heavy metals are monitored, all of which can affect the quality of groundwater for drinking-water supply. These metals may be derived from soil, rocks and minerals in the aquifer as water passes through them, as well as from anthropogenic sources including agricultural and industrial activities. Concentrations of many dissolved metals, for example iron and manganese, are controlled by the redox state of the water – when the concentration of dissolved oxygen in the water is low (often in older, more evolved groundwater) these metals tend to be more soluble.

### Iron

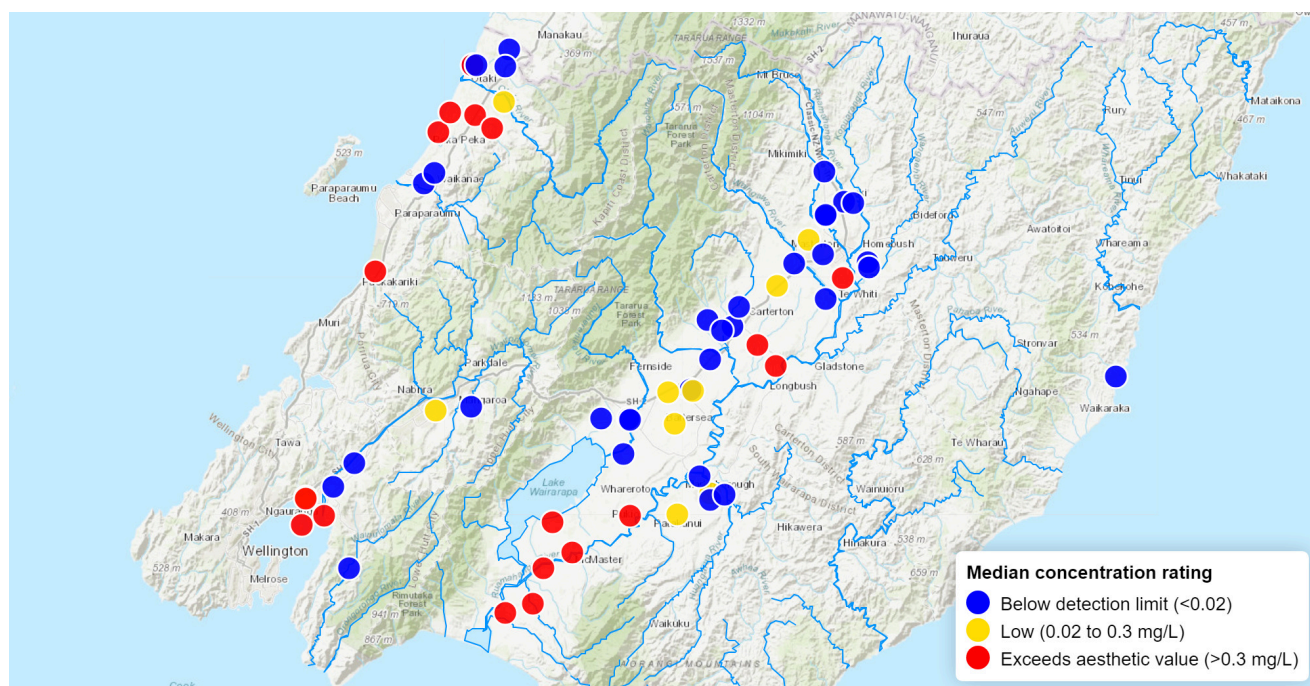


Figure 13: Groundwater dissolved iron concentrations are evaluated below in terms of the drinking water aesthetic value of 0.3 mg/L (Taumata Arowai, 2022). Concentrations above this may cause staining of laundry and sanitary ware. Sites with annual median concentrations above the aesthetic threshold value are flagged as ‘Exceeds aesthetic value’.

Table 7: Summary of dissolved iron concentration ratings.

Concentration rating	No. Sites
Below detection limit (<0.02)	34
Low (0.02 to 0.3 mg/L)	10
Exceeds aesthetic value (>0.3 mg/L)	18
Total sites	62

# Manganese

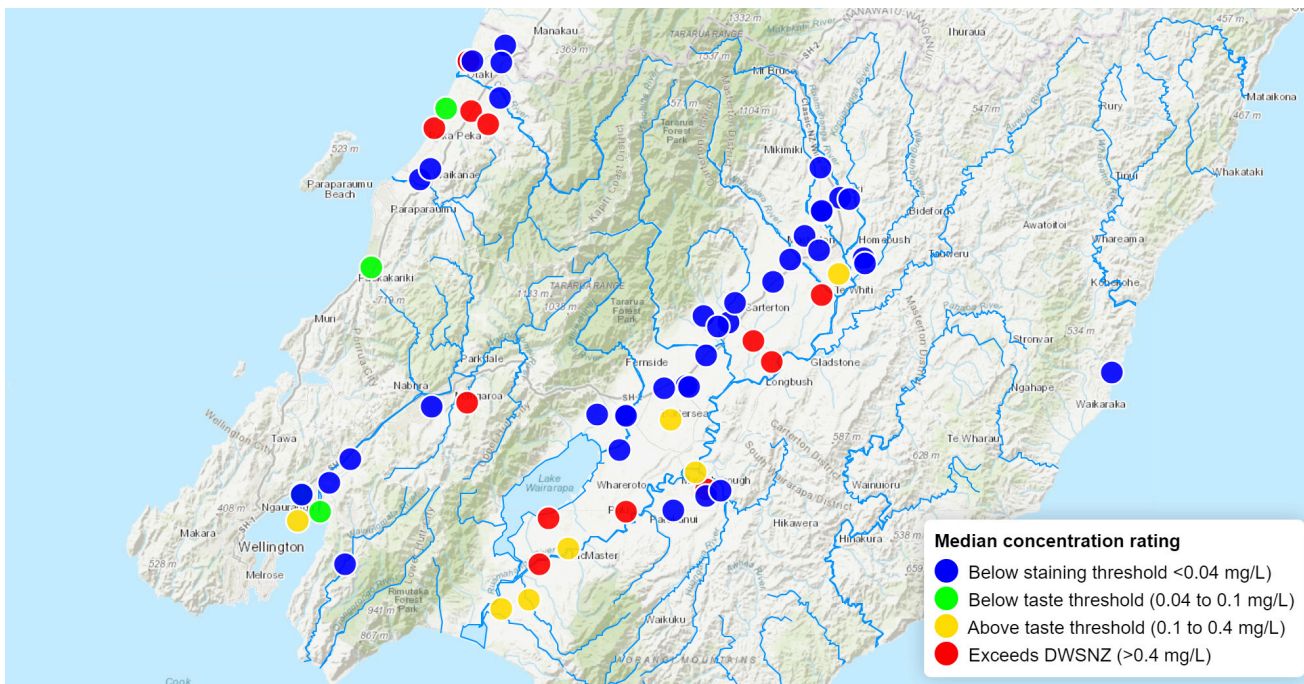


Figure 14: Groundwater dissolved manganese concentrations are evaluated below in terms of the Drinking Water Standards for New Zealand (DWSNZ), as excess concentrations can have negative health effects. Manganese concentrations are also assessed against aesthetic values of 0.04 for staining and 0.1 mg/L for taste (Taumata Arowai, 2022). Sites with annual median concentrations above the DWSNZ Maximum Acceptable Value (MAV) of 0.4 mg/L are flagged as ‘Exceeds DWSNZ’.

Table 8: Summary of dissolved manganese concentration ratings.

Concentration rating	No. Sites
Below staining threshold <0.04 mg/L)	39
Below taste threshold (0.04 to 0.1 mg/L)	4
Above taste threshold (0.1 to 0.4 mg/L)	7
Exceeds DWSNZ (>0.4 mg/L)	12
Total sites	62

# Arsenic

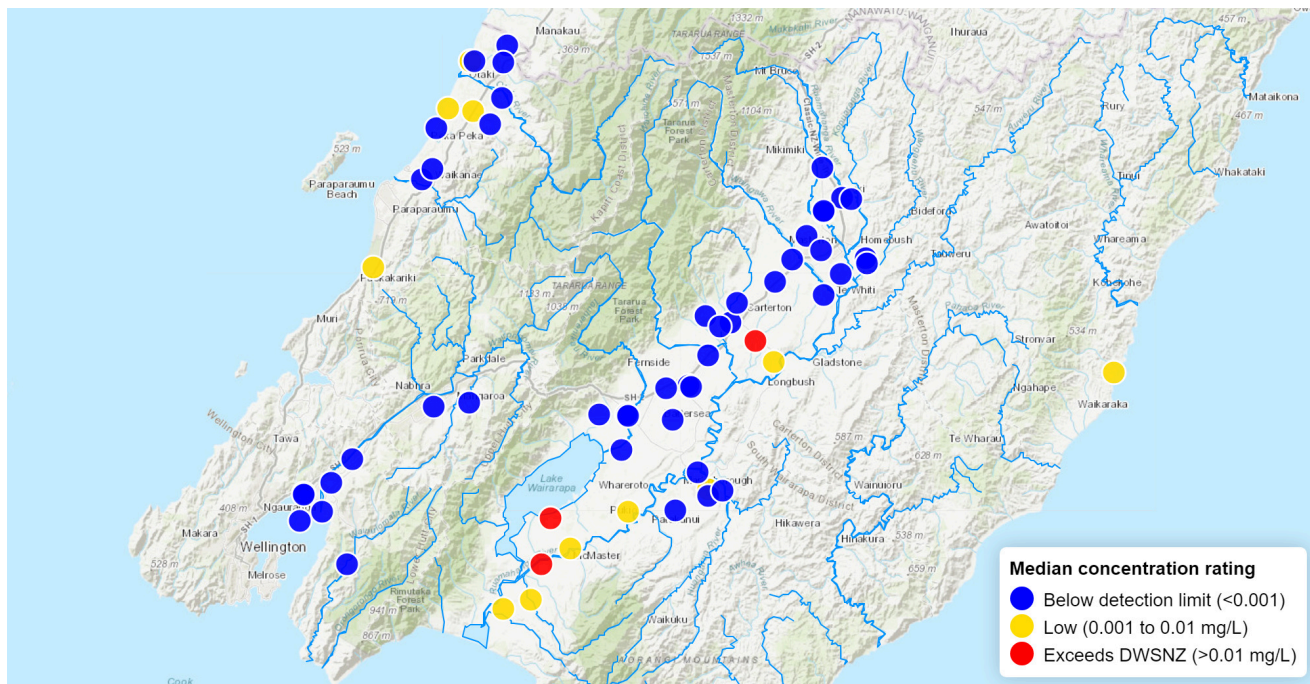


Figure 15: Groundwater dissolved arsenic concentrations are evaluated below in terms of the Drinking Water Standards for New Zealand (DWSNZ), as excess concentrations can have negative health effects. Sites with annual median concentrations above the DWSNZ Maximum Acceptable Value (MAV) of 0.01 mg/L are flagged as ‘Exceeds DWSNZ’.

Table 9: Summary of dissolved arsenic concentration ratings.

Concentration rating	No. Sites
Below detection limit (<0.001)	47
Low (0.001 to 0.01 mg/L)	12
Exceeds DWSNZ (>0.01 mg/L)	3
Total sites	62

# Chromium

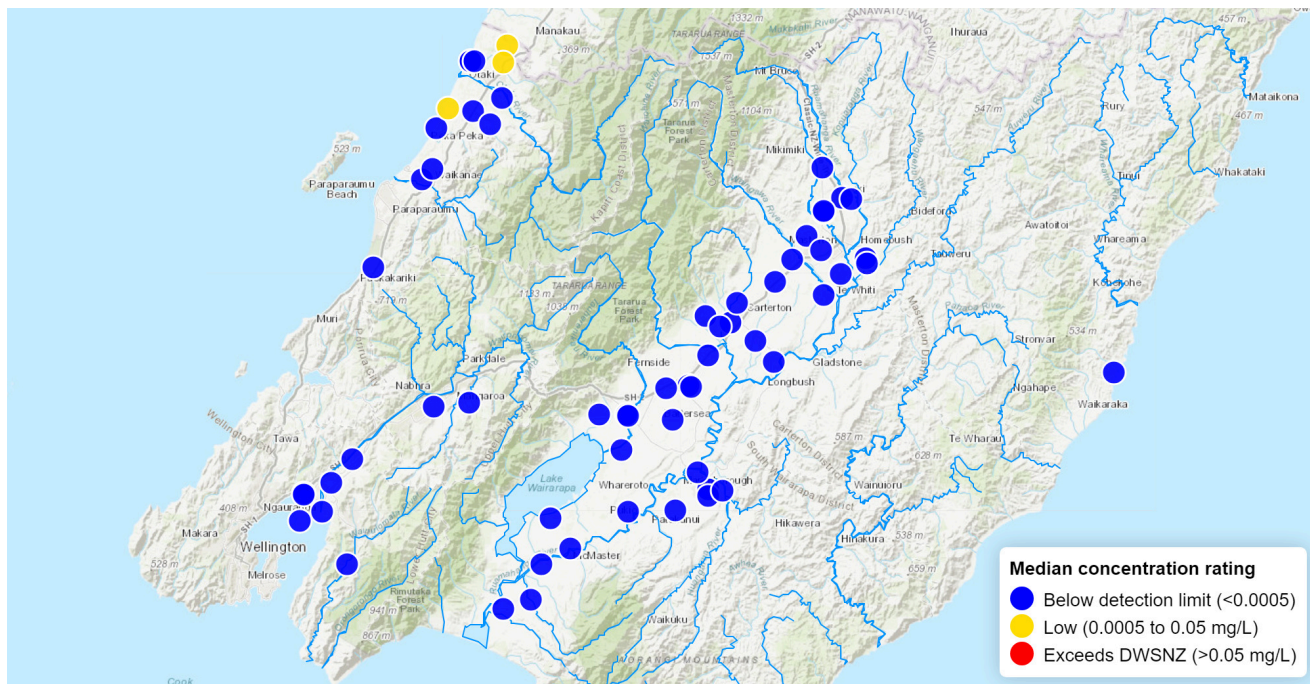


Figure 16: Groundwater dissolved chromium concentrations are evaluated below in terms of the Drinking Water Standards for New Zealand (DWSNZ), as excess concentrations can have negative health effects. Sites with annual median concentrations above the DWSNZ Maximum Acceptable Value (MAV) of 0.05 mg/L are flagged as ‘Exceeds DWSNZ’.

