

Agenda

Canterbury Water Management Strategy Waimakariri Zone Committee

Monday 2 October 2023 at 4pm

Council Chamber
215 High Street, Rangiora

Members:

Claire Aldhamland
Kirk Blumers
John Cooke (Te Ngai Tūāhuriri Rūnanga)
Tim Fulton (WDC Councillor)
Ruby Gill-Clifford (Youth Representative)
Erin Harvie
Martha Jolly
Carolyne Latham
Claire McKay (ECan Councillor)
Arapata Reuben (Te Ngai Tūāhuriri Rūnanga)

AGENDA FOR THE MEETING OF THE CANTERBURY WATER MANAGEMENT STRATEGY WAIMAKARIRI ZONE COMMITTEE TO BE HELD IN THE COUNCIL CHAMBER, 215 HIGH STREET, RANGIORA ON MONDAY 2 OCTOBER 2023 COMMENCING AT 4PM.

Recommendations in reports are not to be construed as Council policy until adopted by the Council

BUSINESS

PAGES

KARAKIA

1. BUSINESS

1.1 **Apologies**

1.2 **Welcome and Introductions**

1.3 **Register of Interests**

Advice of any changes or updates.

4 - 5

2. OPPORTUNITY FOR THE PUBLIC TO SPEAK

3. REPORTS

3.1 **Waimakariri Zone Delivery Team, Environment Canterbury – Update – M Griffin (CWMS Facilitator, ECan)**

6 - 8

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** the information taking into consideration the Committee's 2021/24 Acton Plan priorities.

3.2 **Environment Canterbury Planning Programme – Update – M Griffin (CWMS Facilitator, ECan)**

9 - 10

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** the information taking into consideration the Committee's 2021-2024 Action Plan and community engagement priorities.

4. **COMMITTEE UPDATES – M GRIFFIN (CWMS FACILITATOR, ECAN)**

- 4.1 **CWMS Action Plan Budget 2023/24 – applications for projects now open.**
- 4.2 **Zone Committee Working Groups.**
- 4.3 **Co-opting an advisory member onto the Waimakariri Water Zone Committee.**
- 4.4 **Environment Canterbury Updates.**
- 4.5 **Waimakariri District Council Updates.**
- 4.6 **Action Points from the previous Zone Committee Meetings.**

RECOMMENDATION

11 - 184

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** the information provided as part of the Committee Updates.
- (b) **Requests** an option for co-opting an advisory member on the Zone Committee to be confirmed at the 2 October 2023 Zone Committee meeting.

5. **CONFIRMATION OF MINUTES**

- 5.1 **Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee Meeting – 3 July 2023**

185 - 192

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

- (a) **Confirms** the Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 3 July 2023, as a true and accurate record.

6. **GENERAL BUSINESS**

KARAKIA

NEXT MEETING

The next meeting of the CWMS Waimakariri Water Zone Committee is scheduled for 6 November 2023 at 3:30pm.

| | |
|---|-------------------------------------|
| AGENDA ITEM NO: 1.1 | Register of Interests |
| Waimakariri Water Zone Committee | MEETING DATE: 2 October 2023 |

WAIMAKARIRI WATER ZONE COMMITTEE

Register of Interests – at 1 September 2023

Keeping a Zone Committee Members' declarations of interest register allows Zone Committees to identify and manage a conflict of interest when it arises.

The Office of the Auditor General notes a conflict of interest can arise when: "A member's or official's duties or responsibilities to a public entity could be affected by some other interest or duty that the member or official may have."¹

If a member is in any doubt as to whether or not they have a conflict of interest, then the Member should seek guidance from General Counsel, Environment Canterbury, the Zone Facilitator, and/or refer to the following guidance: <https://oag.parliament.nz/2020/lamia>

Types of Interest to be documented in the register:

- Employment, trade or profession carried on by the Member or the Member's spouse for profit or gain
- Company, trust, partnership etc for which the Member or their spouse is a director, partner or trustee, or a shareholder of more than 10% shares
- Address of any land in which the Member has a beneficial interest and which is in the area of the Zone Committee
- The address of any land where the landlord is Environment Canterbury, Mackenzie District Council or Waitaki District Council and:
 - The Member or their spouse is a tenant; or
 - The land is tenanted by a firm in which the Member or spouse is a partner, a company of which the Member or spouse is a director, or a Trust of which the Member or spouse is a Trustee.
- Any other matters which the public might reasonably regard as likely to influence the Member's actions during the course of their duties as a Member.
- Any contracts held between the Member or the Member's spouse and Environment Canterbury, Mackenzie District Council or Waitaki District Council. Including contracts in which the Member or their spouse is a partner, a company of which the spouse is a director and/or holds more than 10% in shares, or a Trust of which the Member or their spouse is a trustee (noting that no committee member should be a party to a contract with Environment Canterbury or the relevant TLA if that value is more than \$25,000 per annum)

Zone Committee members are to ensure that the information contained in this register is accurate and complete.

| Name | Committee Member Interests |
|--------------------------|---|
| Claire Aldhamland | - Teacher – Rangiora High School |
| John Cooke | - Director/Shareholder – Executive Limousines 2015 Limited - Director/Shareholder – Express Hire Limited - Director/Shareholder – Testpro Limited |

¹ Office of the Auditor General Good Practice Guide – Managing Conflicts of Interest: Guidance for public entities

| | |
|------------------------|--|
| | <ul style="list-style-type: none"> - Director/Shareholder – Acropolis Wedding and Event Hire Limited - Director/Shareholder – Pines Beach Store Limited - Director/Shareholder – Coastal Dream 2005 Limited – 4Ha property, Kaiapoi - Interim Trustee – Section 6 Survey Office Plan 465273 Ahu Whenua Trust |
| Cr Tim Fulton | <ul style="list-style-type: none"> - Waimakariri District Councillor - Freelance Writer in the agricultural business sector |
| Erin Harvie | <ul style="list-style-type: none"> - Shareholder – Bowden Consultancy Limited, trading as Bowden Environmental - Co-ordinator - Waimakariri Landcare Trust - Member – NZ Hydrological Society - Member – NZ Institute of Primary Industry Management - Involvement with Cust River Water User Group |
| Martha Jolly | <ul style="list-style-type: none"> - Veterinary surgeon (Companion animal) - PhD Student in Water Resource Management (2nd year) - Volunteer assistant the Styx Living Laboratory Trust - Volunteer educator Vets for Compassion - Volunteer clinician SPCA NZ - Member – Forest and Bird NZ |
| Carolyne Latham | <ul style="list-style-type: none"> - Farmer – Sheep, beef - Director – Latham Ag Ltd Consulting - Shareholder – Silver Fern Farms, Farmlands - Registered Member – New Zealand Institute of Primary Industry Management |
| Cr Claire McKay | <ul style="list-style-type: none"> - Canterbury Regional Councillor - Ihenga Holdings – Partner (with spouse) - McKay Family Trust – Trustee (spouse also a Trustee) - Shareholder – Waimakariri Irrigation Limited, Ravensdown Ltd, Balance Agri-nutrients Ltd, Fonterra, and Farmlands - Member – Federated Farmers, Irrigation NZ - Water take and use consents CRC: 050222.1 - Domestic Wastewater discharge consents CRC: 102594, 122318, 144865 |
| Arapata Reuben | <ul style="list-style-type: none"> - Trustee – Tuhono Trust - Member – National Kiwi Recovery Group - Rūnanga Rep – Christchurch/West Melton Water Zone Committee - Rūnanga Rep – Ashburton Water Zone Committee |

| | |
|--|--|
| AGENDA ITEM NO: 3.1 | SUBJECT MATTER: Waimakariri Zone Delivery Team, ECan – update |
| REPORT TO: Waimakariri Water Zone Committee | MEETING DATE: 2 October 2023 |
| REPORT BY: Murray Griffin, CWMS Facilitator, ECan | |

PURPOSE

This agenda item provides the Zone Committee with an update and overview of recent priorities for the Waimakariri Zone Delivery Team (ECan) that align with the Canterbury Water Management Strategy.

This update will cover:

- The recent industrial wastewater spill and incident response in the Sefton Area
- Rat control project in the Ashley/Rakahuri catchment
- ECan Summer student programme – Waimakariri fish screening and fish passage

RECOMMENDATION

That the Zone Committee

Receive – this update for its information and with consideration to the committee's 2021-2024 Acton Plan priorities.

BY WHO

This update will be led by:

- **Nerida Theinhardt, Zone Delivery Lead – Waimakariri, ECan**
- **Carys Marulli De Barletta: Land Management Advisor – ECan,**

BACKGROUND

1. Industrial wastewater spill and incident response in the Sefton Area

On Friday 1 September Environment Canterbury was alerted to a factory wastewater spill at Saltwater Creek in North Canterbury, and an investigation was initiated. The following key points were provided on 1 September to clarify the situation.

- The spill has stopped, but it has affected the waterway from the Beatties Road end, through to the estuary on the upper side of State Highway One.
- Several signs have been put up warning the public to stay away from the water and to keep animals away.
- Water tests are being carried out.
- Staff from various agencies are on the ground alerting the public, including whitebaiters.
- Fish, including bullies and tuna/eels, are affected. It's important that people do not fish, whitebait or harvest mahinga kai in the area.
- Those who know people who could be heading to the creek or estuary over the weekend, such as for whitebaiting, are asked to share this message.
- If you see affected wildlife, do not touch it - call [0800 765 588](tel:0800765588).

For more information on this incident and investigation go to:

Link - [Discharge to waterway, Saltwater Creek | Environment Canterbury \(ecan.govt.nz\)](https://www.ecan.govt.nz/discharge-to-waterway/saltwater-creek/)

Further updates have been provided over the weeks following the original incident. The most recent update (at the time of writing) was on 22 September at 2pm, as provided below:

Update 9: Friday 22 September 2.00pm

Update from Environment Canterbury and Te Whatu Ora Health New Zealand – Waitaha Canterbury

- Test results from water samples taken three days after the spill indicate that the water quality in the affected area has returned to what it was before the incident. This means people can resume fishing, including whitebaiting.
- However, this does not include shellfish. Further tests are required on shellfish to check whether they're safe to consume.
- For now, people must continue to avoid gathering shellfish in Saltwater Creek and the wider Saltwater Creek and Ashley/Rakahuri estuary.
- Other types of mahinga kai, including watercress, can be consumed but washing them in clean water first is advisable.
- At this stage, we are unable to release further details about the wider test results, due to the ongoing investigation. However, we are confident the deaths to whitebait and other fish were caused by depleted oxygen in river water as a result of the spill.
- We appreciate this has been frustrating for those who like to spend time at the waterway, and we thank the community for its patience while the test results were being processed by the laboratory.
- We will continue to provide updates as and when we can.
- Please share this message with anyone who may be visiting the area.