Table 10: Summary of dissolved chromium concentration ratings.

Concentration rating	No. Sites
Below detection limit (<0.0005)	59
Low (0.0005 to 0.05 mg/L)	3
Exceeds DWSNZ (>0.05 mg/L)	0
Total sites	62



# Lead

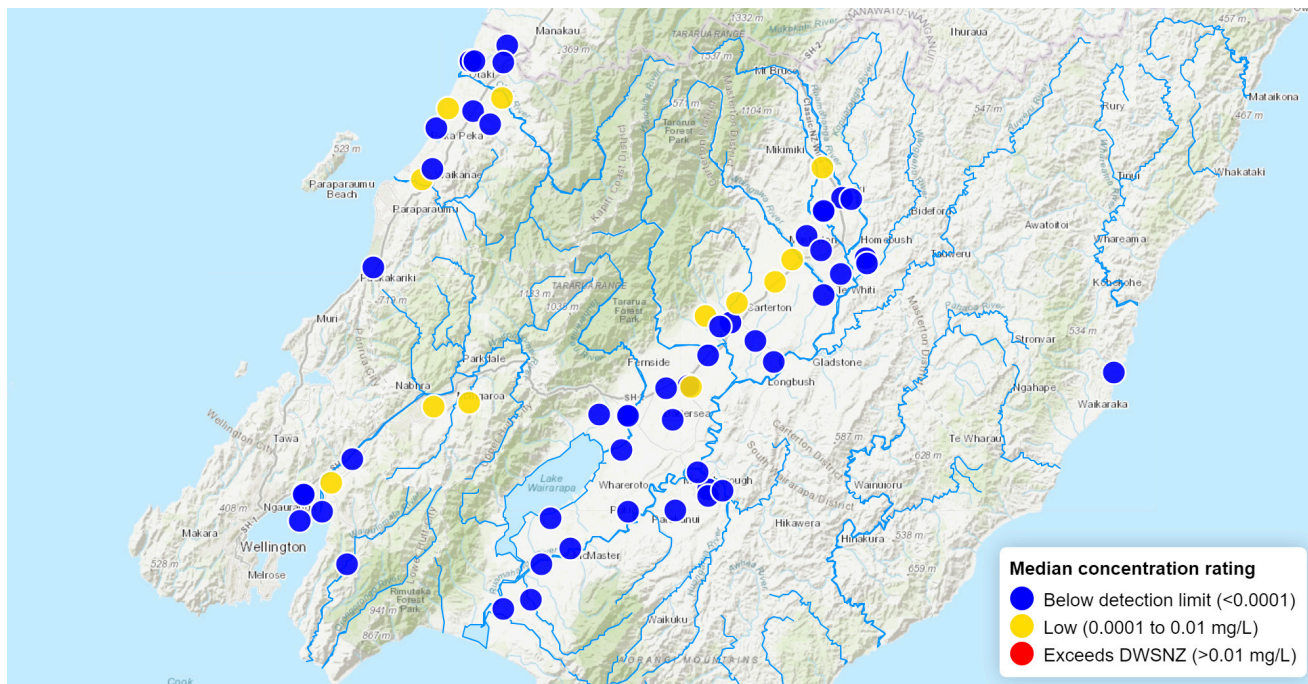


Figure 17: Groundwater dissolved lead concentrations are evaluated below in terms of the Drinking Water Standards for New Zealand (DWSNZ), as excess concentrations can have negative health effects. Sites with annual median concentrations above the DWSNZ Maximum Acceptable Value (MAV) of 0.01 mg/L are flagged as ‘Exceeds DWSNZ’.

Table 11: Summary of dissolved lead concentration ratings.

Concentration rating	No. Sites
Below detection limit (<0.0001)	50
Low (0.0001 to 0.01 mg/L)	12
Exceeds DWSNZ (>0.01 mg/L)	0
Total sites	62

# Zinc

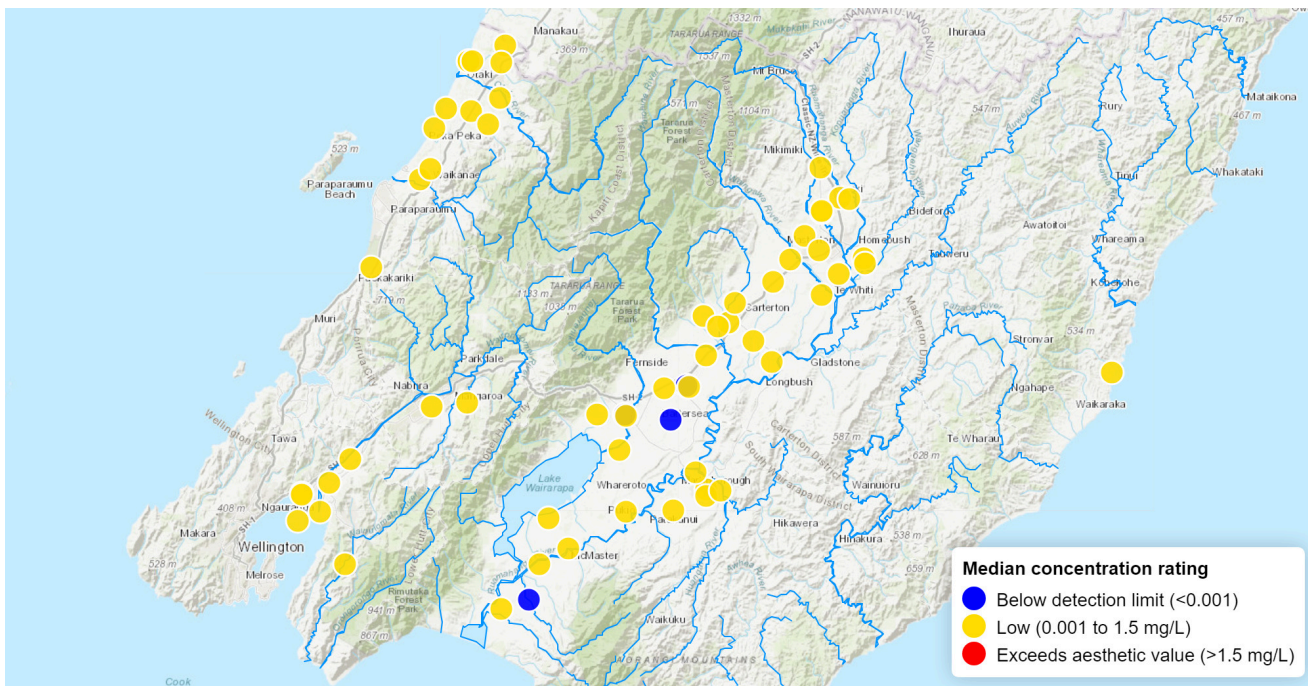


Figure 18: Groundwater dissolved zinc concentrations are evaluated below in terms of the drinking water aesthetic value of 1.5 mg/L (Taumata Arowai, 2022). Concentrations above this may have noticeable taste. Sites with annual median concentrations above the aesthetic threshold value are flagged as ‘Exceeds aesthetic value’.

Table 12: Summary of dissolved zinc concentration ratings.

Concentration rating	No. Sites
Below detection limit (<0.001)	4
Low (0.001 to 1.5 mg/L)	58
Exceeds aesthetic value (>1.5 mg/L)	0
Total sites	62

## Major ion chemistry

Groundwater chemistry is commonly dominated by the major cations calcium, magnesium, potassium and sodium, and the major anions bicarbonate, chloride and sulphate. These ions are derived from soil, rocks and minerals in the aquifer as water passes through them, as well as from anthropogenic sources such as fertilisers, and human and animal wastes.

Chloride has a drinking water aesthetic value of 250 mg/L, above which it may have noticeable taste ([Taumata Arowai, 2022](#)). See the [LAWA chloride factsheet](#) for more information. High chloride concentrations can also cause corrosion of metal water pipes and plumbing fittings. Sodium and sulphate have taste thresholds of 200 mg/L and 250 mg/L respectively ([Taumata Arowai, 2022](#)). Calcium and magnesium are the main components of water hardness. High hardness (<200 mg/L) can cause scale deposition in plumbing and pipe work, while low hardness (<100mg/L) can be a cause of corrosion. High hardness may also have noticeable taste.

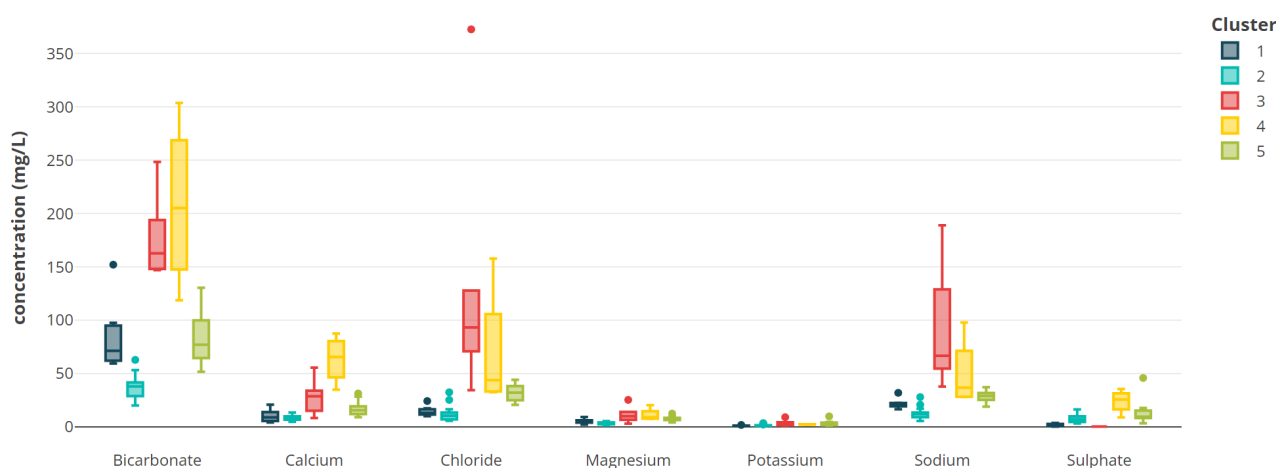


Figure 19: Using site median concentrations of these major ions, sites have been assigned into groups of similar chemical make-up using hierarchical cluster analysis (HCA). These groupings reflect recharge sources (river vs rain), land use, aquifer geology, location and the length of time the water has been underground. The range of concentrations for each group are shown in the box plot below. For a full description of the HCA technique and and more in-depth analysis of groundwater chemistry in the Wairarapa see [Daughney et al. \(2009\)](#).

## Map of major ion chemistry

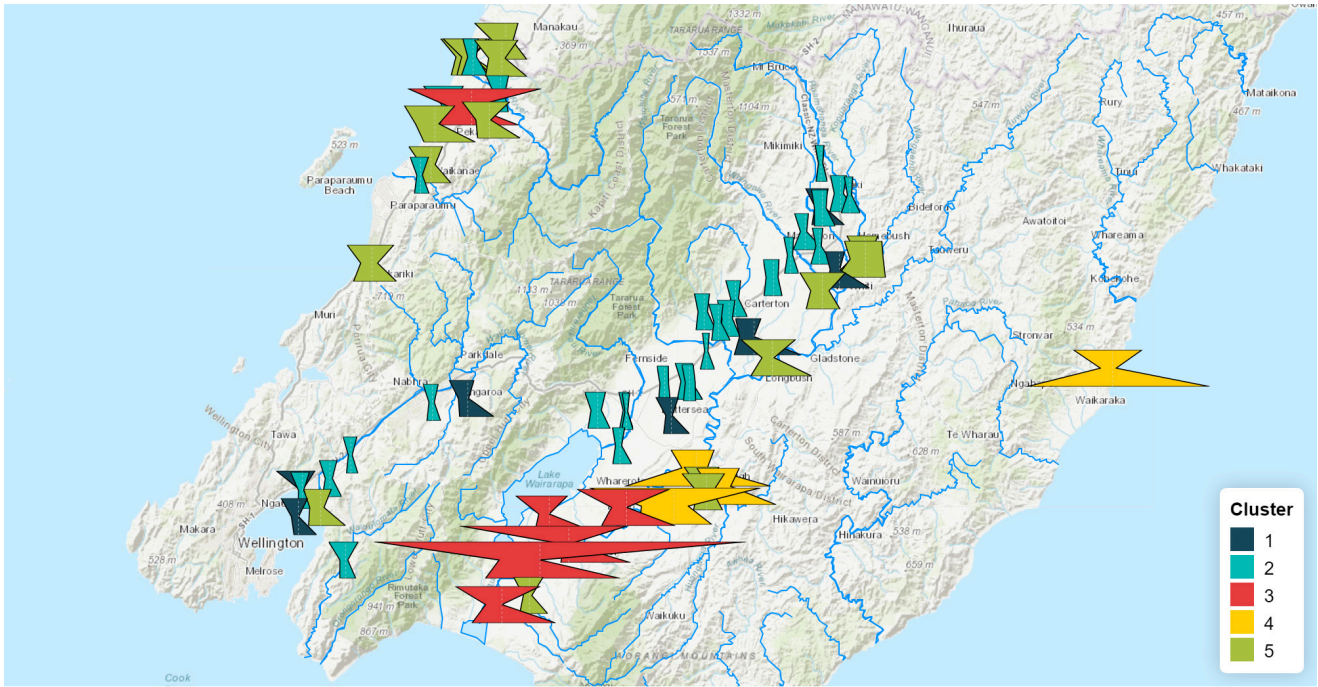


Figure 20: Sites on the map are presented in the form of Stiff plots, which are a graphical representation of the cation and anion make-up of the water sample. This allows quick assessment of similarities in groundwater chemistry across the region.

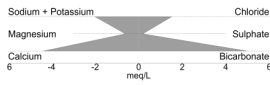


Figure 21: The shape of the plots are defined in milliequivalents per litre, which are a function of the concentrations, the molar mass of each component and their respective ionic charge.

## Resources

### Access to monitoring data

Full monitoring data for the latest monitoring season can be downloaded from the [latest Groundwater quality monitoring report](#) and data for other time periods can be accessed using the [GWRC live data viewer](#) or in [previous reports](#). Please read the [disclaimer](#) before using this information.

---

### Useful links

- [Drinking Water Standards for New Zealand](#)
  - [Aesthetic Values for Drinking Water](#)
  - [National Environmental Monitoring Standards: Water Quality Part 1 - Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data](#)
  - [Australian and New Zealand Guidelines for Fresh and Marine Water Quality](#)
  - [Nitrate Toxicity Effects on Freshwater Aquatic Species](#)
  - [Land and Water Aotearoa \(LAWA\) Groundwater](#)
- 

## References

ANZECC 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, The Guidelines*. Australian and New Zealand Environment and Conservation Council. Agriculture and Resource Management Councils of Australia and New Zealand, Canberra.

Daughney, C.J., Guggenmos, M., McAlister, D., Begg, J., Jackson, B. 2009. *Assessment of groundwater and surface water chemistry in the Upper and Lower Wairarapa Valley*. GNS Science Report 2009/21. 33p.

GW 2023. *Natural Resources Plan for the Wellington Region Greater Wellington*. <https://www.gw.govt.nz/assets/Documents/2023/07/Natural-Resource-Plan-Operative-Version-2023-incl-maps-compressed.pdf>

Hughes, B., Gyopari, M. 2011. *Wairarapa Valley groundwater resource investigation – Proposed framework for conjunctive water management*. Greater Wellington report. 293p.

MfE 2023. *National Policy Statement for Freshwater Management 2020 (as amended February 2023)*. Ministry for the Environment, Wellington. <https://environment.govt.nz/acts-and-regulations>

[/national-policy-statements/national-policy-statement-freshwater-management/](#)

Taumata Arowai 2022. Aesthetic Values for Drinking Water Notice 2022. Taumata Arowai, Wellington. <https://www.taumataarowai.govt.nz/assets/Uploads/Rules-and-standards/Taumata-Arowai-Aesthetic-Values-for-Drinking-Water-2022.pdf>

Water Services (Drinking Water Standards for New Zealand) Regulations 2022. New Zealand Government, Wellington. <https://www.legislation.govt.nz/regulation/public/2022/0168/latest/whole.html>

# Appendix

## Monitoring details

Table A1: Monitoring site information.

Whaitua	Site code	Monitoring frequency	Groundwater connectivity	Depth
Ruamāhanga	BQ33/0032	3-yr	Unknown	71.5m
Kāpiti Coast	R25/5100	annual	B (high)	48.2m
Kāpiti Coast	R25/5135	annual	B (high)	93.27m
Kāpiti Coast	R25/5164	removed		N/A
Kāpiti Coast	R25/5165	quarterly	B (high)	8.0m
Kāpiti Coast	R25/5190	quarterly	B (high)	5.0m
Kāpiti Coast	R25/5233	quarterly	A (direct)	18.7m
Kāpiti Coast	R26/6503	quarterly	B (high)	14.8m
Kāpiti Coast	R26/6587	quarterly	A (direct)	12.96m
Kāpiti Coast	R26/6624	quarterly	B (high)	10.2m
Te Whanganui-a-Tara	R27/0122	continuous - conductivity	B (high)	26.2m
Te Whanganui-a-Tara	R27/0320	quarterly	B (high)	114.6m
Te Whanganui-a-Tara	R27/1137	quarterly	B (high)	20.4m
Te Whanganui-a-Tara	R27/1171	quarterly	B (high)	23.2m
Te Whanganui-a-Tara	R27/1180	quarterly	B (high)	39.0m
Te Whanganui-a-Tara	R27/1182	quarterly	B (high)	38.0m
Te Whanganui-a-Tara	R27/1183	quarterly	B (high)	25.0m
Te Whanganui-a-Tara	R27/1265	quarterly	B (high)	48.3m
Te Whanganui-a-Tara	R27/6418	quarterly	Unknown	8.0m
Te Whanganui-a-Tara	R27/6833	quarterly	Unknown	24.5m
Te Whanganui-a-Tara	R27/7153	continuous - conductivity	B (high)	34.0m
Te Whanganui-a-Tara	R27/7154	continuous - conductivity	B (high)	45.1m
Te Whanganui-a-Tara	R27/7215	continuous - conductivity	B (high)	56.9m
Kāpiti Coast	S25/5125	quarterly	A (direct)	10.0m
Kāpiti Coast	S25/5200	annual	B (high)	45.8m
Kāpiti Coast	S25/5256	quarterly	B (high)	30.78m
Kāpiti Coast	S25/5322	quarterly	B (high)	27.0m
Ruamāhanga	S26/0117	quarterly	A (direct)	4.1m
Ruamāhanga	S26/0223	quarterly	B (high)	9.92m
Ruamāhanga	S26/0299	quarterly	B (high)	8.1m
Ruamāhanga	S26/0439	quarterly	C (moderate to low)	11.5m
Ruamāhanga	S26/0457	quarterly	A (direct)	6.06m
Ruamāhanga	S26/0467	quarterly	A (direct)	6.2m
Ruamāhanga	S26/0568	annual	B (high)	45.0m
Ruamāhanga	S26/0576	3-yr	B (high)	31.0m
Ruamāhanga	S26/0705	3-yr	C (moderate to low)	27.4m
Ruamāhanga	S26/0756	removed		19.0m
Ruamāhanga	S26/0762	quarterly	A (direct)	9.5m
Ruamāhanga	S26/0824	removed		20.6m
Ruamāhanga	S26/0846	removed	A (direct)	39.3m
Ruamāhanga	S27/0009	quarterly	B (high)	10.5m
Ruamāhanga	S27/0070	quarterly	B (high)	14.6m



Whaitua	Site code	Monitoring frequency	Groundwater connectivity	Depth
Ruamāhanga	S27/0136	quarterly	B (high)	20.4m
Ruamāhanga	S27/0156	removed	B (high)	20.7m
Ruamāhanga	S27/0202	quarterly	B (high)	4.88m
Ruamāhanga	S27/0268	3-yr	C (moderate to low)	58.4m
Ruamāhanga	S27/0283	3-yr	B (high)	19.0m
Ruamāhanga	S27/0299	quarterly	A (direct)	17.4m
Ruamāhanga	S27/0344	3-yr	A (direct)	16.0m
Ruamāhanga	S27/0389	quarterly	C (moderate to low)	17.85m
Ruamāhanga	S27/0396	quarterly	A (direct)	17.0m
Ruamāhanga	S27/0433	3-yr	C (moderate to low)	44.6m
Ruamāhanga	S27/0435	annual	C (moderate to low)	44.0m
Ruamāhanga	S27/0442	annual	C (moderate to low)	177.7m
Ruamāhanga	S27/0495	annual	C (moderate to low)	37.5m
Ruamāhanga	S27/0522	quarterly	C (moderate to low)	21.0m
Ruamāhanga	S27/0571	quarterly	C (moderate to low)	32.0m
Ruamāhanga	S27/0585	3-yr	C (moderate to low)	42.0m
Ruamāhanga	S27/0588	annual	A (direct)	11.7m
Ruamāhanga	S27/0594	annual	C (moderate to low)	44.0m
Ruamāhanga	S27/0602	3-yr	C (moderate to low)	60.95m
Ruamāhanga	S27/0607	annual	C (moderate to low)	38.0m
Ruamāhanga	S27/0615	3-yr	Unknown	18.2m
Ruamāhanga	S27/0681	quarterly	A (direct)	5.0m
Ruamāhanga	T26/0003	quarterly	B (high)	5.5m
Ruamāhanga	T26/0087	quarterly	C (moderate to low)	36.0m
Ruamāhanga	T26/0099	quarterly	B (high)	15.0m
Ruamāhanga	T26/0206	quarterly	C (moderate to low)	28.7m
Ruamāhanga	T26/0259	quarterly	A (direct)	6.1m
Ruamāhanga	T26/0332	quarterly	C (moderate to low)	13.4m
Ruamāhanga	T26/0413	quarterly	C (moderate to low)	23.3m
Ruamāhanga	T26/0430	quarterly	B (high)	0m
Ruamāhanga	T26/0489	quarterly	B (high)	54.0m
Ruamāhanga	T26/0538	quarterly	B (high)	9.0m
Wairarapa Coast	T27/0063	quarterly	Unknown	3.6m
Kāpiti Coast	BN33/0032	quarterly	B (high)	12.0m
Kāpiti Coast	BN32/0063	quarterly	B (high)	30.0m
Kāpiti Coast	BN32/0062	quarterly	B (high)	5.0m
Ruamāhanga	BP34/0216	quarterly	B (high)	17.7m
Te Whanganui-a-Tara	BQ31/0047	annual	Unknown	48.0m
Te Awarua-o-Porirua	BP32/0103	annual	Unknown	49.0m
Ruamāhanga	BP33/0056	quarterly	B (high)	14.0m
Ruamāhanga	BP33/0057	quarterly	B (high)	8.2m
Ruamāhanga	BP34/0229	quarterly	A (direct)	8.5m
Ruamāhanga	BP34/0236	quarterly	B (high)	6.9m
Te Whanganui-a-Tara	BQ32/0611	continuous - conductivity	B (high)	60.0m
Te Whanganui-a-Tara	BQ32/0612	continuous - conductivity	B (high)	48.0m
Te Whanganui-a-Tara	BQ32/0613	continuous - conductivity	B (high)	38.8m

## Data tables

See the respective [methods](#) and [results](#) sections for more information on guidelines and groundwater connectivity categories presented in the following tables.

### Groundwater nitrate-nitrogen concentrations

Table A2: Nitrate-nitrogen results evaluated in terms of human health.