Nerida Theinhardt will provide the committee with the latest update on this investigation at the meeting.

2. Rat control project in the Ashley/Rakahuri River

Nerida Theinhardt will provide the committee with an overview of this project.

Norway rats pose the main predation threat to braided river birds breeding in the lower reaches of the Ashley Rakahuri River including the black-billed gull, the black-fronted tern, and wrybill. This project provides funding to the Ashley Rakahuri Rivercare group to contract a specialised rat detection dog to control Norway rats in the lower reaches of the Ashley-Rakahuri River. The rat detection dog and handler will be contracted for 3 days in August and 3 days in November reducing the threat of predation by Norway rats to breeding braided river birds on the Ashley Rakahuri River.

about and thinking to get some funding for fish passage to continue with this.

3. Summer student programme – Waimakariri fish screening and fish passage

Carys Marulli De Barletta has provided the following overview of the 2022/23 Summer Student Programme run by Environment Canterbury.

Over the course of our 10 weeks at Environment Canterbury we worked on two different projects. Our first project focused on mapping willows in basins across the Canterbury region. Our second project was a continuation of the fish passage assessment work done by previous summer students.

The aim of mapping willows was to understand their distribution across Canterbury. Willow trees (*Salix* spp.) pose a significant threat to wetlands in New Zealand. Our work focused on Lees Valley, a site with unique areas of remnant wetlands. Willows have not previously colonised Lees Valley due to stock grazing. With this expected to stop, willow eradication may occur to ensure the integrity of the wetland. The maps we have created will provide the information required for any future eradication.

The aim of our fish passage work was to identify barriers and assess the level of risk they pose to native fish movement. The fish passage project was twofold, first we reassessed ECan owned structures that had undergone full or partial remediation or had been assessed in unfavourable conditions (i.e., high flow). The second part of this project was to complete an initial assessment of fish passage barriers in the Washpen Catchment. Washpen catchment

is one of the last Mudfish (*Neochanna burrowsius*) strongholds and therefore understanding the barriers to their migration as well as the barriers protecting them from Trout are particularly important.

For more information on the ECan Northern Zone Delivery Team:

[Meet your northern Environment Canterbury team | Environment Canterbury \(ecan.govt.nz\)](#)

| | |
|--|---|
| AGENDA ITEM NO: 3.2 | SUBJECT MATTER: ECan Planning Programme – update |
| REPORT TO: Waimakariri Water Zone Committee | MEETING DATE: 2 October 2023 |
| REPORT BY: Murray Griffin, CWMS Facilitator, ECan | |

PURPOSE

This agenda item provides the Zone Committee with an update and overview of the Environment Canterbury Planning Programme, with a specific focus on:

- Plan Change 7 of the Canterbury Land and Water Regional Plan, and
- The next round of consultation for the Regional Policy Statement review.

RECOMMENDATION

That the Zone Committee

Receive – this update for its information and with consideration to the committee’s 2021-2024 Action Plan and community engagement priorities.

BY WHO

This update will be led by:

- **Zella Smith, Principal Planning Advisor, ECan**

BACKGROUND

Plan Change 7

Plan Change 7 has been made partially operative and Plan Change 2 is fully operative. That means PC7 now has full legal effect (with the exception of the plantation forestry provisions that are still subject to an appeal).

In preparing to make PC7 operative, we noticed an error that had occurred in water allocation table. The error occurred because the calculations to determine the consented allocation were done using a different methodology than the methodology that is required to be used by consenting staff that is set out in Schedule 9 (which was amended as a part of PC7).

For more information:

[Plan Change 7 | Environment Canterbury \(ecan.govt.nz\)](https://ecan.govt.nz/plan-change-7)

Regional Policy Statement Review

We have completed the first round of community engagement for the Regional Policy statement review. We had excellent engagement from right across Waitaha in that first round with around 70 hui, webinars and workshops held and around 380 email and survey responses.

We are working closely with our Papatipu Rūnanga partners and continuing conversations with key stakeholders throughout September to refine options to bring to the public in October.

We are also designing the next round of engagement (which will start in October). One of the key things we noticed in the last round was that community groups didn’t have a lot of

opportunity to work together to discuss the resource management issues and understand the varying perspectives on them. That is why we are working on creating opportunities for stakeholders to have joined up discussions with varying opinions and ideas “in the room” in the upcoming engagement round.

Zone Committees are well placed to draw communities together for collaborative discussions and we are keen to work with you to set up some workshops with a wide range of stakeholders.

For more information:

[Developing an integrated regional planning framework | Environment Canterbury \(ecan.govt.nz\)](#)

| | |
|--|-------------------------------------|
| AGENDA ITEM NO: 4 | SUBJECT: Committee Updates |
| REPORT TO: Waimakariri Water Zone Committee | MEETING DATE: 2 October 2023 |
| REPORT BY: Murray Griffin, CWMS Facilitator – Waimakariri, ECan | |

PURPOSE

The purpose of the agenda item is to provide the committee with an overview of updates to be tabled.

RECOMMENDATION

That the Zone Committee:

Receives these updates for its information.

Requests an option for co-opting an advisory member onto the Zone Committee to be confirmed at the 2 October 2023 Zone Committee meeting.

COMMITTEE UPDATES

The following updates will be addressed with the committee:

1. CWMS Action Plan Budget 2023/24 – applications for projects now open

- A copy of the ad placed in both the North Canterbury News and Northern Outlook inviting applications from the Waimakariri Water Zone for the 2023/24 CWMS Action Plan Budget is provided as **agenda item 4 – 1**.

2. Zone Committee Working Groups

Biodiversity Working Group

Martha Jolly has provided the following update:

- The Working Group has promoted the upcoming environmental awards with the help of WDC. We have received applications in every category and the judging panel, that includes working group members, Biodiversity Trust input, and representatives from WDC and ECan will go out in the next week to assess applications.
- These inaugural Environmental Awards are to be given out as part of the WDC community awards on October 18th.

Lifestyle Block Working Group

Carolyne Latham had provided the following update:

- WDC have advised they can post out leaflets with rates notices, numbers of pamphlets to be advised.
- A trial workshop has been run covering tips 1-5. It went well with good feedback, but the numbers attending was quite low. Wider advertising may have been needed. A workshop for tips 6-10 will be run later in the year or early next year. Another tips 1-5 workshop may be run with WDC in the Ohoka area.

- ECan have been working on a Lifestylers Hub web page.
- Other avenues for promotion are being investigated.

Monitoring Working Group

Erin Harvie provided the following update:

- The Working Group has been working with the Waimakariri Landcare Trust to confirm a project focused on analysis of the current freshwater monitoring within the zone. This project will build the understanding of the existing monitoring already being undertaken by various stakeholders within the Waimakariri District and to determine where the spatial and temporal data gaps are in the monitoring programme and what additional monitoring needs to be undertaken to meet the new freshwater management targets and outcomes.
- A copy of the last milestone report for Waimakariri Landcare Trust is provided as **agenda item 4 – 2**.
- Also provided, via the link below, is the Good Management Practice (GMP) document prepared as part of the project.
https://drive.google.com/file/d/1twOqT0uJo_mglWBIOfqv-GZoT6UtzstU/view?usp=sharing

3. Co-opting an advisory member onto the Waimakariri Water Zone Committee

Following on from the discussion at the committee's 1 May meeting it was proposed that the committee's Facilitator, M Griffin, follow up on the options available for the committee to co-opt an advisory member onto the committee through until the next CWMS Zone Committee Refresh in 2024.

In following up on this option, two key points have been clarified for the committee's consideration:

1. Former Zone Committee member and Chair, David Ashby, currently has other commitments that preclude him from being co-opted back onto the committee.
2. The approach developed with ECan Planning for the second round of consultation for the draft Regional Policy Statement proposes CWMS Committees host 'stakeholder network meetings in October and November to support further feedback on the drafting of the RPS. This approach effectively builds off the existing relationships of the Waimakariri Water Zone Committee within the community (e.g. Waimakariri Landcare Trust, WIL, Waimakariri Biodiversity Trust, Ashley Rakahuri Rivercare Group). This 'stakeholder network' approach effectively addresses the original impetus to co-opt an additional advisory member onto the committee in the short term.
3. Consequently, the committee is advised that the co-option of an additional advisory member to the committee need no longer be a priority for the committee currently.

4. Environment Canterbury Updates

Councillor Claire McKay will lead this update to the committee.

- **Water and Land Committee Meetings**

Please find the link below for the Environment Canterbury Water and Land Committee meetings, with the meeting to be held on Wednesday 18 October.

The agenda can be viewed and downloaded from this link:

- Link: [Council and committee meetings: Current month | Environment Canterbury \(ecan.govt.nz\)](https://www.ecan.govt.nz/council-and-committee-meetings/current-month/)

- Waimakariri Water Zone Committee Chair & Deputy, Carlyne Latham and Erin Harvie, presented to the previous Water and Land Committee held on 30 August. A copy of the Northern Water Zone Committee's report to this committee is provided as **agenda item 4 – 3**.
- The other two ECan reports provided for the committee are:
 - **Agenda items 4 – 4**: Annual groundwater quality survey, spring 2022
 - **Agenda items 4 – 5**: Water quality for contact recreation – Annual summary report 2022-23 season

5. Waimakariri District Council updates

Councillor Tim Fulton will lead this update to the committee. The three WDC reports provided for the committee are:

- **Agenda items 4 – 6**: Private Well Study Results 2022 Eyreton Cust Carleton Swannanoa
- **Agenda items 4 – 7**: Zone Implementation Programme Addendum (ZIPA) Capital Works Programme – 2023-24
- **Agenda items 4 – 8**: Community Biodiversity funding – ZIPA Recommendation 2.8

6. Action points from the previous zone committee meetings

Action points from the previous meetings:

- Information on the realignment of the North Brook tributary and water quality sampling at Tutaepatu Lagoon.
- An update on the Kaiapoi River salinity logger data.
 - Further updates on the above action points are being facilitated.