Whaitua	Site code	No. samples	Concentration rating	Median nitrate-nitrogen (mg/L)
Kāpiti Coast	BN32/0062	4	Low ( $\leq 2.4$ mg/L)	1.51
Kāpiti Coast	BN32/0063	4	Low ( $\leq 2.4$ mg/L)	0.530
Kāpiti Coast	BN33/0032	4	Elevated ( $> 5.6$ to $\leq 11.3$ mg/L)	7.52
Ruamāhanga	BP33/0056	4	Low ( $\leq 2.4$ mg/L)	0.010
Ruamāhanga	BP33/0057	4	Low ( $\leq 2.4$ mg/L)	0.694
Ruamāhanga	BP34/0216	4	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	4.40
Ruamāhanga	BP34/0229	4	Low ( $\leq 2.4$ mg/L)	1.77
Ruamāhanga	BP34/0236	4	Low ( $\leq 2.4$ mg/L)	0.447
Kāpiti Coast	R25/5100	1	Low ( $\leq 2.4$ mg/L)	<0.02
Kāpiti Coast	R25/5135	1	Low ( $\leq 2.4$ mg/L)	<0.02
Kāpiti Coast	R25/5165	4	Low ( $\leq 2.4$ mg/L)	0.308
Kāpiti Coast	R25/5233	4	Low ( $\leq 2.4$ mg/L)	1.39
Kāpiti Coast	R26/6503	4	Low ( $\leq 2.4$ mg/L)	0.008
Kāpiti Coast	R26/6587	2	Low ( $\leq 2.4$ mg/L)	0.426
Kāpiti Coast	R26/6624	4	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	2.46
Te Whanganui-a-Tara	R27/0320	4	Low ( $\leq 2.4$ mg/L)	<0.002
Te Whanganui-a-Tara	R27/1137	4	Low ( $\leq 2.4$ mg/L)	1.05
Te Whanganui-a-Tara	R27/1171	4	Low ( $\leq 2.4$ mg/L)	0.011
Te Whanganui-a-Tara	R27/1180	4	Low ( $\leq 2.4$ mg/L)	0.681
Te Whanganui-a-Tara	R27/1182	4	Low ( $\leq 2.4$ mg/L)	0.573
Te Whanganui-a-Tara	R27/1183	4	Low ( $\leq 2.4$ mg/L)	0.233
Te Whanganui-a-Tara	R27/1265	3	Low ( $\leq 2.4$ mg/L)	0.066
Te Whanganui-a-Tara	R27/6418	3	Low ( $\leq 2.4$ mg/L)	1.60
Te Whanganui-a-Tara	R27/6833	3	Low ( $\leq 2.4$ mg/L)	0.499
Kāpiti Coast	S25/5125	3	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	3.67
Kāpiti Coast	S25/5200	1	Low ( $\leq 2.4$ mg/L)	0.008
Kāpiti Coast	S25/5322	2	Elevated ( $> 5.6$ to $\leq 11.3$ mg/L)	8.27
Ruamāhanga	S26/0117	4	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	2.50
Ruamāhanga	S26/0223	4	Elevated ( $> 5.6$ to $\leq 11.3$ mg/L)	5.90
Ruamāhanga	S26/0299	4	Low ( $\leq 2.4$ mg/L)	2.39
Ruamāhanga	S26/0439	4	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	2.92
Ruamāhanga	S26/0457	4	Low ( $\leq 2.4$ mg/L)	0.546
Ruamāhanga	S26/0467	4	Low ( $\leq 2.4$ mg/L)	1.79
Ruamāhanga	S26/0568	1	Low ( $\leq 2.4$ mg/L)	<0.02
Ruamāhanga	S26/0762	4	Low ( $\leq 2.4$ mg/L)	0.002
Ruamāhanga	S27/0009	4	Intermediate ( $> 2.4$ to $\leq 5.6$ mg/L)	3.16

Whaitua	Site code	No. samples	Concentration rating	Median nitrate-nitrogen (mg/L)
Ruamāhanga	S27/0136	4	Intermediate (>2.4 to ≤5.6 mg/L)	3.40
Ruamāhanga	S27/0202	4	Low (≤2.4 mg/L)	1.67
Ruamāhanga	S27/0299	4	Low (≤2.4 mg/L)	0.634
Ruamāhanga	S27/0389	3	Low (≤2.4 mg/L)	<0.002
Ruamāhanga	S27/0396	4	Low (≤2.4 mg/L)	0.841
Ruamāhanga	S27/0435	1	Low (≤2.4 mg/L)	<0.02
Ruamāhanga	S27/0442	1	Low (≤2.4 mg/L)	<0.002
Ruamāhanga	S27/0495	1	Low (≤2.4 mg/L)	0.045
Ruamāhanga	S27/0522	4	Intermediate (>2.4 to ≤5.6 mg/L)	3.79
Ruamāhanga	S27/0571	4	Intermediate (>2.4 to ≤5.6 mg/L)	4.00
Ruamāhanga	S27/0588	1	Low (≤2.4 mg/L)	<0.002
Ruamāhanga	S27/0594	1	Low (≤2.4 mg/L)	<0.02
Ruamāhanga	S27/0607	1	Low (≤2.4 mg/L)	<0.02
Ruamāhanga	S27/0681	4	Low (≤2.4 mg/L)	0.443
Ruamāhanga	T26/0003	4	Low (≤2.4 mg/L)	0.605
Ruamāhanga	T26/0087	3	Low (≤2.4 mg/L)	1.11
Ruamāhanga	T26/0099	4	Intermediate (>2.4 to ≤5.6 mg/L)	3.09
Ruamāhanga	T26/0206	4	Low (≤2.4 mg/L)	2.18
Ruamāhanga	T26/0259	4	Low (≤2.4 mg/L)	0.581
Ruamāhanga	T26/0332	4	Low (≤2.4 mg/L)	1.55
Ruamāhanga	T26/0413	4	Low (≤2.4 mg/L)	0.046
Ruamāhanga	T26/0430	2	Low (≤2.4 mg/L)	1.31
Ruamāhanga	T26/0489	3	Elevated (>5.6 to ≤11.3 mg/L)	8.70
Ruamāhanga	T26/0538	4	Elevated (>5.6 to ≤11.3 mg/L)	8.13
Wairarapa Coast	T27/0063	6	Low (≤2.4 mg/L)	0.632

Table A3: Nitrate-nitrogen results evaluated in terms of ecosystem health.

Whaitua	Site code	Connectivity	No. samples	ANZECC rating	DGV (mg/L)	Median nitrate-nitrogen (mg/L)
Kāpiti Coast	BN32/0062	B (high)	4	Exceeds DGV	0.195	1.51
Kāpiti Coast	BN32/0063	B (high)	4	Exceeds DGV	0.195	0.530
Kāpiti Coast	BN33/0032	B (high)	4	Exceeds DGV	0.195	7.52
Ruamāhanga	BP33/0056	B (high)	4	Within DGV	0.195	0.010
Ruamāhanga	BP33/0057	B (high)	4	Exceeds DGV	0.195	0.694
Ruamāhanga	BP34/0216	B (high)	4	Exceeds DGV	0.195	4.40
Ruamāhanga	BP34/0229	A (direct)	4	Exceeds DGV	0.265	1.77
Ruamāhanga	BP34/0236	B (high)	4	Exceeds DGV	0.195	0.447
Kāpiti Coast	R25/5100	B (high)	1	Within DGV	0.195	<0.02
Kāpiti Coast	R25/5135	B (high)	1	Within DGV	0.195	<0.02
Kāpiti Coast	R25/5165	B (high)	4	Exceeds DGV	0.195	0.308
Kāpiti Coast	R25/5233	A (direct)	4	Exceeds DGV	0.195	1.39
Kāpiti Coast	R26/6503	B (high)	4	Within DGV	0.065	0.008
Kāpiti Coast	R26/6587	A (direct)	2	Exceeds DGV	0.195	0.426
Kāpiti Coast	R26/6624	B (high)	4	Exceeds DGV	0.065	2.46
Te Whanganui-a-Tara	R27/0320	B (high)	4	Within DGV	0.065	<0.002
Te Whanganui-a-Tara	R27/1137	B (high)	4	Exceeds DGV	0.065	1.05
Te Whanganui-a-Tara	R27/1171	B (high)	4	Within DGV	0.065	0.011
Te Whanganui-a-Tara	R27/1180	B (high)	4	Exceeds DGV	0.065	0.681
Te Whanganui-a-Tara	R27/1182	B (high)	4	Exceeds DGV	0.065	0.573
Te Whanganui-a-Tara	R27/1183	B (high)	4	Exceeds DGV	0.065	0.233
Te Whanganui-a-Tara	R27/1265	B (high)	3	Exceeds DGV	0.065	0.066
Te Whanganui-a-Tara	R27/6418	Unknown	3	Exceeds DGV	0.170	1.60
Te Whanganui-a-Tara	R27/6833	Unknown	3	Exceeds DGV	0.170	0.499
Kāpiti Coast	S25/5125	A (direct)	3	Exceeds DGV	0.195	3.67
Kāpiti Coast	S25/5200	B (high)	1	Within DGV	0.170	0.008
Kāpiti Coast	S25/5322	B (high)	2	Exceeds DGV	0.195	8.27
Ruamāhanga	S26/0117	A (direct)	4	Exceeds DGV	0.170	2.50
Ruamāhanga	S26/0223	B (high)	4	Exceeds DGV	0.195	5.90
Ruamāhanga	S26/0299	B (high)	4	Exceeds DGV	0.195	2.39
Ruamāhanga	S26/0439	C (moderate to low)	4	Exceeds DGV	0.065	2.92
Ruamāhanga	S26/0457	A (direct)	4	Exceeds DGV	0.195	0.546
Ruamāhanga	S26/0467	A (direct)	4	Exceeds DGV	0.195	1.79
Ruamāhanga	S26/0568	B (high)	1	Within DGV	0.195	<0.02
Ruamāhanga	S26/0762	A (direct)	4	Within DGV	0.195	0.002
Ruamāhanga	S27/0009	B (high)	4	Exceeds DGV	0.065	3.16
Ruamāhanga	S27/0070	B (high)	4	Within DGV	0.195	0.183
Ruamāhanga	S27/0136	B (high)	4	Exceeds DGV	0.195	3.40
Ruamāhanga	S27/0202	B (high)	4	Exceeds DGV	0.195	1.67
Ruamāhanga	S27/0299	A (direct)	4	Exceeds DGV	0.195	0.634
Ruamāhanga	S27/0389	C (moderate to low)	3	Within DGV	0.195	<0.002
Ruamāhanga	S27/0396	A (direct)	4	Exceeds DGV	0.170	0.841
Ruamāhanga	S27/0435	C (moderate to low)	1	Within DGV	0.195	<0.02
Ruamāhanga	S27/0442	C (moderate to low)	1	Within DGV	0.170	<0.002
Ruamāhanga	S27/0495	C (moderate to low)	1	Within DGV	0.195	0.045

Whaitua	Site code	Connectivity	No. samples	ANZECC rating	DGV (mg/L)	Median nitrate-nitrogen (mg/L)
Ruamāhanga	S27/0522	C (moderate to low)	4	Exceeds DGV	0.195	3.79
Ruamāhanga	S27/0571	C (moderate to low)	4	Exceeds DGV	0.195	4.00
Ruamāhanga	S27/0588	A (direct)	1	Within DGV	0.087	<0.002
Ruamāhanga	S27/0594	C (moderate to low)	1	Within DGV	0.195	<0.02
Ruamāhanga	S27/0607	C (moderate to low)	1	Within DGV	0.195	<0.02
Ruamāhanga	S27/0681	A (direct)	4	Exceeds DGV	0.265	0.443
Ruamāhanga	T26/0003	B (high)	4	Exceeds DGV	0.265	0.605
Ruamāhanga	T26/0087	C (moderate to low)	3	Exceeds DGV	0.195	1.11
Ruamāhanga	T26/0099	B (high)	4	Exceeds DGV	0.195	3.09
Ruamāhanga	T26/0206	C (moderate to low)	4	Exceeds DGV	0.195	2.18
Ruamāhanga	T26/0259	A (direct)	4	Exceeds DGV	0.265	0.581
Ruamāhanga	T26/0332	C (moderate to low)	4	Exceeds DGV	0.195	1.55
Ruamāhanga	T26/0413	C (moderate to low)	4	Within DGV	0.195	0.046
Ruamāhanga	T26/0430	B (high)	2	Exceeds DGV	0.195	1.31
Ruamāhanga	T26/0489	B (high)	3	Exceeds DGV	0.195	8.70
Ruamāhanga	T26/0538	B (high)	4	Exceeds DGV	0.195	8.13
Wairarapa Coast	T27/0063	Unknown	6	Exceeds DGV	0.195	0.632

Table A4: Nitrate-nitrogen results evaluated in terms of of NPS-FM attribute bands for aquatic toxicity.

Whaitua	Site code	Connectivity	No. samples	Attribute band	Median nitrate-nitrogen (mg/L)
Kāpiti Coast	BN32/0062	B (high)	4	B (>1.0 and ≤2.4 mg/L)	1.51
Kāpiti Coast	BN32/0063	B (high)	4	A (≤1.0 mg/L)	0.530
Kāpiti Coast	BN33/0032	B (high)	4	D (>6.9 mg/L)	7.52
Ruamāhanga	BP33/0056	B (high)	4	A (≤1.0 mg/L)	0.010
Ruamāhanga	BP33/0057	B (high)	4	A (≤1.0 mg/L)	0.694
Ruamāhanga	BP34/0216	B (high)	4	C (>2.4 and ≤6.9 mg/L)	4.40
Ruamāhanga	BP34/0229	A (direct)	4	B (>1.0 and ≤2.4 mg/L)	1.77
Ruamāhanga	BP34/0236	B (high)	4	A (≤1.0 mg/L)	0.447
Kāpiti Coast	R25/5100	B (high)	1	A (≤1.0 mg/L)	<0.02
Kāpiti Coast	R25/5135	B (high)	1	A (≤1.0 mg/L)	<0.02
Kāpiti Coast	R25/5165	B (high)	4	A (≤1.0 mg/L)	0.308
Kāpiti Coast	R25/5233	A (direct)	4	B (>1.0 and ≤2.4 mg/L)	1.39
Kāpiti Coast	R26/6503	B (high)	4	A (≤1.0 mg/L)	0.008
Kāpiti Coast	R26/6587	A (direct)	2	A (≤1.0 mg/L)	0.426
Kāpiti Coast	R26/6624	B (high)	4	C (>2.4 and ≤6.9 mg/L)	2.46
Te Whanganui-a-Tara	R27/0320	B (high)	4	A (≤1.0 mg/L)	<0.002
Te Whanganui-a-Tara	R27/1137	B (high)	4	B (>1.0 and ≤2.4 mg/L)	1.05
Te Whanganui-a-Tara	R27/1171	B (high)	4	A (≤1.0 mg/L)	0.011
Te Whanganui-a-Tara	R27/1180	B (high)	4	A (≤1.0 mg/L)	0.681
Te Whanganui-a-Tara	R27/1182	B (high)	4	A (≤1.0 mg/L)	0.573
Te Whanganui-a-Tara	R27/1183	B (high)	4	A (≤1.0 mg/L)	0.233
Te Whanganui-a-Tara	R27/1265	B (high)	3	A (≤1.0 mg/L)	0.066
Te Whanganui-a-Tara	R27/6418	Unknown	3	B (>1.0 and ≤2.4 mg/L)	1.60
Te Whanganui-a-Tara	R27/6833	Unknown	3	A (≤1.0 mg/L)	0.499
Kāpiti Coast	S25/5125	A (direct)	3	C (>2.4 and ≤6.9 mg/L)	3.67
Kāpiti Coast	S25/5200	B (high)	1	A (≤1.0 mg/L)	0.008
Kāpiti Coast	S25/5322	B (high)	2	D (>6.9 mg/L)	8.27
Ruamāhanga	S26/0117	A (direct)	4	C (>2.4 and ≤6.9 mg/L)	2.50
Ruamāhanga	S26/0223	B (high)	4	C (>2.4 and ≤6.9 mg/L)	5.90
Ruamāhanga	S26/0299	B (high)	4	B (>1.0 and ≤2.4 mg/L)	2.39
Ruamāhanga	S26/0439	C (moderate to low)	4	C (>2.4 and ≤6.9 mg/L)	2.92
Ruamāhanga	S26/0457	A (direct)	4	A (≤1.0 mg/L)	0.546
Ruamāhanga	S26/0467	A (direct)	4	B (>1.0 and ≤2.4 mg/L)	1.79
Ruamāhanga	S26/0568	B (high)	1	A (≤1.0 mg/L)	<0.02
Ruamāhanga	S26/0762	A (direct)	4	A (≤1.0 mg/L)	0.002
Ruamāhanga	S27/0009	B (high)	4	C (>2.4 and ≤6.9 mg/L)	3.16
Ruamāhanga	S27/0070	B (high)	4	A (≤1.0 mg/L)	0.183
Ruamāhanga	S27/0136	B (high)	4	C (>2.4 and ≤6.9 mg/L)	3.40
Ruamāhanga	S27/0202	B (high)	4	B (>1.0 and ≤2.4 mg/L)	1.67
Ruamāhanga	S27/0299	A (direct)	4	A (≤1.0 mg/L)	0.634
Ruamāhanga	S27/0389	C (moderate to low)	3	A (≤1.0 mg/L)	<0.002
Ruamāhanga	S27/0396	A (direct)	4	A (≤1.0 mg/L)	0.841
Ruamāhanga	S27/0435	C (moderate to low)	1	A (≤1.0 mg/L)	<0.02