Fin.

Waimakariri

Canterbury Water Management Strategy

ACTION PLAN FUNDING

The Waimakariri Water Zone Committee will be making recommendations to Environment Canterbury during 2023/24 on how to allocate \$75,000 of funding to help implement the committee's action plan.

If you have a project that requires funding that will help improve water management, enhance biodiversity, or engage the community, please email zone facilitator murray.griffin@ecan.govt.nz

An application form and guidance will be provided. Applications close on 13 October 2023. The zone facilitator will advise applicants of the outcome by the end of 2023.

Find out more about funding at
ecan.govt.nz/zone-funding

Next Generation Farming Milestone 12 Report

To: Guy Tapley
From: Erin Harvie
Date: 23rd June 2023
Subject: Milestone 12 Reporting

This report provides the detail of activities undertaken to deliver milestone 12 which included:

- Extension and Engagement with farmers
- Project communications, including innovation and technology case studies.
- Project management and reporting
- Knowledge Attitudes Skills Aspirations survey and updated dashboard.
- Nutrient Mitigation Guide
- Future Opportunities
- Project Reflections

Activities Undertaken

1. Extension and Engagement with Farmers

A summary of activities undertaken is as follows:

- General – All pod groups and membership base
To facilitate further learning from the technology and innovation on farm case studies the last of the on-farm field days was hosted by Julie Bradshaw, supported by Paul Bao from LIC to discuss genetic and genomic testing and the benefits that the data has provided for this case farm. A copy of the FAQ document is attached in the evidence of achievement item 1a (including all three FAQ documents).
- Iwi Engagement -Farmers field trip for Mahinga Kai 21st June 2023
A field trip was held to broaden farmers knowledge and understanding on how they can implement practices on-farm that will protect and improve mahinga kai values within the catchment. The field trip looked at Ki uta ki tai (from the mountains to the sea) a Māori concept that acknowledges the interconnectedness of all elements of the environment. This idea guided the field trip, as we learned how we monitor the health of our catchment, and how mātauraka Māori (Māori knowledge) relates to farmers.
See first-hand how mātauraka monitoring, together with on-farm and catchment monitoring help us understand what is going well and where improvements are needed within a catchment context. This will be useful

for farmers when Freshwater Farm Plans are rolled out in Canterbury in the future. Copy of the flyer is attached as evidence of achievement item 1b.

- Community wellbeing
Waimakariri farmer and chair of Waimakariri Landcare Trust, Sam Spencer-Bower has joined with project partners Dairy NZ in Talking Dairy podcast episode 51 Mental Health: “Don't be afraid to open up”. Overwhelmed by workload pressure, self-doubt and a fear of what others expected of him, fifth generation farmer Sam Spencer-Bower stopped being able to function. It took six months before his wife – and Sir John Kirwan – helped convince him to get help. Sam joins us to share his mental health journey: the underlying causes, learning to talk about it, and the skills he's developed to cope with the stresses of the job.
Copy of the link to the full podcast is available as evidence of achievement 1c.
- Caretakers of the land for future generations
Engagement continues with experts and scientists from Our Land and Water with the case study farmers to complete the modelling on land use opportunities. Further reporting on the work with Our Land and Water is provided in section 7.0.
- Proactive about economic and environmental measures.
Engagement has focused on evaluating the experiences of farmers who have undertaken Integrated Farm Plans. This has also been supported with a media package to communicate the experiences of local farmers and experts (more details are provided in section 2, project communications).

2. Project Communications

The project website continues to be updated with project events and extension material. The website can be viewed at www.waimaklandcaretrust.co.nz

The quarterly newsletter continues to be distributed to all members of the Waimakariri Landcare Trust and other rural professionals. This provides the opportunity to inform the wider membership with the project updates, summary of event information, and opportunities to get involved. A link to recent newsletters is attached as part of the evidence of achievement 2a.

Delivery of the innovation and technology case studies continue into a second year, a summary of the media coverage leveraged from these is outlined as part of the

evidence of achievement. A full list of all nine articles and videos produced is provided as evidence of achievement 2b.

Media coverage package for Integrated Farm Plans has focused on the farmers experience and benefits gained from the process. It was created with the intention of knowledge sharing and to be a useful resource which can be used by other groups to encourage farmers to take up the opportunities and benefits that Integrated Farm Planning can offer farmers. This has been accompanied by formal media article focused on the experience of both farmers and experts involved in the project. A copy of the media package is provided as evidence of achievement item 2c.

3. Project Management and Reporting

The steering group, made up of project partners, has been an invaluable asset throughout the project and has contributed to the sharing of knowledge and information at a strategic level. We would like to acknowledge and thank the steering group for their contribution. Since the last reporting on project management, there have been two steering group meetings, these have been held in November 2022, March 2023. A copy of the steering group meeting minutes, risk and issue register and project reporting dashboard are attached as part of the evidence of achievement for November 2022 and March 2023.

4. KASA Survey and Dashboard Reporting

To track the changes in Knowledge Attitudes Skills and Aspirations of the farmers within the Waimakariri over the duration of the project, a series of survey have been conducted. The most recent survey was conducted in April and May 2023. This has built on the previous KASA survey undertaken throughout the project with several of the individuals surveyed for each consecutive survey to provide continuity. The results have been collated and analysed to generation information to update the monitoring dashboard. A copy of the survey questions, survey analysis and monitoring dashboard is attached as part of the evidence of achievement items 4a, 4b and 4c.

Survey questioning determined that visual and audio media were a valued source of information for farmer with less than 10 years' experience, while farmers with more than 10 years' experience preferred to receive information from one-on-one meetings or via workshops. However, across all age groups, local case study information was preferred. Understanding the preferences for delivery across the years of experience is valuable for designing any future extension programmes within the Waimakariri.

5. Nutrient Loss Mitigation Guide

The guide has been used as an opportunity to connect its reader with wider tools and resources developed throughout the Next Generation Farming project, and those already available within the industry which are applicable to the Waimakariri. It is anticipated that the guide will become a resource for farmers within the district as it provides references to relevant links and references for further learning. In support of this aim, the guide includes relevant links to both the Waimakariri Landcare Trust website information hub and other relevant external resources and tools. A copy of the completed guide is provided in the evidence of achievement item 5a.

6. Integrated Farm Plans -Evaluation of Farmer Experience and Benefits

Throughout the development and testing of the integrated farm planning approach, farmer input has been instrumental for ensuring the outcome is meaningful and has a lasting impact. To this end, a survey of farmers experience has been undertaken to provide a feedback loop for continuous improvement. In summary the results have indicated that -

- Some indication of the areas and level of questioning would be useful for some farmers prior to the initial interview phase; and
- The Report prepared and the chance to discuss this with the lead consultant and experts was extremely valuable; and
- Experience provided access to high calibre experts, who farmers said they would not have known about otherwise; and
- Provided an opportunity to work on the business rather than in the business; and
- Core themes for additional support was linked to accountability, a scheduled follow-up meeting with the lead consultant and/or experts involved would be beneficial.

To continue to promote the benefits of the Integrated Farm Planning approach beyond this project media package consisting of article and video creation has been completed. Refer to evidence of achievement item 2c.

A comprehensive targets document is under development, to assist individual farmers as a guidance document covering all aspects in alignment with current Integrated Farm Planning format developed through the Next Generation Farming project. The document can provide a quick/cost effective starting point for farm businesses to identify any risks and opportunities to then seek further specialist advice or to identify other businesses with similar risks or opportunities; further learning could then be facilitated via a group workshop setting with specialists. This document will be a resource which can be used beyond this project by farm businesses or other groups looking to further encourage taking an Integrated approach to Farm Planning.

7. Future opportunities

The Our Land and Water science challenge, research stream Whitiwhiti Ora: Land Use Opportunities programme, aims to help identify the most suitable land use options for land by providing a broad understanding of the benefits and consequences of each option, supporting better land use and policy decisions. Researchers are working on creating and curating environmental, economic, social, and cultural information for different land use options.

Over the course of the project, farmers and scientists from the Whitiwhiti Ora: Land Use Opportunities programme have worked collaboratively to identify land use diversification opportunities that farmers have the appetite for, and are viable for the Waimakariri District; these both being identified by local farmers as key driver in the decision making process.

In phase one (reported previously in MS11) specialists have been engaged to create modelling on the four case study farms. The dairy farm modelling focused on further detailed analysis of stacked mitigation measures for reducing nitrogen losses, including abatement curves of costs vs nitrogen loss reduction under each successive mitigation measure. Non-dairy platforms modelled the inclusion of apples, hops, trees on farm and edible fungus. Phase two has included detailed modelling of two **scenario; a farmer's choice** and a researched oriented scenario that pushes for greater change in land use to deliver further reductions in nitrogen leaching. Reporting for each of the case study farms has included an outline of development costs and requirements. A copy of the reporting for each land use option is provided in evidence of achievement 7b-7e. Note, that the documents in 7b-7e require final farmer approval prior to be circulated to wider audience. Once approved, the documents will be made available to farmers within the Waimakariri.

Our Land and Water science challenge continues to work with Waimakariri dairy farmer data to model a low nitrate -nitrogen leaching future dairy system. Expected delivery and presentation of this alternative farm system will occur at a workshop run by OLW and Waimakariri Landcare Trust on the 11th of July.

The local case study analysis will continue to be hosted on the website. To further extend the reach of the learnings, a prototype of a practical visualisation tool has been developed. This tool utilises the online repository, the “data supermarket” developed as part of the wider Whitiwhiti Ora research programme, which includes information on the land use suitability and production potential of a variety of crops. Using the visualisation tool farmers can identify their farm and select any area within the farm (using the polygon drawing feature). A copy of the link and an example of how the tool can be used is provided below.

The prototype visualisation tool can be accessed at the following link:
<https://polite-ground-061a76310.2.azurestaticapps.net/>

Instructions for use of the visualisation tool is provided in evidence of achievement item 7a.

In addition to the land use work, two baseline eDNA water sampling within the catchment has been conducted. These serve as a basis for understanding of the current ecological health of some waterbodies within the Waimakariri District. During the second round of eDNA sampling, freshwater ecologists also collected conventional macroinvertebrate samples. This data provides for opportunities for comparison in the future, should land use change occur. The data can be accessed via an interactive map hosted by wilderlab (Figure one) and includes a list of species, a wheel of life, and ecological health overall rating for the sample area (Figure two).