Whaitua	Site code	Connectivity	No. samples	Attribute band	Median nitrate-nitrogen (mg/L)
Ruamāhanga	S27/0495	C (moderate to low)	1	A ( $\leq 1.0$ mg/L)	0.045
Ruamāhanga	S27/0522	C (moderate to low)	4	C ( $> 2.4$ and $\leq 6.9$ mg/L)	3.79
Ruamāhanga	S27/0571	C (moderate to low)	4	C ( $> 2.4$ and $\leq 6.9$ mg/L)	4.00
Ruamāhanga	S27/0588	A (direct)	1	A ( $\leq 1.0$ mg/L)	<0.002
Ruamāhanga	S27/0594	C (moderate to low)	1	A ( $\leq 1.0$ mg/L)	<0.02
Ruamāhanga	S27/0607	C (moderate to low)	1	A ( $\leq 1.0$ mg/L)	<0.02
Ruamāhanga	S27/0681	A (direct)	4	A ( $\leq 1.0$ mg/L)	0.443
Ruamāhanga	T26/0003	B (high)	4	A ( $\leq 1.0$ mg/L)	0.605
Ruamāhanga	T26/0087	C (moderate to low)	3	B ( $> 1.0$ and $\leq 2.4$ mg/L)	1.11
Ruamāhanga	T26/0099	B (high)	4	C ( $> 2.4$ and $\leq 6.9$ mg/L)	3.09
Ruamāhanga	T26/0206	C (moderate to low)	4	B ( $> 1.0$ and $\leq 2.4$ mg/L)	2.18
Ruamāhanga	T26/0259	A (direct)	4	A ( $\leq 1.0$ mg/L)	0.581
Ruamāhanga	T26/0332	C (moderate to low)	4	B ( $> 1.0$ and $\leq 2.4$ mg/L)	1.55
Ruamāhanga	T26/0413	C (moderate to low)	4	A ( $\leq 1.0$ mg/L)	0.046
Ruamāhanga	T26/0430	B (high)	2	B ( $> 1.0$ and $\leq 2.4$ mg/L)	1.31
Ruamāhanga	T26/0489	B (high)	3	D ( $> 6.9$ mg/L)	8.70
Ruamāhanga	T26/0538	B (high)	4	D ( $> 6.9$ mg/L)	8.13
Wairarapa Coast	T27/0063	Unknown	6	A ( $\leq 1.0$ mg/L)	0.632

## Detection of *E. coli* bacteria

Table A5: *E. coli* bacteria results benchmarked against Drinking Water Standards for New Zealand guidelines.

Whaitua	Site code	Connectivity	No. samples	DWSNZ MAV	No. $\geq 1$ cfu/100ml	Max cfu/100ml
Kāpiti Coast	BN32/0062	B (high)	4	Not detected (<1)	0	<1.0
Kāpiti Coast	BN32/0063	B (high)	4	Not detected (<1)	0	<1.0
Kāpiti Coast	BN33/0032	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	BP33/0056	B (high)	4	Detected ( $\geq 1$ )	1	1.0
Ruamāhanga	BP33/0057	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	BP34/0216	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	BP34/0229	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	BP34/0236	B (high)	4	Not detected (<1)	0	<1.0
Kāpiti Coast	R25/5100	B (high)	1	Not detected (<1)	0	<1.0
Kāpiti Coast	R25/5165	B (high)	4	Detected ( $\geq 1$ )	1	3.0
Kāpiti Coast	R25/5233	A (direct)	4	Not detected (<1)	0	<1.0
Kāpiti Coast	R26/6587	A (direct)	2	Detected ( $\geq 1$ )	2	3.0
Kāpiti Coast	R26/6624	B (high)	4	Not detected (<1)	0	<1.0
Te Whanganui-a-Tara	R27/1137	B (high)	4	Not detected (<1)	0	<1.0
Te Whanganui-a-Tara	R27/1171	B (high)	4	Not detected (<1)	0	<1.0
Te Whanganui-a-Tara	R27/1180	B (high)	4	Not detected (<1)	0	<1.0
Te Whanganui-a-Tara	R27/1183	B (high)	4	Not detected (<1)	0	<1.0
Te Whanganui-a-Tara	R27/6418	Unknown	3	Detected ( $\geq 1$ )	1	24.0
Te Whanganui-a-Tara	R27/6833	Unknown	3	Not detected (<1)	0	<1.0
Kāpiti Coast	S25/5125	A (direct)	3	Detected ( $\geq 1$ )	3	1000.0
Kāpiti Coast	S25/5200	B (high)	1	Not detected (<1)	0	<1.0
Kāpiti Coast	S25/5322	B (high)	2	Not detected (<1)	0	<1.0
Ruamāhanga	S26/0117	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S26/0223	B (high)	4	Detected ( $\geq 1$ )	3	200.0
Ruamāhanga	S26/0299	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S26/0439	C (moderate to low)	4	Detected ( $\geq 1$ )	2	60.0
Ruamāhanga	S26/0457	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S26/0467	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S26/0762	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0009	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0070	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0136	B (high)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0202	B (high)	4	Detected ( $\geq 1$ )	1	1.0
Ruamāhanga	S27/0299	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0389	C (moderate to low)	3	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0396	A (direct)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0522	C (moderate to low)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0571	C (moderate to low)	4	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0588	A (direct)	1	Not detected (<1)	0	<1.0
Ruamāhanga	S27/0681	A (direct)	4	Not detected (<1)	0	<1.0



Whaitua	Site code	Connectivity	No. samples	DWSNZ MAV	No. $\geq 1$ cfu/100ml	Max cfu/100ml
Ruamāhanga	T26/0087	C (moderate to low)	3	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0099	B (high)	4	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0206	C (moderate to low)	4	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0259	A (direct)	4	Detected ( $\geq 1$ )	1	1.0
Ruamāhanga	T26/0332	C (moderate to low)	4	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0413	C (moderate to low)	4	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0430	B (high)	2	Detected ( $\geq 1$ )	1	11.0
Ruamāhanga	T26/0489	B (high)	3	Not detected ( $<1$ )	0	$<1.0$
Ruamāhanga	T26/0538	B (high)	4	Detected ( $\geq 1$ )	1	1.0
Wairarapa Coast	T27/0063	Unknown	6	Not detected ( $<1$ )	0	$<1.0$

## Saline intrusion

Monthly average saline intrusion results for six Te Whanganui-a-Tara groundwater bores.

Table A6: Shallow groundwater bore R27/0122, the warning threshold is 250  $\mu\text{S}/\text{cm}$ .

Month	Mean conductivity ( $\mu\text{S}/\text{cm}$ )	# warning exceedances
2023-07	174.7	0
2023-08	178.6	0
2023-09	163.3	0
2023-10	158.4	0
2023-11	188.1	0
2023-12	188.7	0
2024-01	186.3	0
2024-02	187.2	0
2024-03	190.5	0
2024-04	190.9	0
2024-05	193.0	0
2024-06	183.5	0

Table A7: Shallow groundwater bore R27/7154, the warning threshold is 200  $\mu\text{S}/\text{cm}$ .

Month	Mean conductivity ( $\mu\text{S}/\text{cm}$ )	# warning exceedances
2023-07	126.2	0
2023-08	126.9	0
2023-09	126.0	0
2023-10	123.7	0
2023-11	118.7	0
2023-12	126.1	0
2024-01	116.4	0
2024-02	118.1	0
2024-03	117.6	0
2024-04	115.9	0
2024-05	114.5	0
2024-06	112.5	0

Table A8: Deep groundwater bore R27/7215, the warning threshold is 200  $\mu\text{S}/\text{cm}$ .

Month	Mean conductivity ( $\mu\text{S}/\text{cm}$ )	# warning exceedances
2023-07	161.2	0
2023-08	176.1	0
2023-09	175.5	0
2023-10	169.9	0
2023-11	157.2	0
2023-12	167.9	0
2024-01	165.8	0
2024-02	164.0	0
2024-03	160.6	0
2024-04	156.0	0
2024-05	152.2	0
2024-06	149.3	0

Table A9: Deep groundwater bore BQ32/0611, the warning threshold is 250  $\mu\text{S}/\text{cm}$ .

Month	Mean conductivity ( $\mu\text{S}/\text{cm}$ )	# warning exceedances
2023-07	179.5	0
2023-08	200.8	0
2023-09	223.3	0
2023-10	209.5	0
2023-11	203.4	0
2023-12	172.3	0
2024-01	170.2	0
2024-02	170.8	0
2024-03	170.2	0
2024-04	169.7	0
2024-05	169.4	0
2024-06	169.2	0

Table A10: Deep groundwater bore BQ32/0612, no warning threshold has been set for this well.

Month	Mean conductivity ( $\mu\text{S/cm}$ )	# warning exceedances
2023-07	382.4	
2023-08	379.4	
2023-09	382.1	
2023-10	383.4	
2023-11	390.9	
2023-12	403.4	
2024-01	386.8	
2024-02	387.1	
2024-03	384.9	
2024-04	374.2	
2024-05	377.1	
2024-06	377.9	

Table A11: Shallow groundwater bore BQ32/0613, no warning threshold has been set for this well.

Month	Mean conductivity ( $\mu\text{S/cm}$ )	# warning exceedances
2023-07	202.2	
2023-08	201.7	
2023-09	201.6	
2023-10	201.7	
2023-11	206.1	
2023-12	209.9	
2024-01	210.4	
2024-02	211.5	
2024-03	211.9	
2024-04	212.7	
2024-05	213.5	
2024-06	213.7	

## Groundwater dissolved reactive phosphorus concentrations

Table A12: Dissolved reactive phosphorus results evaluated in terms of NPS-FM attribute bands for ecosystem health.