The interactive map can be viewed at [Explore — wilderlab](#)
Enter passcode WC35828 for round 1 sampling;
Enter passcode J30C6BB for round 2 sampling.



Figure One: interactive map showing the sampling locations.

Environmental DNA: Cam River

- <https://www.wilderlab.co.nz/explore>

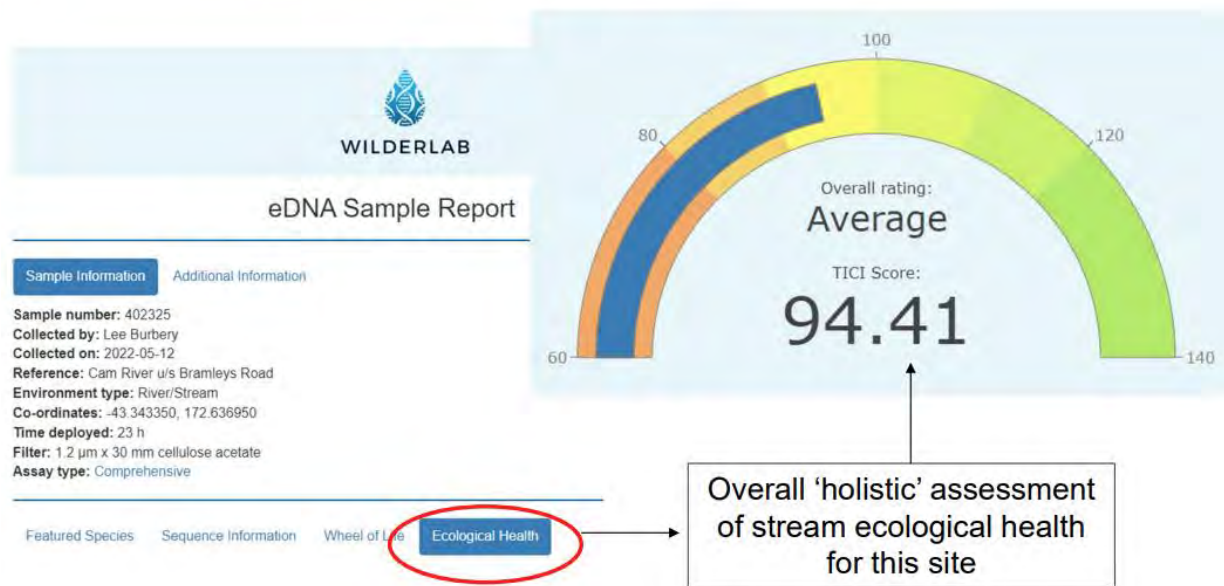


Figure Two: example of the ecological health scoring from a sample from Cam River at Bramleys Road

8. Project Reflections

The Next Generation Farming project has sought to use an integrated farm planning approach to help farmers achieve nitrogen reduction targets, while considering other requirements, such as green-house gases emissions, and animal welfare. In conjunction with this, the project sought to support farmers to explore future farm systems that will achieve the long-term sustainability limits for the Waimakariri Catchment.

Collaboration with the Our Land and Water Science Challenge has been pivotal in exploring future farm systems. Initial engagement from farmers within the Waimakariri Catchment, indicated that diversification of current farm systems was preferable as opposed to whole scale land use change. Key deliverables have included -

- Stacked nitrogen mitigation measures including marginal abatement curves for profit/loss and nitrogen reduction achieved, including milk price sensitivity for each mitigation option.
- Detailed case study reports for the inclusion of apples, trees, edible fungi, and hops within existing farm system
- Online visualisation tool to support farmers decision -making and investigation of suitable alternative land uses.

Developing and testing an Integrated Farm Planning approach was a significant undertaking of the Next Generation Farming project. The framework was developed with input from farmers, industry experts and considering national guidance. Following the development of the framework, the concept was piloted with three farmers, which quickly identified areas for improvement in both the process and the resulting report. Subsequent changes were implemented, tested, and communicated to farmers and experts. While it has taken longer to develop integrated farm planning within the Waimakariri as a collaborative learning process, the outcome is more robust and has increased farmer and primary sector understanding of what an IFP is and how it can add value to a farming business.

Key deliverables relating to the integrated farm planning have included –

- Collaborative approach between farmers and experts to a framework of what needs to be included within Integrate Farm Planning; and
- Integrated Farm Plan questioner and numerical summary template; and
- Integrated Farm Plan template; and
- Building capacity and capability of relating to the process of integrate farm planning; and
- Nutrient Mitigation Guide.

Additional workstreams undertaken within the project included extension work focused on delivering support and information relating to the core themes of the pod

group. The engagement with each group has varied over the duration of the project; with engagement increasing following facilitation. The groups required a higher level of facilitation and co-ordination to maintain momentum than was initially expected. It is suggested that this in part, a consequence of the Covid-19 pandemic occurring during project delivery. Communication and monitoring were used as an essential tool for reporting on and sharing knowledge to improve engagement.

Project execution has been impacted by Covid-19, with initial project engagement with farmers restricted by the ability to hold events and workshops. This combined with changes across project management/delivery because of the issues outside the control of the Waimakariri Landcare Trust, has meant that the project was slower to generate momentum than expected. Despite this, the project has been successful in engaging the farming community and providing resources and tools for assisting farmers to achieve nitrogen reduction targets over time.

The project has generated significant media exposure, especially with the technology and innovation case studies. Through the delivery of the project, the Waimakariri Landcare Trust, and antidotally project partners, have experienced consequential benefits. The Waimakariri Trust has built up a digital presence and created a website to be able to share learnings with local farmers and a wider audience. This has resulted in building and strengthening relationships between members, industry bodies, and establishing a presence with the wider public.

Key lessons for project execution are –

- Importance of a steering group or committee for governance and strategic guidance; and
- Importance of initially setting up the correct framework for project evaluation and monitoring to successfully track project progress and impacts; and
- Importance of creating and implementing a communications strategy both internally to farmers, and externally to the industry and wider public; and
- Ensuring sufficient budget and resources are allocated for extension facilitation; and
- Importance of central platform for hosting and sharing resources developed.

Recommendations for next steps:

Project evaluation has identified the benefits of using an integrated farm planning approach for lifting farm improvement and building business resilience. The final survey was structured to capture the preference and requirements of the local community moving forward into the next phase. Results indicated that 90% of local farmers would value expert knowledge; This is the highest single survey result within the project. The topics broadly included environmental improvements, farm systems changes, technology to implement and improve efficiencies, financial, and people management.

The survey results indicated no preference for support on business governance or planning, even though less than 45% of farmers had written business plans. Reasons for this were not able to be defined based on the current survey. However, the integrated farm plans piloted within the Waimakariri frequently identified this area within the top two priorities for improvement. Suggesting, while this topic is not often in the front of mind, it is a critical element to get right, to ensuring other areas of the farm business operative efficiently.

To support the acceleration of an integrated approach to farm planning it is recommended that -

- Topics of interest be covered initially in group/workshop settings to define what good practices is for the topic and to explore strengths and weaknesses; and
- That a session on strategy and governance is included in any integrated farm planning program; and
- Ensure that group/workshops are concluded with a clear outline of next steps for farmers, or list of experts which could assist on the topic; and
- Experienced subject matter experts be utilised for workshops; and
- Peer to peer learning is supported via collaboration between organisations undertaking integrated farm planning.

From completing of the Next Generation Farming project, the Waimakariri Landcare Trust is in a strong position to sharing knowledge and resources relating to an integrated farm planning approach, to provide continued benefit the wider farming community beyond the current project.

Evidence of Achievement

The following is an outline of the evidence provided for the activities completed:

1. Extension and Engagement
 - 1a N Sensor- FAQ
 - 1a Subsurface Irrigation -FAQ
 - 1a Genetics within Dairy FAQ
 - 1b Flyer for the Mahinga Kai Farmers Field Day, co-hosted with Environment Canterbury
 - 1c Podcast episode 51 Mental health “Don't be afraid to open up”.

<https://www.buzzsprout.com/259061?&iframe=true&referrer=https%3A%2F%2Fwww.buzzsprout.com%2Fadmin%2Fpodcasts%2F259061%2Fembed#>

2. Project communications and innovation and technology case studies
 - 2a Link to the latest Newsletter (Autumn 2023)

<https://mailchi.mp/7bb867a95dc5/waimakariri-landcare-trust-autumn2023-newsletter-6041557>

- 2b links to all nine of the innovation and technology case studies video and articles are provided below.

Nitrogen Sensor:

#1 <https://waimaklandcaretrust.co.nz/quantifying-benefits-of-sensor-based-nitrogen-application/>

#2 <https://waimaklandcaretrust.co.nz/n-sensor-provides-environmental-and-economic-benefits/>

#3 <https://waimaklandcaretrust.co.nz/farm-viability-improved-through-precision-agriculture/>

Subsurface drip irrigation

#1 <https://waimaklandcaretrust.co.nz/data-gathering-focus-for-subsurface-irrigation-trial/>

#2 <https://waimaklandcaretrust.co.nz/subsurface-drip-irrigation-trial-gains-momentum/>

#3 <https://waimaklandcaretrust.co.nz/underground-irrigation-trial-boosts-efficiency/>

Genetics within herd

#1 <https://waimaklandcaretrust.co.nz/quality-data-helps-refine-dairy-herd/>

#2 <https://waimaklandcaretrust.co.nz/maintaining-milk-production-with-fewer-cows/>

#3 <https://waimaklandcaretrust.co.nz/genomic-data-empowers-decision-making/>

- 2c Integrated Farm Planning media package
- Article -Integrated farm plan boosts business structure
3. Project management and reporting
 - 3a November 2022 steering group meeting papers and minutes.
 - 3b March 2023 steering group meeting papers and minutes.
 4. KASA Survey
 - 4a Copy of survey questionnaire
 - 4b summary of survey results
 - 4c Dashboard reporting from survey
 5. Nutrient Loss Mitigation Guide
 - 5a copy of the Nutrient mitigation guide
 7. Future Farming Opportunities
 - Visualisation prototype tool
<https://polite-ground-061a76310.2.azurestaticapps.net/>
 - 7a Visualisation tool instructions
 - 7b Apple production in the Waimakariri
 - 7c Incorporation of trees and fungi within arable farm system
 - 7d Incorporation of trees within sheep and beef farm system
 - 7e Inclusion of Edible Fungi within farm systems.

**Evidence of Achievement:
Extension and Engagement 1a -1b**

Roscoe Taggart – Precision Agriculture

December 2022 Field Day

N-sensor FAQs

- **How does the N-sensor work?**

The N-sensor is fitted to the roof of Roscoe's tractor and allows him to measure the precise amount of nitrogen required for each area of crops in a paddock. As the fertiliser spreader moves through the paddock it varies the fertiliser application rate according to the data that the N-sensor receives. The amount of nitrogen is determined by measuring the crop's light reflectance. Measurements are taken every two seconds at specific wave bands which reflect the crop's biomass and chlorophyll content. The system then calculates the crop's nitrogen uptake which enables the correct amount of fertiliser to be applied directly to the plant.

The N-sensor should be used during the growth stage of a plant.

- **Which operating modes does the sensor use and what is the difference between the modes?**

Absolute mode – the sensor is completely in control of spreading nitrogen and it does so via the process described above.

Target mode – you enter the number of units of N obtained from the handheld N sensor into a tablet fixed inside the tractor. This process involves taking 30 leaf samples from the paddock and then the sensor provides a reading of how many units of N you need to apply to the crops.

- **What's the range of operation of the sensor?**

It measures 3.6 metres from each side of the tractor.

- **What information do you need to provide to the N-sensor?**

The upper and lower parameters of the N you want to apply.

The growth stage of the crop

The expected yield of the crop

This information is entered into a tablet fixed inside the tractor which then feeds the information to the N sensor.

- **What is the range of N that you can use for the upper and lower limits?**

N is measured in kilograms. Roscoe has the lower limit set at 0kgs and the upper limit set at 120kgs as he prefers to be cautious regarding the amount of N he uses on farm.

- **How many different algorithms are you running?**

Every crop has its own algorithm, and these are all pre-loaded into the tablet.

- **What is the handheld N sensor used for?**

The handheld N sensor provides you with your target rate which you need to know before operating the N-sensor in the target mode.

The handheld N sensor is also used to check that you have applied the correct amount of N to the crops. It is recommended to check the N levels once per week. This process involves taking 30 leaf samples from the paddock and then checking the reading to ensure that the levels of N are correct.

- **Do you need a particular type of tractor to fit the N-sensor?**

No, Roscoe uses a basic model of tractor and says that you don't need the latest model of tractor. The sensors and tablet can be removed from the tractor for storage when not in use.

- **How many farmers are using N sensors in New Zealand?**

In 2021, there were just two farmers in New Zealand using N-sensors (Roscoe and one other farmer located in mid-Canterbury). This year there are around 20 farmers using the N-sensors throughout New Zealand.

- **Is it easy to operate?**

It is quite easy. There are only six settings to adjust. You turn it on and then enter your paddock details, put in your upper and lower N limits, your growth stage, and the crop type (i.e. – wheat or barley) into the tablet and then you're ready to go.

- **Could you use the N-sensor for dairy pasture?**

The patches of cow urine in the paddock would distort the readings so it wouldn't work well in this setting.

- **Have you noticed a lot of variability since you have started using the sensor?**

More than I would have thought when it comes to pH, K, and S. Roscoe says the biggest difference is that he is putting on less fertiliser on everything which provides savings.

For more information on N-sensors please refer to the Yara website link below:

[Yara N-Sensor - to variably apply nitrogen | Yara New Zealand](#)

Subsurface Drip Irrigation Field Day FAQs

23/2/23 – Robinson SDI trial block

Q. What sort of paddock shapes can it be installed on?

A. SDI can be installed in all types of paddock shapes, but irregular/unusually shaped paddocks will cost more in terms of installation & material costs. The most cost-effective Paddock is 400m to 650m Long.

SDI also works on undulating land and can be designed to match elevations. We have a very skilled Irrigation Design Team that use the latest IrriCad Design Software to Design the SDI system. We work with Accredited Irrigation New Zealand Designers and deal directly with Netafim on Dripline Selection and Supply. Netafim is the world's largest Irrigation Company and specializes in Drip Irrigation.

Q. What is the application rate?

A. We design SDI to suit the Soil Type and Crop Requirement. We typically design around a 2.0mm per hour application rate and operated every 2 – 3 days for 6 to 8 hours for each irrigation zone – once again subject to Soil Type and a key part of the overall Irrigation Design.

Q. What about water hardness and sediment?

A. Sediment is addressed by the Automatic Filtration System and considered in the design. Any Sediment that can pass through the Filter can pass through the Dripline Emitters; we also incorporate Flushing Manifolds at the ends of the Driplines that can flush the Laterals if required. The Filtration System is the key to the SDI lasting for 20+ Years and is a Commercial Grade Filtration System.

A. Hardness could be an issue long term and may require additional maintenance and flushing. We would recommend a water test first to see what we are dealing with.

Q. Can the system be linked to a soil moisture probe and set to automatically turn on?

A. Yes, the technology is now available for full Automation. We use Soil Moisture Probes as our key Irrigation Tool for monitoring what is going on in the Soil and making Irrigation decisions based on the Soil Moisture Levels. This is all controlled and monitored from your phone or laptop and is linked to local weather stations.

Q. What is the efficiency rate for this type of irrigation system?

A. It can operate at 95- 98% efficiency and is the most efficient method of Irrigating in the World, SDI delivers water directly to the root zone, SDI has little evaporation as it water direct to the root zone, SDI is not affected by the wind, SDI requires very little maintenance once installed and operates on low pressure = less pumping costs.

Q. Would the system allow you to have more trees and shade on farm?

A. Yes, it would allow you to install and operate around existing trees and structures. It will also allow you to plant and irrigate more trees.

Q. What soil types work best with SDI?

A. SDI works best on heavier types of soil. For permanent installations we install the dripline between -200mm to -300mm Deep and 1000mm Dripline Row Spacing. This Depth and Width can work on most suitable soils. SDI can cost more on lighter soils due to requiring closer Dripline Row Spacings. We work with our Irrigation New Zealand Accredited Irrigation Design Team to select the most efficient Dripline Row spacing to match the Soil Type, Dripline Dripper Spacing and Flow Rate.

The benefit of working with Netafim allows us to custom build the dripline to suit the SDI Project and Soil & Crop Type, it's a great Team and guarantees we get it right.

Q. What about root intrusion into the system?

A. It is a matter of being consistent with your water applications. If you use it irregularly for short bursts of time then the roots will naturally search for the water source. If the soil is kept moist it won't happen.

In some cases where SDI has been installed with aggressive roots it can be managed by two methods – Hydrogen Peroxide or similar products can be injected into the dripline at a controlled rate for periodically cleaning of the driplines and burning off roots. Netafim have also developed a Copper Impregnated Dripline Emitter that naturally repels roots. With good Irrigation Management root intrusion is not a problem.

Q. Does slope elevation have an impact?

A. SDI will work over elevations and can impact the design and cost. As a rule of thumb, if you can plough it, you can irrigate it with SDI. We take the elevation into account during the SDI Design process and need to physically inspect each site with our Irrigation Designers.

Q. Do you use different grades of piping?

A. Yes, the Netafim Dripline we use does have multiple grades for various applications. We select the Dripline Type during the SDI Design Process. This selection is subject to Soil Type, Crop Type & Rotation, paddock length & elevation is also a factor along with Water Quality. This Type of Dripline is also used for Wastewater Dispersal to Land.

Q. How much is the nitrate leaching reduced by?

A. SDI doesn't reduce leaching on its own. Soil Moisture monitoring is the key indicator for making the correct SDI decisions and getting the applicate rates right. Knowing what is going on and understanding the soil moisture levels more should naturally reduce all leaching by keeping the soil moisture at correct levels, not overwatering is going to help reduce leaching. Subsurface Drip Irrigation operates at 95- 98% efficiency and is the most efficient way to irrigate in 2023 using SDI Technology.

Q. Is the main pipe buried at the same depth as the dripline?

A. The Mainline Pipe is buried below the dripline in a separate trench, typically with 600mm cover. We use PVC or HDPE Pipe as our preferred mainlines and pipes, once again subject to soil type, pressure and flow.

For more information visit Robinson SDI's Facebook page [here](#): or contact Jeff Denley – jeffh20bro@gmail.com or Ph 021 467 473

Julie Bradshaw – Genetics in the herd

May 2023 Field Day

Genetics and Genomics FAQs

- **What is genomic testing?**

Genomic testing adds your heifers' DNA information to their evaluation so that farmers receive a more reliable prediction of their future performance before they start milking. This allows farmers to select the cows with the highest genetics to breed the next generation of cows. The test uses the same tissue sample as the DNA parentage testing.

- **What program has this property been using over the years?**

LIC's Sire Proving Scheme (SPS) since 2001.

- **How do the breeding values for the case property sit compared to the average NZ herd?**

Julie's herd is sitting in the top 5 per cent of Canterbury herds for BW and PW and in the top 10% nationally.

- **How much better do the best genetic cows perform in the herd vs the lower genetic cows on the case property?**

There is a huge difference. Think of it as a bell-shaped curve. You will always have some animals at the bottom and some at the top. Julie's bell-shaped curve is getting closer together over time as she continues to remove the lower value cows from the herd which raises the overall value of the entire herd.

- **What are the benefits from doing this level of testing?**

The data and results allow Julie to use science-based decision making on farm. The following are some of the benefits:

- Improved herd records
- Increased ancestry accuracy
- Improved reliability of the herd's breeding value
- Improved accuracy of predicted genetic merit,

- On average reliability of calves gBW increases from 32% to 51%
- **How has this property used this data for decision making?**
Julie has been able to refine her herd by removing cows and calves with lower values and still maintain the same level of milk production. She removed 15 cows from her herd and maintained the same level of milk production.
- **What does this improvement mean for efficiency and profitability?**
Increases the ability to reliably and accurately select which animals to breed from, and which animals to cull from your herd.
Corrects any mis-recording at calving time.
- **While Julies BW/PW values went up with the genomic testing can the BW/PW also go down?**
Yes, it is possible and some of Julie's calves went down in their values, so she has removed those calves from the herd.
- **What would happen if this was a nationally driven process to ensure that all cows were the best possible?**
In some countries overseas, such as Ireland, the government covers the cost of genomic testing as they view it as an essential farming tool in terms of improving the value of their dairy herds. They are examining their entire national herd. Is this something that we should be doing in New Zealand on a national level to look at the best way forward for the whole country?
- **How is this data useful for meeting sustainability and GHG?**
Recent material from DairyNZ mentions that herd testing is going to be an important factor in reducing emissions. The farming industry sees genomic testing as a helpful tool for increasing sustainability and reducing emissions.