Whaitua	Site code	Connectivity	No. samples	Attribute band	Median dissolved reactive phosphorus (mg/L)
Kāpiti Coast	BN32/0062	B (high)	4	D (>0.018 mg/L)	0.0866
Kāpiti Coast	BN32/0063	B (high)	4	D (>0.018 mg/L)	0.0788
Kāpiti Coast	BN33/0032	B (high)	4	D (>0.018 mg/L)	0.0699
Ruamāhanga	BP33/0056	B (high)	4	D (>0.018 mg/L)	0.0703
Ruamāhanga	BP33/0057	B (high)	4	B (>0.006 and ≤0.010mg/L)	0.0078
Ruamāhanga	BP34/0216	B (high)	4	D (>0.018 mg/L)	0.0188
Ruamāhanga	BP34/0229	A (direct)	4	C (>0.010 and ≤0.018 mg/L)	0.0107
Ruamāhanga	BP34/0236	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0124
Kāpiti Coast	R25/5100	B (high)	1	D (>0.018 mg/L)	0.2280
Kāpiti Coast	R25/5135	B (high)	1	D (>0.018 mg/L)	0.2847
Kāpiti Coast	R25/5165	B (high)	4	D (>0.018 mg/L)	0.2179
Kāpiti Coast	R25/5190	B (high)	4	D (>0.018 mg/L)	0.0805
Kāpiti Coast	R25/5233	A (direct)	4	C (>0.010 and ≤0.018 mg/L)	0.0118
Kāpiti Coast	R26/6503	B (high)	4	D (>0.018 mg/L)	0.0467
Kāpiti Coast	R26/6587	A (direct)	2	B (>0.006 and ≤0.010mg/L)	0.0079
Kāpiti Coast	R26/6624	B (high)	4	D (>0.018 mg/L)	0.0198
Te Whanganui-a-Tara	R27/0320	B (high)	4	D (>0.018 mg/L)	0.1442
Te Whanganui-a-Tara	R27/1137	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0119
Te Whanganui-a-Tara	R27/1171	B (high)	4	D (>0.018 mg/L)	0.1102
Te Whanganui-a-Tara	R27/1180	B (high)	4	A (≤0.006 mg/L)	0.0050
Te Whanganui-a-Tara	R27/1182	B (high)	4	A (≤0.006 mg/L)	<0.004
Te Whanganui-a-Tara	R27/1183	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0107
Te Whanganui-a-Tara	R27/1265	B (high)	3	D (>0.018 mg/L)	0.0210
Te Whanganui-a-Tara	R27/6418	Unknown	3	C (>0.010 and ≤0.018 mg/L)	0.0151
Te Whanganui-a-Tara	R27/6833	Unknown	3	D (>0.018 mg/L)	0.0471
Kāpiti Coast	S25/5125	A (direct)	3	C (>0.010 and ≤0.018 mg/L)	0.0108
Kāpiti Coast	S25/5200	B (high)	1	D (>0.018 mg/L)	0.1447
Kāpiti Coast	S25/5322	B (high)	2	D (>0.018 mg/L)	0.0439
Ruamāhanga	S26/0117	A (direct)	4	C (>0.010 and ≤0.018 mg/L)	0.0167
Ruamāhanga	S26/0223	B (high)	4	B (>0.006 and ≤0.010mg/L)	0.0085
Ruamāhanga	S26/0299	B (high)	4	D (>0.018 mg/L)	0.0199
Ruamāhanga	S26/0439	C (moderate to low)	4	C (>0.010 and ≤0.018 mg/L)	0.0133
Ruamāhanga	S26/0457	A (direct)	4	B (>0.006 and ≤0.010mg/L)	0.0072
Ruamāhanga	S26/0467	A (direct)	4	D (>0.018 mg/L)	0.0186
Ruamāhanga	S26/0568	B (high)	1	D (>0.018 mg/L)	0.9608
Ruamāhanga	S26/0762	A (direct)	4	D (>0.018 mg/L)	0.2716
Ruamāhanga	S27/0009	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0141
Ruamāhanga	S27/0070	B (high)	4	B (>0.006 and ≤0.010mg/L)	0.0061

Whaitua	Site code	Connectivity	No. samples	Attribute band	Median dissolved reactive phosphorus (mg/L)
Ruamāhanga	S27/0202	B (high)	4	D (>0.018 mg/L)	0.0192
Ruamāhanga	S27/0299	A (direct)	4	B (>0.006 and ≤0.010mg/L)	0.0063
Ruamāhanga	S27/0389	C (moderate to low)	3	D (>0.018 mg/L)	0.6717
Ruamāhanga	S27/0396	A (direct)	4	D (>0.018 mg/L)	0.0197
Ruamāhanga	S27/0435	C (moderate to low)	1	D (>0.018 mg/L)	3.2191
Ruamāhanga	S27/0442	C (moderate to low)	1	D (>0.018 mg/L)	3.9242
Ruamāhanga	S27/0495	C (moderate to low)	1	D (>0.018 mg/L)	0.5596
Ruamāhanga	S27/0522	C (moderate to low)	4	A (≤0.006 mg/L)	0.0058
Ruamāhanga	S27/0571	C (moderate to low)	4	C (>0.010 and ≤0.018 mg/L)	0.0126
Ruamāhanga	S27/0588	A (direct)	1	D (>0.018 mg/L)	0.0380
Ruamāhanga	S27/0594	C (moderate to low)	1	D (>0.018 mg/L)	0.1578
Ruamāhanga	S27/0607	C (moderate to low)	1	A (≤0.006 mg/L)	<0.004
Ruamāhanga	S27/0681	A (direct)	4	C (>0.010 and ≤0.018 mg/L)	0.0174
Ruamāhanga	T26/0003	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0167
Ruamāhanga	T26/0087	C (moderate to low)	3	D (>0.018 mg/L)	0.0217
Ruamāhanga	T26/0099	B (high)	4	C (>0.010 and ≤0.018 mg/L)	0.0169
Ruamāhanga	T26/0206	C (moderate to low)	4	D (>0.018 mg/L)	0.0578
Ruamāhanga	T26/0259	A (direct)	4	B (>0.006 and ≤0.010mg/L)	0.0075
Ruamāhanga	T26/0332	C (moderate to low)	4	D (>0.018 mg/L)	0.0363
Ruamāhanga	T26/0413	C (moderate to low)	4	B (>0.006 and ≤0.010mg/L)	0.0083
Ruamāhanga	T26/0430	B (high)	2	C (>0.010 and ≤0.018 mg/L)	0.0123
Ruamāhanga	T26/0489	B (high)	3	C (>0.010 and ≤0.018 mg/L)	0.0144
Ruamāhanga	T26/0538	B (high)	4	A (≤0.006 mg/L)	0.0060
Wairarapa Coast	T27/0063	Unknown	6	D (>0.018 mg/L)	0.0981

## Groundwater dissolved metal concentrations

Table A13: Dissolved iron results evaluated in terms of drinking water aesthetic values.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved iron (mg/L)
Kāpiti Coast	BN32/0062	4	Below detection limit (<0.02)	<0.02
Kāpiti Coast	BN32/0063	4	Exceeds aesthetic value (>0.3 mg/L)	3.13
Kāpiti Coast	BN33/0032	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	BP33/0056	4	Low (0.02 to 0.3 mg/L)	0.156
Ruamāhanga	BP33/0057	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	BP34/0216	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	BP34/0229	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	BP34/0236	4	Below detection limit (<0.02)	<0.02
Kāpiti Coast	R25/5100	1	Exceeds aesthetic value (>0.3 mg/L)	1.21
Kāpiti Coast	R25/5135	1	Exceeds aesthetic value (>0.3 mg/L)	1.19
Kāpiti Coast	R25/5165	4	Exceeds aesthetic value (>0.3 mg/L)	2.25
Kāpiti Coast	R25/5233	4	Below detection limit (<0.02)	<0.02
Kāpiti Coast	R26/6503	4	Exceeds aesthetic value (>0.3 mg/L)	1.35
Kāpiti Coast	R26/6587	2	Below detection limit (<0.02)	<0.02
Kāpiti Coast	R26/6624	4	Below detection limit (<0.02)	<0.02
Te Whanganui-a-Tara	R27/0320	4	Low (0.02 to 0.3 mg/L)	0.106
Te Whanganui-a-Tara	R27/1137	4	Low (0.02 to 0.3 mg/L)	0.039
Te Whanganui-a-Tara	R27/1171	4	Exceeds aesthetic value (>0.3 mg/L)	1.13
Te Whanganui-a-Tara	R27/1180	4	Below detection limit (<0.02)	<0.02
Te Whanganui-a-Tara	R27/1182	4	Exceeds aesthetic value (>0.3 mg/L)	1.52
Te Whanganui-a-Tara	R27/1183	4	Below detection limit (<0.02)	<0.02
Te Whanganui-a-Tara	R27/1265	3	Exceeds aesthetic value (>0.3 mg/L)	0.341
Te Whanganui-a-Tara	R27/6418	3	Below detection limit (<0.02)	<0.02
Te Whanganui-a-Tara	R27/6833	3	Below detection limit (<0.02)	<0.02
Kāpiti Coast	S25/5125	3	Low (0.02 to 0.3 mg/L)	0.051
Kāpiti Coast	S25/5200	1	Exceeds aesthetic value (>0.3 mg/L)	0.440
Kāpiti Coast	S25/5322	2	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0117	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0223	4	Low (0.02 to 0.3 mg/L)	0.087
Ruamāhanga	S26/0299	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0439	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0457	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0467	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S26/0568	1	Exceeds aesthetic value (>0.3 mg/L)	3.23
Ruamāhanga	S26/0762	4	Exceeds aesthetic value (>0.3 mg/L)	7.29
Ruamāhanga	S27/0009	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S27/0070	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S27/0136	4	Low (0.02 to 0.3 mg/L)	0.035
Ruamāhanga	S27/0202	4	Low (0.02 to 0.3 mg/L)	0.076
Ruamāhanga	S27/0299	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S27/0389	3	Low (0.02 to 0.3 mg/L)	0.127
Ruamāhanga	S27/0396	4	Below detection limit (<0.02)	<0.02

Whaitua	Site code	No. samples	Concentration rating	Median dissolved iron (mg/L)
Ruamāhanga	S27/0435	1	Exceeds aesthetic value (>0.3 mg/L)	6.88
Ruamāhanga	S27/0442	1	Exceeds aesthetic value (>0.3 mg/L)	0.923
Ruamāhanga	S27/0495	1	Exceeds aesthetic value (>0.3 mg/L)	4.03
Ruamāhanga	S27/0522	4	Low (0.02 to 0.3 mg/L)	0.104
Ruamāhanga	S27/0571	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	S27/0588	1	Exceeds aesthetic value (>0.3 mg/L)	4.32
Ruamāhanga	S27/0594	1	Exceeds aesthetic value (>0.3 mg/L)	1.69
Ruamāhanga	S27/0607	1	Exceeds aesthetic value (>0.3 mg/L)	19.4
Ruamāhanga	S27/0681	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0003	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0087	3	Low (0.02 to 0.3 mg/L)	0.050
Ruamāhanga	T26/0099	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0206	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0259	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0332	4	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0413	4	Exceeds aesthetic value (>0.3 mg/L)	0.467
Ruamāhanga	T26/0430	2	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0489	3	Below detection limit (<0.02)	<0.02
Ruamāhanga	T26/0538	4	Below detection limit (<0.02)	<0.02
Wairarapa Coast	T27/0063	6	Below detection limit (<0.02)	<0.02



Table A14: Dissolved manganese results evaluated against Drinking Water Standards New Zealand guidelines.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved manganese (mg/L)
Kāpiti Coast	BN32/0062	4	Below staining threshold <0.04 mg/L)	0.00438
Kāpiti Coast	BN32/0063	4	Exceeds DWSNZ (>0.4 mg/L)	0.432
Kāpiti Coast	BN33/0032	4	Below staining threshold <0.04 mg/L)	0.00108
Ruamāhanga	BP33/0056	4	Above taste threshold (0.1 to 0.4 mg/L)	0.351
Ruamāhanga	BP33/0057	4	Below staining threshold <0.04 mg/L)	<0.0005
Ruamāhanga	BP34/0216	4	Below staining threshold <0.04 mg/L)	0.00664
Ruamāhanga	BP34/0229	4	Below staining threshold <0.04 mg/L)	0.00136
Ruamāhanga	BP34/0236	4	Below staining threshold <0.04 mg/L)	0.00177
Kāpiti Coast	R25/5100	1	Exceeds DWSNZ (>0.4 mg/L)	1.48
Kāpiti Coast	R25/5135	1	Exceeds DWSNZ (>0.4 mg/L)	0.89
Kāpiti Coast	R25/5165	4	Below taste threshold (0.04 to 0.1 mg/L)	0.0743
Kāpiti Coast	R25/5233	4	Below staining threshold <0.04 mg/L)	0.00053
Kāpiti Coast	R26/6503	4	Below taste threshold (0.04 to 0.1 mg/L)	0.0773
Kāpiti Coast	R26/6587	2	Below staining threshold <0.04 mg/L)	0.00439
Kāpiti Coast	R26/6624	4	Below staining threshold <0.04 mg/L)	0.0009
Te Whanganui-a-Tara	R27/0320	4	Below taste threshold (0.04 to 0.1 mg/L)	0.059
Te Whanganui-a-Tara	R27/1137	4	Below staining threshold <0.04 mg/L)	0.00246
Te Whanganui-a-Tara	R27/1171	4	Above taste threshold (0.1 to 0.4 mg/L)	0.226
Te Whanganui-a-Tara	R27/1180	4	Below staining threshold <0.04 mg/L)	0.0365
Te Whanganui-a-Tara	R27/1182	4	Below taste threshold (0.04 to 0.1 mg/L)	0.0687
Te Whanganui-a-Tara	R27/1183	4	Below staining threshold <0.04 mg/L)	0.0026
Te Whanganui-a-Tara	R27/1265	3	Below staining threshold <0.04 mg/L)	0.0222
Te Whanganui-a-Tara	R27/6418	3	Below staining threshold <0.04 mg/L)	0.00148
Te Whanganui-a-Tara	R27/6833	3	Exceeds DWSNZ (>0.4 mg/L)	0.41
Kāpiti Coast	S25/5125	3	Below staining threshold <0.04 mg/L)	0.00786
Kāpiti Coast	S25/5200	1	Exceeds DWSNZ (>0.4 mg/L)	0.912
Kāpiti Coast	S25/5322	2	Below staining threshold <0.04 mg/L)	0.00083
Ruamāhanga	S26/0117	4	Below staining threshold <0.04 mg/L)	0.00251
Ruamāhanga	S26/0223	4	Below staining threshold <0.04 mg/L)	0.0101
Ruamāhanga	S26/0299	4	Below staining threshold <0.04 mg/L)	0.0033
Ruamāhanga	S26/0439	4	Below staining threshold <0.04 mg/L)	0.0276
Ruamāhanga	S26/0457	4	Below staining threshold <0.04 mg/L)	0.00172
Ruamāhanga	S26/0467	4	Below staining threshold <0.04 mg/L)	0.00297
Ruamāhanga	S26/0568	1	Exceeds DWSNZ (>0.4 mg/L)	0.78
Ruamāhanga	S26/0762	4	Exceeds DWSNZ (>0.4 mg/L)	0.938
Ruamāhanga	S27/0009	4	Below staining threshold <0.04 mg/L)	0.0007
Ruamāhanga	S27/0070	4	Below staining threshold <0.04 mg/L)	0.00067
Ruamāhanga	S27/0136	4	Below staining threshold <0.04 mg/L)	0.0153
Ruamāhanga	S27/0202	4	Below staining threshold <0.04 mg/L)	0.00516
Ruamāhanga	S27/0299	4	Below staining threshold <0.04 mg/L)	0.00075
Ruamāhanga	S27/0389	3	Exceeds DWSNZ (>0.4 mg/L)	0.441
Ruamāhanga	S27/0396	4	Above taste threshold (0.1 to 0.4 mg/L)	0.1
Ruamāhanga	S27/0435	1	Exceeds DWSNZ (>0.4 mg/L)	0.496