- **How can the genetic data be used to predict what changes will occur on farm over time?**

It increases reliability and accuracy in the herd and corrects any mis-recording at calving time. Mis-mothering remains at 25% nationally, while DNA parentage verification removes this issue. Any future predictions will therefore have greater reliability.

- **What farm systems do you need to change to adopt these processes?**

To use DNA parent verification, your herd records and tagging must be up to date and correct. When you sign up for Genemark Wholeherd, LIC Field Assist service is also provided to help you with this, before tissue samples are taken.

DNA parent verification and genomic evaluation service are tools to help improve accuracy and reliability. As such, it provides information to enhance and improve your on-farm systems.

Farmers field trip for mahinga kai

Did you know that mahinga kai species like kākahi/freshwater mussels can help protect the natural environment? Join Makarini Rupene (Pō Mātai Ko, Cultural Land Management Advisor) and Channell Thoms (Mātauraka Putaio Senior Advisor, Science) for a three-stop hop along the Cust River catchment.



What will we learn?

Ki uta ki tai (from the mountains to the sea) is a Māori concept that acknowledges the interconnectedness of all elements of the environment. This idea will guide the field trip, as we learn how we monitor the health of our catchment, and how mātauraka Māori (Māori knowledge) relates to farmers.

Over a couple of hours, we will travel to three locations along the Cust River from the foothills down to the Kaiapoi confluence. This field trip is open to all farmers and landowners, and all who are interested in broadening their knowledge on how they can implement practises on-farm that will protect and improve mahinga kai values within the catchment.

See first-hand how mātauraka monitoring, together with on-farm and catchment monitoring help us understand what is going well and where improvements are needed within a catchment context. This will be useful for farmers when Freshwater Farm Plans are rolled out in Canterbury in the future.

Event details

When

Wednesday 21 June,
11am-1pm

Where

Starting at The Grange,
211 Ashley Gorge Road,
then travelling to Cust and
finally the Cust River/
Kaiapoi River confluence

Free event

Please RSVP at
ecan.govt.nz/farmers-field-trip

For more information email:

Anna.Veltman@ecan.govt.nz

Erin Harvie:

waimakaririlandcare@gmail.com

Next Generation Farming.

SUPPORTING SUSTAINABLE AGRICULTURE



The Waimakariri Landcare Trust is a farmer-led initiative to support long-term, sustainable agriculture in the Waimakariri District.

waimaklandcaretrust.co.nz



The top **3** motivations for improvements to GMP are **environmental, financial, & social responsibility.**

The main environmental risks identified by farmers are nitrogen leaching to groundwater and sediment and phosphorus loss to surface water.

Within the last 6 months, **83%** of farmers have made changes to improve their good management practices.

Changing wintering systems, improving stockwater systems, and planting biodiversity are minimising direct impacts on waterways. Other improvements are reducing nitrogen fertiliser and improving soil management.



88% of farmers say community engagement is critical.

Community engagement is still important for over 80% of farmers. They emphasized the importance of building and strengthening relationships with the community with peer to peer learning and mental wellbeing as further reasons.



77% of farmers would encourage the next generation to choose farming.

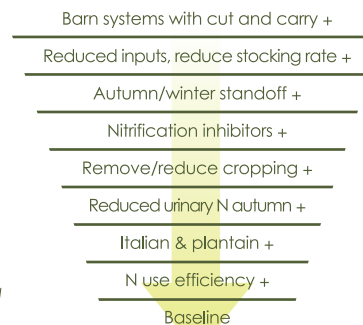
Reasons include the lifestyle, variety of work and opportunities.

"Farming comes with farming industry: a wide set of skills is required and a wide set of opportunities given. Farming has become a lot more complex than a generation ago".



Stacked on top of each other, with each added mitigation having an additive effect on N removal relative to the baseline state

N mitigations



The source of information most valued by farmers is local knowledge.



Delivery is preferred through peer-to-peer learning, digital media, case studies, workshops and farm specific expert input.

90% of farmers want expert advice on improving efficiencies within farm systems & technologies to achieve this.

Consistent areas of interest across all surveys are financials and environment.



Roscoes Field day | Taggart property

Evidence of Achievement:
Future Opportunities Items 7a-7e

[About](#)[Farm](#)[Parcels](#)[Summary](#)

Land Use Opportunities

A tool to explore land use options on farm.

This is merely a proof of concept and still very much a work in progress.

Usage:

1. Define property boundaries under the *Farm* tab (optional)
2. Delineate parcels and select target land uses under the *Parcels* tab
3. View report under *Summary* tab

Data

Land use suitability and productivity datasets provided by the [Whitiwhiti Ora](#) project.

API

Documentation available [here](#).



Under farm tab - click on map and it will highlight land parcels (can selected multiple parcels)

About

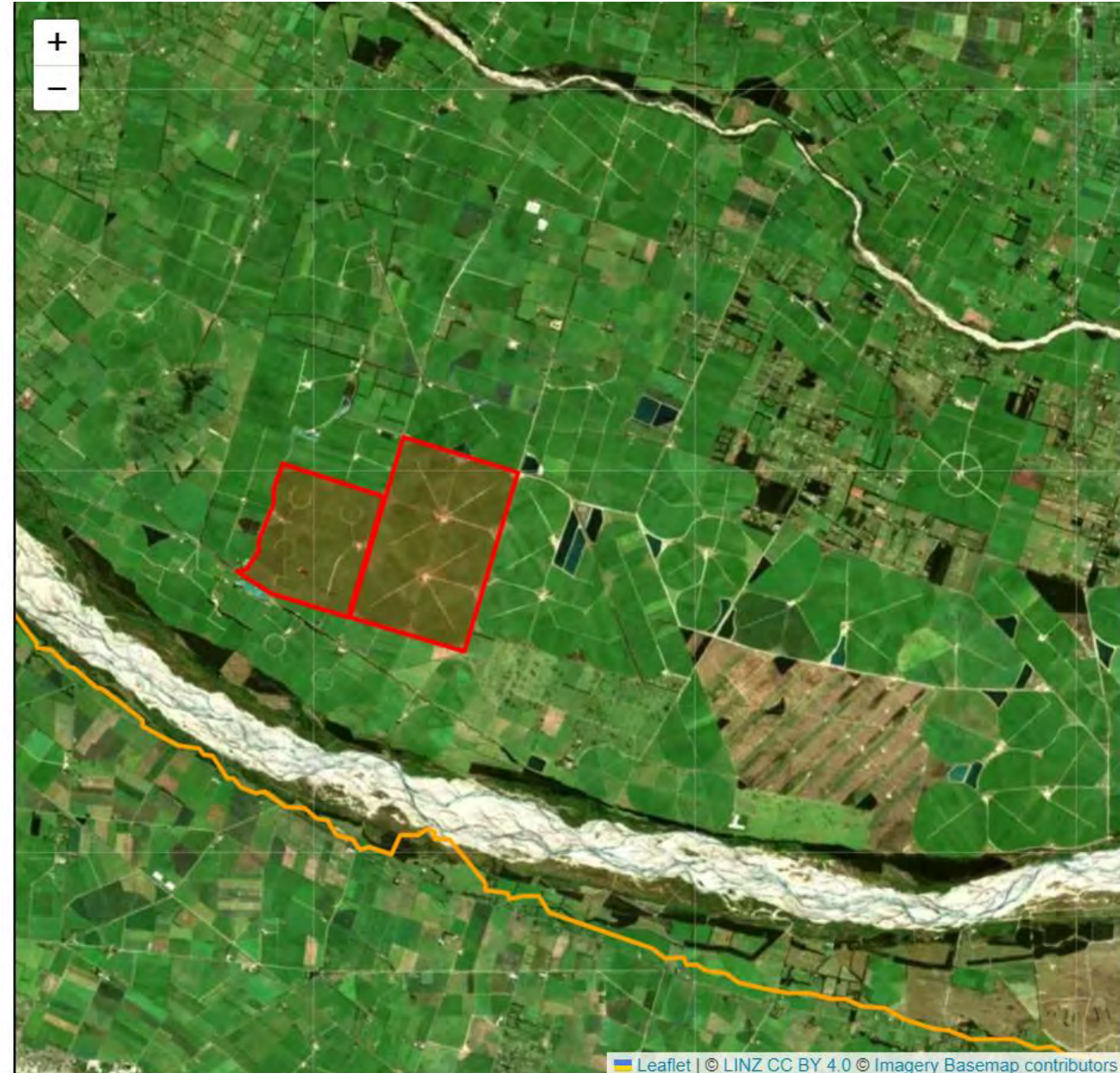
Farm

Parcels

Summary

Here you can define the boundaries of your property.
This information is used to report metrics relative to the farm's area.
Select additional property titles or click *Next* to proceed

Done



Under “Parcel” tab - use  tool to draw polygon(s) for alternate land use

About Farm **Parcels** Summary

Plot-1 16.9 ha *Select land use*

select land use



Select land use for polygon(s) - then click close to 'lock in' that option

About Farm Parcels Summary

Plot-1 16.9 ha Close

| Land use | Suitability | Yield |
|------------------------------|-------------|------------|
| Apple | 0.37 | 37.8 t/ha |
| Avocado | 0.30 | 25.3 t/ha |
| Blueberry | 0.05 | 5.3 t/ha |
| Cherry | 0.95 | 111.8 t/ha |
| Kiwifruit | 0.59 | 53.5 t/ha |
| Wine grape - pinot noir | 0.88 | 93.3 t/ha |
| Wine grape - Sauvignon blanc | 0.89 | 102.0 t/ha |
| Chestnuts | 0.66 | 63.9 t/ha |
| Mānuka Honey | 0.73 | 70.2 t/ha |
| Maize (grain) | 0.58 | 66.0 t/ha |
| Onion | 0.06 | 5.6 t/ha |
| Peas | 0.49 | 48.3 t/ha |
| Potatoes | 0.19 | 17.8 t/ha |
| Truffles | 0.28 | 23.5 kg/ha |
| Wheat (grain) | 0.33 | 28.3 t/ha |

NOTE: suitability / production data in this example is using dummy data. The tool now access real data via the 'supermarket' data tables



Data summary / dashboard (under construction) 😊

Navigation menu: About | Farm | Parcels | **Summary**

Plot-1 16.9 ha Wine grape - Sauvignon blanc

Dashboard summary comparing 'new' scenario with 'current' scenario still being developed



CANTERBURY REGIONAL COUNCIL

Kaunihera Taiao ki Waitaha

Agenda 2023

Water and Land Committee

Date: Wednesday, 30 August 2023
Time: 10.30 AM
Venue: Council Chamber
Environment Canterbury
200 Tuam Street, Christchurch



Water and Land Committee

Membership

Committee Chair: Councillor Iaeen Cranwell

Committee Deputy Chair: Councillor Claire McKay

Committee Members:

- Councillor Greg Byrnes
- Councillor Joe Davies
- Councillor Paul Dietsche
- Councillor David East
- Councillor Grant Edge
- Councillor Tutehounuku Korako
- Councillor Ian Mackenzie
- Councillor Craig Pauling
- Councillor Genevieve Robinson
- Councillor Peter Scott
- Councillor Vicky Southworth
- Councillor John Sunckell
- Councillor Deon Swiggs
- Councillor Nick Ward

Water and Land Committee

Table of Contents

| | |
|--|------------|
| 1. Karakia/Mihi Timatanga - Opening | 6 |
| 2. Apologies..... | 6 |
| 3. Conflicts of Interest | 6 |
| 4. Public Forum, Deputations, and Petitions..... | 6 |
| 5. Extraordinary and Urgent Business..... | 7 |
| 6. Notices of Motion..... | 7 |
| 7. Minutes | 8 |
| 7.1. Unconfirmed Minutes - Water and Land Committee - 28 June 2023..... | 8 |
| 8. Report Items | 16 |
| 8.1. Water and Land Committee Resolutions Status Report - August 2023..... | 16 |
| 8.2. CWMS Update - Northern Zone Committees | 24 |
| 8.3. CWMS Fish Screen Working Group - final report..... | 41 |
| 8.4. Discharging the CWMS Regional Committee | 56 |
| 8.5. Ōtūwharekai/Ashburton Lakes Lessons-learnt Report | 60 |
| 8.6. Portfolio Work Programme - Water and Land..... | 104 |
| 9. Next Meeting..... | 116 |
| 10. Karakia/Whakamutunga - Closing..... | 116 |

8.2. CWMS Update - Northern Zone Committees

Water and Land Committee report

| | |
|-----------------------------|---|
| Date of meeting | Wednesday, 30 August 2023 |
| Author | Murray Griffin, CWMS Facilitation Team Leader |
| Responsible Director | Dr Tim Davie, Director Science |

Purpose

1. This paper provides the Water and Land Committee with an update on the work of the two Northern Canterbury Water Management Strategy (CWMS) zone committees and their Action Plans to support the implementation of the CWMS.

Recommendations

That the Water and Land Committee:

1. **Receives this progress update on the two Northern Canterbury Water Management Strategy (CWMS) zone committees, on their current priorities, and progress in advancing their Action Plans and budget.**
2. **Receives this progress update on the formation of the Hurunui Water and Land Committee.**

Key points

2. All CWMS zone committees have completed and are working towards implementing their Action Plans for 2021-2024.
3. All CWMS zone committees are working towards finalising their priority projects to support through the CWMS Action Plan Budget established in the Long-Term Plan 2021-31. The two zone committees reporting in this paper allocated their respective budgets in full for the 2022/23 financial year.

Background

4. The zone committees were established under the CWMS. They are joint committees of Canterbury Regional Council and the territorial authorities within the respective zones:
 - Kaikōura Water Zone Committee is a joint committee of Environment Canterbury and Kaikōura District Council.
 - Waimakariri Water Zone Committee is a joint committee of Environment Canterbury and Waimakariri District Council.
5. Zone committee memberships include representation from the respective Councils, a member from each Rūnanga where the zone falls within their takiwā, and four to seven community members.
6. The Northern, Central and Southern zone committee progress reporting was established for the former Natural Environment Committee. This format has been

adopted for the current Water and Land Committee which will see it receive progress reports for each of the three zone groupings per year as follows:

- Central: Christchurch West Melton, Banks Peninsula, and Selwyn Waihora zone committees (May).
- Southern: Ashburton, Ōrāri Temuka Ōpihi Pareora, Lower Waitaki, and Upper Waitaki zone committees (June).
- Northern: Kaikōura and Waimakariri zone committees, and the Hurunui Water and Land Committee which is yet to be established.

7. This reporting provides an opportunity to report on the northern zone committees' progress on implementing their action plans following the Local Government elections and Councillor appointments to zone committees.

Zone Committee Purpose

8. The purpose of the zone committees is to uphold the mana of the freshwater bodies within their zone by facilitating enduring land and water management solutions that give effect to the CWMS vision, principles, and targets in their zone.

Zone Committee Functions

9. Zone committees have several core functions:
 - Facilitating community engagement and collaboration - continuing an active programme of engaging with communities on freshwater management matters.
 - Facilitating the provision of advice through to councils (relevant Territorial Authorities and Environment Canterbury) and others (e.g., private sector) contributing to freshwater management.
 - Enhancing delivery capability and coalition of the willing - working with stakeholders across all sectors to extend the resources available to implement the CWMS, including connecting others to additional resources and seeking opportunities to promote, support, leverage and expand catchment-based initiatives that deliver the CWMS.
 - Providing progress reports - annual progress reporting to Councils on progress towards delivery of the zone-specific priorities and CWMS target areas identified in the Zone Committee Action Plan.
10. Zone committees make recommendations on how the CWMS Action Plan Budget is allocated in their zone. This budget is provided through the Long-Term Plan 2021-31, with \$50,000 allocated for each water zone committee in both 2021/22 and 2022/23. \$75,000 has been allocated to each water zone committee in 2023/24.
11. As zone committees do not have financial delegation, a senior manager at Environment Canterbury is provided project details, detail of how these projects align with the Action Plan, and confirmation that the Zone Committee has confirmed the projects. Environment Canterbury then enters into a funding agreement with the successful project owner, and releases funds, in accordance with the Council's delegations manual.
12. The purpose of this budget is to allow zone committees to focus on implementing their Action Plan and leverage other funding opportunities to achieve the CWMS priorities.

13. Environment Canterbury has a separate contestable fund called Waitaha Action to Impact for community groups to apply to, and separate operational funding for regional and zone biodiversity and water management projects.

Zone Committee Action Plans

14. The CWMS zone committees have developed three-year (July 2021-June 2024) Action Plans. These action plans provide the primary focus for zone committee meetings, workshops, field trips and community engagement. They also form the basis for their recommendations for allocating the CWMS Action Plan Budget. These Action Plans are reviewed and updated annually with new Action Plans prepared once the first three-year Action Plans are nearing completion.

Kaikōura Water Zone Committee update

Membership

15. At the May 2023 meeting, the committee welcomed their first Youth Representative to the table, Maia Kahu. Maia is a year 13 student at Kaikōura High School (KHS). She is one of the five Head Students and has been a member of Kaikōura Youth Council for six and a half years, including as Chairperson and Co-Chairperson in 2022.
16. During her time on Youth Council, she has always been interested in the environment, and attended the Love the Lyell group as the Youth Council representative for two years where she took part in field trips, planting days and supported community events. Maia has attended many Youth Conferences and Leadership Groups beyond Kaikōura. Last year she attended the Pacific Student Leaders Programme in Rarotonga for two weeks increasing the depth of her environmental and leadership knowledge.
17. Maia is a strong voice for rangatahi, able to speak confidently and clearly in a group and stand up for what she believes in. In 2022 Maia was the student representative on the Kaikōura High School Board of Trustees and the Board speaks very highly of her in that position, where she was a proactive voice for students.



Image 1 - Kaikōura Zone Committee Youth Representative Maia Kahu at the 2023 Anzac Day dawn service.

18. Current membership (12) is made up of; Ted Howard (Chairman), Rob Roche (Deputy Chair), Councillor Grant Edge (Environment Canterbury), Cr Tony Blunt (Kaikōura District Council), John Murray, Nicky McArthur, Teri Sonal, Gina Solomon, Desiree Bolton, Clint McConchie (Runanga Rep), Aroha Boyd (Runanga Rep), Maia Kahu (Youth Rep).
19. As of late February 2023, the Kaikōura Water Zone Committee received a new Facilitator. Kaikōura local, Jodie Hoggard now joins the team, allowing Jaimee Grant to support the Selwyn Waihora Zone Committee. Jodie comes with much local knowledge, connections, and networks in both the rural and urban space, including established working relationships with many of the committee members. She has previously worked in the biodiversity/environmental project space with Kaikōura District Council, education/advocacy with Innovative Waste Kaikōura, Land Management with Environment Canterbury and most recently project managing the Kaikōura Plains Recovery Project (MPI funded) and the Mill Road Catchment Group work.

Recent Committee Priorities

20. At its May 2023 meeting, the committee received a presentation from Environment Canterbury Ground Water scientist, Ben Wilkens, summarising results of recent groundwater reports in relation to the Kaikōura zone.
21. At the June 2023 workshop, members of the Kaikōura Water Zone Committee received presentations from both Makarini Rupene (Environment Canterbury Northern Po Matai Kou) and Channell Toms (Environment Canterbury Mātauranga Putaiao Senior Advisor). The committee members appreciated learning about various aspects of mahinga kai and mātauranga, the values of both and relating that to the current 2021-2024 Action Plan, and the upcoming Action Plan review, for 2024-2027.

Local projects supported by the CWMS Action Plan Budget 2022/23

22. The Kaikōura Zone Committee has supported the following projects utilising the \$50,000 of CWMS Action Plan Budget allocated in the 2022/23 financial year:

Hapuku Catchment Collective Initiative Year 2

23. This initiative has been supported by the Zone Committee in year 1 also and is gaining promising traction (now into year 3). The initiative supports community action to address issues (weeds and pests) and enhance freshwater in the Hāpuku catchment using an integrated approach.
24. Year 2 saw the continuation of working with the “coalition of the willing” to support on the ground action using the incentivised approach used in Year 1. Year 2 focused on:
 - Weed control, in particular vine control.
 - Looking to include riparian enhancement and predator control depending on uptake.
 - Offering a well-attended ‘Weedy workshop’ to bring people together and encourage a catchment group approach.
 - Story link: [Weedy workshop in Kaikōura well received | Environment Canterbury \(ecan.govt.nz\)](https://ecan.govt.nz)



Image 2 - attendees at the Weedy Workshop held at Hapuku, supported by local Department of Conservation field staff & Environment Canterbury Biosecurity staff.