Whaitua	Site code	No. samples	Concentration rating	Median dissolved manganese (mg/L)
Ruamāhanga	S27/0495	1	Exceeds DWSNZ (>0.4 mg/L)	0.605
Ruamāhanga	S27/0522	4	Below staining threshold <0.04 mg/L)	0.00153
Ruamāhanga	S27/0571	4	Below staining threshold <0.04 mg/L)	0.00118
Ruamāhanga	S27/0588	1	Above taste threshold (0.1 to 0.4 mg/L)	0.126
Ruamāhanga	S27/0594	1	Above taste threshold (0.1 to 0.4 mg/L)	0.215
Ruamāhanga	S27/0607	1	Exceeds DWSNZ (>0.4 mg/L)	1.6
Ruamāhanga	S27/0681	4	Below staining threshold <0.04 mg/L)	<0.0005
Ruamāhanga	T26/0003	4	Below staining threshold <0.04 mg/L)	0.00159
Ruamāhanga	T26/0087	3	Below staining threshold <0.04 mg/L)	0.00252
Ruamāhanga	T26/0099	4	Below staining threshold <0.04 mg/L)	0.00175
Ruamāhanga	T26/0206	4	Below staining threshold <0.04 mg/L)	0.00575
Ruamāhanga	T26/0259	4	Below staining threshold <0.04 mg/L)	0.00186
Ruamāhanga	T26/0332	4	Exceeds DWSNZ (>0.4 mg/L)	1.81
Ruamāhanga	T26/0413	4	Above taste threshold (0.1 to 0.4 mg/L)	0.324
Ruamāhanga	T26/0430	2	Below staining threshold <0.04 mg/L)	0.00162
Ruamāhanga	T26/0489	3	Below staining threshold <0.04 mg/L)	0.00166
Ruamāhanga	T26/0538	4	Below staining threshold <0.04 mg/L)	0.0133
Wairarapa Coast	T27/0063	6	Below staining threshold <0.04 mg/L)	0.00262

Table A15: Dissolved arsenic results evaluated against Drinking Water Standards for New Zealand guidelines.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved arsenic (mg/L)
Kāpiti Coast	BN32/0062	4	Low (0.001 to 0.01 mg/L)	0.0022
Kāpiti Coast	BN32/0063	4	Low (0.001 to 0.01 mg/L)	0.00109
Kāpiti Coast	BN33/0032	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	BP33/0056	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	BP33/0057	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	BP34/0216	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	BP34/0229	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	BP34/0236	4	Below detection limit (<0.001)	<0.001
Kāpiti Coast	R25/5100	1	Below detection limit (<0.001)	<0.001
Kāpiti Coast	R25/5135	1	Low (0.001 to 0.01 mg/L)	0.0048
Kāpiti Coast	R25/5165	4	Low (0.001 to 0.01 mg/L)	0.00381
Kāpiti Coast	R25/5233	4	Below detection limit (<0.001)	<0.001
Kāpiti Coast	R26/6503	4	Low (0.001 to 0.01 mg/L)	0.00636
Kāpiti Coast	R26/6587	2	Below detection limit (<0.001)	<0.001
Kāpiti Coast	R26/6624	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/0320	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1137	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1171	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1180	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1182	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1183	4	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/1265	3	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/6418	3	Below detection limit (<0.001)	<0.001
Te Whanganui-a-Tara	R27/6833	3	Below detection limit (<0.001)	<0.001
Kāpiti Coast	S25/5125	3	Below detection limit (<0.001)	<0.001
Kāpiti Coast	S25/5200	1	Below detection limit (<0.001)	<0.001
Kāpiti Coast	S25/5322	2	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0117	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0223	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0299	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0439	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0457	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0467	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S26/0568	1	Exceeds DWSNZ (>0.01 mg/L)	0.0234
Ruamāhanga	S26/0762	4	Low (0.001 to 0.01 mg/L)	0.00123
Ruamāhanga	S27/0009	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0070	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0136	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0202	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0299	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0389	3	Low (0.001 to 0.01 mg/L)	0.00236
Ruamāhanga	S27/0396	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0435	1	Exceeds DWSNZ (>0.01 mg/L)	0.0238

Whaitua	Site code	No. samples	Concentration rating	Median dissolved arsenic (mg/L)
Ruamāhanga	S27/0495	1	Low (0.001 to 0.01 mg/L)	0.00473
Ruamāhanga	S27/0522	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0571	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	S27/0588	1	Low (0.001 to 0.01 mg/L)	0.00206
Ruamāhanga	S27/0594	1	Low (0.001 to 0.01 mg/L)	0.00173
Ruamāhanga	S27/0607	1	Exceeds DWSNZ (>0.01 mg/L)	0.0319
Ruamāhanga	S27/0681	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0003	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0087	3	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0099	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0206	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0259	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0332	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0413	4	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0430	2	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0489	3	Below detection limit (<0.001)	<0.001
Ruamāhanga	T26/0538	4	Below detection limit (<0.001)	<0.001
Wairarapa Coast	T27/0063	4	Low (0.001 to 0.01 mg/L)	0.00216

Table A16: Dissolved chromium results evaluated against Drinking Water Standards for New Zealand guidelines.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved chromium (mg/L)
Kāpiti Coast	BN32/0062	4	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	BN32/0063	4	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	BN33/0032	4	Low (0.0005 to 0.05 mg/L)	0.00419
Ruamāhanga	BP33/0056	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	BP33/0057	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	BP34/0216	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	BP34/0229	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	BP34/0236	4	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R25/5100	1	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R25/5135	1	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R25/5165	4	Low (0.0005 to 0.05 mg/L)	0.0005
Kāpiti Coast	R25/5233	4	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R26/6503	4	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R26/6587	2	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	R26/6624	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/0320	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1137	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1171	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1180	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1182	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1183	4	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/1265	3	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/6418	3	Below detection limit (<0.0005)	<0.0005
Te Whanganui-a-Tara	R27/6833	3	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	S25/5125	3	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	S25/5200	1	Below detection limit (<0.0005)	<0.0005
Kāpiti Coast	S25/5322	2	Low (0.0005 to 0.05 mg/L)	0.0062
Ruamāhanga	S26/0117	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0223	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0299	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0439	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0457	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0467	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0568	1	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S26/0762	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0009	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0070	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0136	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0202	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0299	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0389	3	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0396	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0435	1	Below detection limit (<0.0005)	<0.0005

Whaitua	Site code	No. samples	Concentration rating	Median dissolved chromium (mg/L)
Ruamāhanga	S27/0495	1	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0522	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0571	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0588	1	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0594	1	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0607	1	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	S27/0681	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0003	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0087	3	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0099	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0206	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0259	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0332	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0413	4	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0430	2	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0489	3	Below detection limit (<0.0005)	<0.0005
Ruamāhanga	T26/0538	4	Below detection limit (<0.0005)	<0.0005
Wairarapa Coast	T27/0063	4	Below detection limit (<0.0005)	<0.0005

Table A17: Dissolved lead results evaluated against Drinking Water Standards for New Zealand guidelines.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved lead (mg/L)
Kāpiti Coast	BN32/0062	4	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	BN32/0063	4	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	BN33/0032	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	BP33/0056	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	BP33/0057	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	BP34/0216	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	BP34/0229	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	BP34/0236	4	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	R25/5100	1	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	R25/5135	1	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	R25/5165	4	Low (0.0001 to 0.01 mg/L)	0.000478
Kāpiti Coast	R25/5233	4	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	R26/6503	4	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	R26/6587	2	Low (0.0001 to 0.01 mg/L)	0.000347
Kāpiti Coast	R26/6624	4	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/0320	4	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/1137	4	Low (0.0001 to 0.01 mg/L)	0.00109
Te Whanganui-a-Tara	R27/1171	4	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/1180	4	Low (0.0001 to 0.01 mg/L)	0.000242
Te Whanganui-a-Tara	R27/1182	4	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/1183	4	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/1265	3	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/6418	3	Below detection limit (<0.0001)	<0.0001
Te Whanganui-a-Tara	R27/6833	3	Low (0.0001 to 0.01 mg/L)	0.000124
Kāpiti Coast	S25/5125	3	Low (0.0001 to 0.01 mg/L)	0.00019
Kāpiti Coast	S25/5200	1	Below detection limit (<0.0001)	<0.0001
Kāpiti Coast	S25/5322	2	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S26/0117	4	Low (0.0001 to 0.01 mg/L)	0.000368
Ruamāhanga	S26/0223	4	Low (0.0001 to 0.01 mg/L)	0.00324
Ruamāhanga	S26/0299	4	Low (0.0001 to 0.01 mg/L)	0.000231
Ruamāhanga	S26/0439	4	Low (0.0001 to 0.01 mg/L)	0.00052
Ruamāhanga	S26/0457	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S26/0467	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S26/0568	1	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S26/0762	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0009	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0070	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0136	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0202	4	Low (0.0001 to 0.01 mg/L)	0.00013
Ruamāhanga	S27/0299	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0389	3	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0396	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0435	1	Below detection limit (<0.0001)	<0.0001

Whaitua	Site code	No. samples	Concentration rating	Median dissolved lead (mg/L)
Ruamāhanga	S27/0495	1	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0522	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0571	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0588	1	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0594	1	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0607	1	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	S27/0681	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0003	4	Low (0.0001 to 0.01 mg/L)	0.00017
Ruamāhanga	T26/0087	3	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0099	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0206	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0259	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0332	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0413	4	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0430	2	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0489	3	Below detection limit (<0.0001)	<0.0001
Ruamāhanga	T26/0538	4	Below detection limit (<0.0001)	<0.0001
Wairarapa Coast	T27/0063	4	Below detection limit (<0.0001)	<0.0001



Table A18: Dissolved zinc results evaluated in terms of drinking water aesthetic values.

Whaitua	Site code	No. samples	Concentration rating	Median dissolved zinc (mg/L)
Kāpiti Coast	BN32/0062	4	Low (0.001 to 1.5 mg/L)	0.00224
Kāpiti Coast	BN32/0063	4	Low (0.001 to 1.5 mg/L)	0.00275
Kāpiti Coast	BN33/0032	4	Low (0.001 to 1.5 mg/L)	0.00219
Ruamāhanga	BP33/0056	4	Below detection limit (<0.001)	0.0005
Ruamāhanga	BP33/0057	4	Below detection limit (<0.001)	0.0005
Ruamāhanga	BP34/0216	4	Low (0.001 to 1.5 mg/L)	0.00392
Ruamāhanga	BP34/0229	4	Low (0.001 to 1.5 mg/L)	0.0017
Ruamāhanga	BP34/0236	4	Below detection limit (<0.001)	0.0005
Kāpiti Coast	R25/5100	1	Low (0.001 to 1.5 mg/L)	0.0033
Kāpiti Coast	R25/5135	1	Low (0.001 to 1.5 mg/L)	0.00859
Kāpiti Coast	R25/5165	4	Low (0.001 to 1.5 mg/L)	0.00663
Kāpiti Coast	R25/5233	4	Low (0.001 to 1.5 mg/L)	0.00395
Kāpiti Coast	R26/6503	4	Low (0.001 to 1.5 mg/L)	0.0107
Kāpiti Coast	R26/6587	2	Low (0.001 to 1.5 mg/L)	0.00636
Kāpiti Coast	R26/6624	4	Low (0.001 to 1.5 mg/L)	0.00579
Te Whanganui-a-Tara	R27/0320	4	Low (0.001 to 1.5 mg/L)	0.00239
Te Whanganui-a-Tara	R27/1137	4	Low (0.001 to 1.5 mg/L)	0.0101
Te Whanganui-a-Tara	R27/1171	4	Low (0.001 to 1.5 mg/L)	0.0125
Te Whanganui-a-Tara	R27/1180	4	Low (0.001 to 1.5 mg/L)	0.0118
Te Whanganui-a-Tara	R27/1182	4	Low (0.001 to 1.5 mg/L)	0.158
Te Whanganui-a-Tara	R27/1183	4	Low (0.001 to 1.5 mg/L)	0.00571
Te Whanganui-a-Tara	R27/1265	3	Low (0.001 to 1.5 mg/L)	0.00722
Te Whanganui-a-Tara	R27/6418	3	Low (0.001 to 1.5 mg/L)	0.00733
Te Whanganui-a-Tara	R27/6833	3	Low (0.001 to 1.5 mg/L)	0.00881
Kāpiti Coast	S25/5125	3	Low (0.001 to 1.5 mg/L)	0.00696
Kāpiti Coast	S25/5200	1	Low (0.001 to 1.5 mg/L)	0.0156
Kāpiti Coast	S25/5322	2	Low (0.001 to 1.5 mg/L)	0.00251
Ruamāhanga	S26/0117	4	Low (0.001 to 1.5 mg/L)	0.00605
Ruamāhanga	S26/0223	4	Low (0.001 to 1.5 mg/L)	0.0758
Ruamāhanga	S26/0299	4	Low (0.001 to 1.5 mg/L)	0.00803
Ruamāhanga	S26/0439	4	Low (0.001 to 1.5 mg/L)	0.0447
Ruamāhanga	S26/0457	4	Low (0.001 to 1.5 mg/L)	0.00576
Ruamāhanga	S26/0467	4	Low (0.001 to 1.5 mg/L)	0.00115
Ruamāhanga	S26/0568	1	Low (0.001 to 1.5 mg/L)	0.00125
Ruamāhanga	S26/0762	4	Low (0.001 to 1.5 mg/L)	0.00177
Ruamāhanga	S27/0009	4	Low (0.001 to 1.5 mg/L)	0.00273
Ruamāhanga	S27/0070	4	Low (0.001 to 1.5 mg/L)	0.00286
Ruamāhanga	S27/0136	4	Low (0.001 to 1.5 mg/L)	0.00271
Ruamāhanga	S27/0202	4	Low (0.001 to 1.5 mg/L)	0.0109
Ruamāhanga	S27/0299	4	Low (0.001 to 1.5 mg/L)	0.0028
Ruamāhanga	S27/0389	3	Low (0.001 to 1.5 mg/L)	0.0052
Ruamāhanga	S27/0396	4	Low (0.001 to 1.5 mg/L)	0.00463
Ruamāhanga	S27/0435	1	Low (0.001 to 1.5 mg/L)	0.0062
Ruamāhanga	S27/0442	1	Low (0.001 to 1.5 mg/L)	0.00154
Ruamāhanga	S27/0495	1	Low (0.001 to 1.5 mg/L)	0.0035

Whaitua	Site code	No. samples	Concentration rating	Median dissolved zinc (mg/L)
Ruamāhanga	S27/0522	4	Low (0.001 to 1.5 mg/L)	0.00286
Ruamāhanga	S27/0571	4	Low (0.001 to 1.5 mg/L)	0.00463
Ruamāhanga	S27/0588	1	Below detection limit (<0.001)	0.0005
Ruamāhanga	S27/0594	1	Low (0.001 to 1.5 mg/L)	0.0174
Ruamāhanga	S27/0607	1	Low (0.001 to 1.5 mg/L)	0.0101
Ruamāhanga	S27/0681	4	Low (0.001 to 1.5 mg/L)	0.00319
Ruamāhanga	T26/0003	4	Low (0.001 to 1.5 mg/L)	0.00534
Ruamāhanga	T26/0087	3	Low (0.001 to 1.5 mg/L)	0.00232
Ruamāhanga	T26/0099	4	Low (0.001 to 1.5 mg/L)	0.002
Ruamāhanga	T26/0206	4	Low (0.001 to 1.5 mg/L)	0.00205
Ruamāhanga	T26/0259	4	Low (0.001 to 1.5 mg/L)	0.00308
Ruamāhanga	T26/0332	4	Low (0.001 to 1.5 mg/L)	0.00314
Ruamāhanga	T26/0413	4	Low (0.001 to 1.5 mg/L)	0.0132
Ruamāhanga	T26/0430	2	Low (0.001 to 1.5 mg/L)	0.00333
Ruamāhanga	T26/0489	3	Low (0.001 to 1.5 mg/L)	0.00637
Ruamāhanga	T26/0538	4	Low (0.001 to 1.5 mg/L)	0.00426
Wairarapa Coast	T27/0063	4	Low (0.001 to 1.5 mg/L)	0.00105

## Groundwater chemistry: major ion concentrations

Table A19: Median concentrations for the 2023/24 year, HCA clusters and water types. The water type describes the dominant ionic constituents of the groundwater at each site.

Site code	Median Bicarbonate (mg/L)	Median Calcium (mg/L)	Median Chloride (mg/L)	Median Magnesium (mg/L)	Median Potassium (mg/L)	Median Sodium (mg/L)	Median Sulphate (mg/L)	Cluster	Watertype
BN32/0062	100.0	18.6	38.2	8.30	4.55	31.2	8.09	5	Na-Ca-Mg-HCO3-Cl
BN32/0063	73.2	12.8	33.1	4.75	3.98	29.4	8.97	5	Na-Ca-HCO3-Cl
BN33/0032	66.8	9.06	22.7	8.18	1.17	37.1	17.7	5	Na-Mg-HCO3-Cl
BP33/0056	61.7	8.42	14.0	3.69	0.886	19.0	2.79	1	Na-Ca-HCO3-Cl
BP33/0057	29.3	6.87	7.2	1.64	1.33	8.3	4.69	2	Na-Ca-HCO3-Cl
BP34/0216	38.6	9.72	12.0	4.93	1.25	15.0	9.25	2	Na-Ca-Mg-HCO3-Cl
BP34/0229	53.2	12	11.6	4.31	1.38	12.3	7.32	2	Ca-Na-Mg-HCO3-Cl
BP34/0236	52.6	10.8	10.4	4.11	1.3	14.1	11.8	2	Na-Ca-Mg-HCO3-Cl
R25/5100	130.5	11.4	37.2	12.40	9.76	31.2	10	5	Na-Mg-HCO3-Cl
R25/5135	148.1	34	127.8	14.05	1.45	75.0	<0.5	3	Na-Ca-Cl-HCO3
R25/5165	39.1	6.81	32.3	3.46	2.84	27.8	15.5	2	Na-Cl-HCO3
R25/5233	49.4	12.8	10.6	3.60	1.65	12.3	9.57	2	Ca-Na-Mg-HCO3-Cl
R26/6503	80.8	19.8	41.8	7.33	3.97	28.4	14.8	5	Na-Ca-Mg-HCO3-Cl
R26/6587	29.4	6.77	16.1	2.54	1.13	12.9	5.23	2	Na-Ca-HCO3-Cl
R26/6624	65.5	9.69	22.2	6.44	1.63	26.7	10.8	5	Na-Mg-Ca-HCO3-Cl
R27/0320	62.8	4.13	24.2	2.18	0.751	32.0	2.56	1	Na-HCO3-Cl
R27/1137	30.0	6.33	12.5	2.42	1.36	11.7	5.67	2	Na-Ca-HCO3-Cl
R27/1171	59.3	4.58	17.3	4.53	1.83	19.9	0.493	1	Na-Mg-HCO3-Cl
R27/1180	41.6	8.61	14.4	3.24	1.25	13.2	7.03	2	Na-Ca-Mg-HCO3-Cl
R27/1182	83.0	13.2	20.6	7.27	1.87	20.2	8.76	5	Na-Ca-Mg-HCO3-Cl
R27/1183	25.9	5.36	13.1	1.93	0.924	10.6	3.99	2	Na-Ca-HCO3-Cl
R27/1265	38.0	4.77	14.6	2.76	0.989	15.5	3.98	2	Na-Ca-HCO3-Cl
R27/6418	34.7	6.55	25.2	3.95	2.42	20.7	5.81	2	Na-Ca-Mg-Cl-HCO3
R27/6833	87.0	8.88	11.9	6.18	0.825	22.6	2.48	1	Na-Mg-Ca-HCO3
S25/5125	26.9	6.38	16.4	4.67	3.52	16.9	11.3	2	Na-Mg-Ca-Cl-HCO3
S25/5200	99.7	12.5	38.3	8.69	1.3	32.4	3.36	5	Na-Mg-Ca-HCO3-Cl
S25/5322	82.9	17.8	30.9	8.74	2.25	33.1	8.38	5	Na-Ca-Mg-HCO3-Cl
S26/0117	41.1	9.24	10.2	3.44	2.83	11.3	8.12	2	Na-Ca-Mg-HCO3-Cl
S26/0223	28.8	10.9	10.4	5.21	1.17	12.8	11.9	2	Na-Ca-Mg-HCO3-Cl
S26/0299	28.8	7.38	6.1	2.43	0.996	9.0	5.65	2	Na-Ca-Mg-HCO3
S26/0439	39.7	8.9	10.7	4.07	1.07	11.7	8.88	2	Na-Ca-Mg-HCO3-Cl
S26/0457	30.3	8.03	5.7	1.60	0.969	5.5	3.64	2	Ca-Na-HCO3-Cl
S26/0467	42.2	8.05	9.5	3.27	2.09	12.0	7.03	2	Na-Ca-Mg-HCO3-Cl
S26/0568	152.1	20.8	13.1	9.23	1.18	21.5	<0.5	1	Ca-Na-Mg-HCO3
S26/0762	124.2	22.4	42.9	6.54	2.01	36.5	4.06	5	Na-Ca-HCO3-Cl
S27/0009	41.3	10.7	15.0	4.48	1.53	15.5	9.35	2	Na-Ca-Mg-HCO3-Cl
S27/0070	24.3	6.05	6.2	1.26	0.787	5.9	3.19	2	Ca-Na-HCO3-Cl
S27/0136	20.1	7.3	7.4	3.38	1.12	9.9	11	2	Na-Ca-Mg-HCO3-SO4-Cl
S27/0202	22.4	7.47	7.7	3.24	1.13	10.4	16.3	2	Na-Ca-Mg-HCO3-SO4-Cl

Site code	Median Bicarbonate (mg/L)	Median Calcium (mg/L)	Median Chloride (mg/L)	Median Magnesium (mg/L)	Median Potassium (mg/L)	Median Sodium (mg/L)	Median Sulphate (mg/L)	Cluster	Watertype
S27/0299	38.9	7.87	8.9	3.04	0.868	8.9	4.08	2	Ca-Na-Mg-HCO3-Cl
S27/0389	102.7	18.5	23.3	6.50	1.43	27.1	8.89	5	Na-Ca-Mg-HCO3-Cl
S27/0396	234.1	73.3	32.6	8.96	2.31	28.4	27.4	4	Ca-Na-HCO3
S27/0435	146.9	15.1	34.3	6.63	4.2	37.8	<0.5	3	Na-Ca-HCO3-Cl
S27/0442	193.9	8.31	107.1	3.07	0.978	128.9	<0.5	3	Na-HCO3-Cl
S27/0495	153.6	26.1	79.3	9.54	2.17	58.4	<0.5	3	Na-Ca-HCO3-Cl
S27/0522	118.7	34.8	157.7	20.34	2.38	97.9	35.4	4	Na-Ca-Mg-Cl-HCO3
S27/0571	51.7	14.1	33.9	6.30	1.69	29.6	15.7	5	Na-Ca-Mg-Cl-HCO3
S27/0588	61.2	10.7	26.5	4.08	1.54	18.9	6.17	5	Na-Ca-HCO3-Cl
S27/0594	171.9	31.3	70.8	10.30	2.33	54.6	<0.5	3	Na-Ca-HCO3-Cl
S27/0607	248.4	55.6	372.8	25.32	9.11	189.0	<0.5	3	Na-Cl-HCO3
S27/0681	176.3	58	33.8	7.79	2.12	28.1	23.7	4	Ca-Na-HCO3-Cl
T26/0003	22.8	5.77	6.4	1.81	0.845	7.3	5.18	2	Na-Ca-Mg-HCO3-Cl
T26/0087	62.7	13.4	6.4	3.27	1.32	12.8	4.16	2	Ca-Na-HCO3
T26/0099	44.8	8.77	10.2	5.35	1.19	13.2	10.4	2	Na-Mg-Ca-HCO3-Cl
T26/0206	71.3	10.8	11.3	4.67	0.904	19.6	3.7	1	Na-Ca-Mg-HCO3
T26/0259	35.3	9.46	5.7	1.67	0.904	6.6	4.59	2	Ca-Na-HCO3
T26/0332	57.2	17	44.1	7.41	1.36	26.6	17	5	Na-Ca-Mg-Cl-HCO3
T26/0413	97.6	14.9	10.0	5.91	1.01	16.5	0.933	1	Ca-Na-Mg-HCO3
T26/0430	45.7	10	6.3	2.53	1.33	8.8	4.6	2	Ca-Na-HCO3
T26/0489	63.6	28.4	26.5	5.11	1.68	20.7	13.7	5	Ca-Na-HCO3-Cl
T26/0538	65.5	31.3	31.0	10.14	3.9	24.0	45.8	5	Ca-Na-Mg-HCO3-SO4-Cl
T27/0063	303.7	87.5	53.8	7.44	2.02	44.8	8.89	4	Ca-Na-HCO3-Cl