Image 3 - Senior Biodiversity Officer, Heath Melville demonstrating to the attendees, techniques for Old Mans Beard control.



Image 4 - A set of taxidermy mammal pests were on display whilst attendees enjoyed a BBQ to finish the workshop and network with likeminded participants.



Image 5 - shows landowner contribution to the initiative, with successful vine control on private land.

Wetland & Riparian Restoration Project Support

25. The Kaikōura Zone Committee supported this initiative allowing staff to assist with further work in existing projects, progressing the site to be a well-established stage so landowners can continue manage the site into the future.
26. Sites included 'Nagari wetland' (plant maintenance, weed control) and 'Waikōau Connection' / West End community site (plant maintenance, weed control).



Image 6 - Nagari Wetland - one of the project sites benefiting from the Action Plan funds and local staff expertise.

Waiau toa / Clarence River Rafting trapping project

27. Through this mahi, predator numbers will be reduced to help protect the catchment's rare and threatened biodiversity.
28. This project will complement existing collaborative trapping and predator control mahi undertaken in the Waiau Toa/Clarence catchment by Environment Canterbury, Toitū Te Whenua Land Information NZ, Department of Conservation, mana whenua and landowners.
29. It links to the CWMS Zone Action Plan by continuing to collaborate and support whole catchment management of the Waiau toa / Clarence by supporting and advocating to maintain or increase predator control of threatened and at-risk bird nesting sites.
30. It also connects by way of facilitating action to enhance biodiversity by coordinating and supporting "on the ground" actions such as trapping and planting.



Image 7 - Kaikōura Men's Shed team built the traps for the Waiau toa /Clarence River Rafting trapping project and will also for the Waiau toa Hapua Protection project 23/24.

- Story Link - [Unique relationship brings biodiversity benefits to Waiau Toa | Environment Canterbury \(ecan.govt.nz\)](https://www.ecan.govt.nz/unique-relationship-brings-biodiversity-benefits-to-waiiau-toa/)

Local projects supported by the CWMS Action Plan Budget 2023/24

31. The Kaikōura Zone Committee has supported the following projects utilising part of the \$75,000 of CWMS Action Plan Budget allocated in this financial year (2023/24):

Hapuku Catchment Collective – Year 3

32. The third year's focus is to reduce weed cover, e.g. vines, willows, and other ecologically problematic species, within the community catchment area, with the opportunity to undertake predator control and riparian enhancement works. Where applicable, workshops will be considered an ongoing and valuable means of educating the community.

Waiau toa Hapua Protection 2023/24

33. This project aims to improve the fledging success of black-billed gulls and other endemic shorebirds at the Waiau Toa / Clarence hapua / river mouth.
34. The Zone Committee continues to support/facilitate “on the ground” actions in the Waiau Toa catchment to help protect and monitor ‘At Risk’ and ‘Threatened’ species nesting at the river mouth/ hāpua, which supports the CWMS and Canterbury Biodiversity Strategy targets. This is the continuation of the black-billed gull protection project that the Committee supported previously.

Waikoau/Lyell Creek/Beach Clean-up/Seaweeek community event.

35. The Waikōau/Lyell Creek / Beach Clean-up / Seaweeek is a community event supporting the health of the Waikōau Lyell Creek and its surrounds. This has been a successful recurring event for the Kaikōura community.
36. Community planting days are also often organised which support the health of waterways.

37. The National event of 'Seaweed' (March 2024) provides lots of opportunity within that context for creativity in how to reach the community. Discussions have been had already with Seaweed coordinators who are very keen to assist local efforts.
38. 2022 saw a collaborative effort across many community agencies and groups, with a range of activities across the week.
39. The Zone Committee will support a community clean-up day by providing a financial contribution to the running of the day.

Waimakariri Zone Committee update

Membership

40. The Waimakariri Zone Committee welcomed new Council representatives appointed to the Committee in 2023:
 - Cr Tim Fulton – Waimakariri District Council.
 - Cr Claire McKay – Environment Canterbury.
41. At its 30 January 2023 meeting, the Committee confirmed the following appointments:
 - Carlyne Latham as Chairperson.
 - Erin Harvie as Deputy.
 - Ruby Gill-Clifford as Youth Representative.
42. Ruby has been a North Canterbury Representative on Environment Canterbury's Youth Rōpū for the last three years and has an appreciation of the environmental focus of the Committee. In 2022, Ruby was elected Deputy Chairperson of the Youth Rōpū and led their biodiversity work. A former student of Rangiora High and Blue Planet leader, Ruby is now studying a Bachelor of Science majoring in Environmental Science and Biochemistry and minoring in Māori and Indigenous Studies.
43. Ruby joined the Committee for its final engagement of the year on 5 December 2022, incorporating a field visit to Tūhaitara Coastal Park and Pines Beach Wetland. Since joining the committee, she has attended several other engagements on behalf of the committee, including mahinga kai workshops and field days in the Hurunui and Cust.



Image 8 – Waimakariri Zone Committee Youth Representative, Ruby Gill-Clifford

44. The Committee also includes:
 - Arapata Reuben – Te Ngāi Tūāhuriri Rūnanga representative
 - John Cooke – Te Ngāi Tūāhuriri Rūnanga representative

- Martha Jolly – community representative
- Claire Aldhamland – community representative

45. In May 2023, the committee received the very sad news that former Chair of the Zone Committee, Michael Blackwell, had passed away. As the new Chair, Carolyne Latham noted the Waimakariri Zone Committee members were very saddened by Michael's recent passing. Mike had represented his community on the zone committee from 2017 and had been Chair since August 2019. Mike was liked and respected by all and was passionate about the environment, particularly wetlands and waterways. He was a true gentleman, ever thoughtful and considerate, who showed great courage as he battled illness. He will be sorely missed, and our thoughts are with his family.



Image 9 – Michael Blackwell

46. At its 3 July 2023 meeting, the zone committee acknowledged the passing of Michael and also former Ngāi Tūāhuriri representative on the committee, Clare Williams.
47. Clare Williams represented Te Ngāi Tūāhuriri Rūnanga on the Zone Committee from its inception in November 2010 through to 2017. Clare was valued and respected by all. Her collaborative leadership approach helped establish links between the Rūnanga, other organisations and community bodies involved with water and the environment. Clare was recognised by both Environment Canterbury and Waimakariri District Council with Service Awards acknowledging her many years of service and dedication to the environment and the community.

Recent Committee Priorities

Tips for lifestyle block owners

48. The Zone Committee's Lifestyle Block Working Group has recently completed a new resource called Top Ten Tips for Lifestylers. There are more than 6,500 lifestyle blocks in Waimakariri, with this brochure aimed at supporting block owners to do their bit for the environment by providing some tips on where to start. This resource condenses all the information available into the most important areas where improvements will make a difference. A brochure has also been developed, which is provided as Attachment 8.2.1.
- Story Link: [Keep your lifestyle block tip top | Environment Canterbury \(ecan.govt.nz\)](https://www.ecan.govt.nz/keep-your-lifestyle-block-tip-top/)

Local projects supported by the CWMS Action Plan Budget 2022/23

49. At its 1 May 2023 meeting, the Waimakariri Water Zone Committee supported the recommendations for the following projects utilising the \$50,000 of CWMS Action Plan Budget allocated in the 2022/23 financial year.

Nesting Area Weed Clearing – Ashley Rakahuri Rivercare Group

50. This project will help clear weeds from braided river bird nesting areas in the Ashley River/Rakahuri. Braided river birds nest on islands, which need to be weed-free and high enough to withstand moderate floods for successful breeding. They also need good water flow around them to deter predators.
51. Sadly, during the last nesting season, the Ashley Rakahuri Rivercare Group recorded that only 17 black-fronted terns successfully fledged from 162 nests. This is a very poor success rate, and the group has identified that floods and predators were the main causes.
52. To help the birds improve their breeding success, 14.6ha of weed clearing is planned on ten separate islands. With the funds from this grant, a local contractor will be enlisted to carry out the work, using a 4WD tractor equipped with a purpose-designed machine and a subsurface blade to tackle the weeds. The Rivercare Group hopes to complete this work by early winter ready for the next breeding season.

Saltwater Creek Wetland Restoration, Daiken NZ – Waimakariri Biodiversity Trust

53. This long-term project aims to enhance the headwaters of Saltwater Creek in Sefton. Restoration of a wetland at the headwaters of this creek will have downstream benefits for the whole waterway, from source to sea. It will increase indigenous biodiversity in the district, as well as have hydrological and ecological benefits.
54. The wetland restoration is a collaboration between the Waimakariri Biodiversity Trust and Daiken New Zealand, the operators of the farm where the former wetland is situated. At the request of Daiken, the Waimakariri Biodiversity Trust has developed a staged project to look at options for biodiversity restoration in this area.
55. This funding will allow the planning and investigation stages of the project to get underway. It will look at baseline hydrology and ecology and develop options for future work. Ngāi Tūāhuriri Rūnanga, local groups, and individuals will be consulted to build up a picture of water flows and instream values in the area.
56. Depending on the outcomes of the first stages, later actions may include stream enhancement and water level management as well as native vegetation planting and improvement of native fish habitats.

Water Quality Gap Analysis – Waimakariri Landcare Trust

57. This project is about building a more complete understanding of water quality in the Waimakariri district.
58. The Waimakariri Landcare Trust will first do a stocktake of all the monitoring efforts already underway by various stakeholders. They will then look for any gaps in the

areas being tested and the timing of monitoring and make recommendations about what else needs to be done.

59. The Trust also wants to engage local people with water monitoring efforts in the district, strengthening connections with the health of their freshwater. They hope to empower everyone with an interest in water quality to take part in monitoring progress.
60. Some of the funding will be used to hire a groundwater nitrate sensor for a short period. In conjunction with the zone committee, they will offer drop-in water testing days for private well owners. This will determine whether the sensor would be a worthwhile tool to purchase for regular ongoing nitrates testing.
61. This project aims to:
 - Achieve a collective understanding of the water monitoring that is already happening to avoid any duplication of efforts between stakeholders.
 - Provide a gap analysis to make recommendations for areas that need increased monitoring.
 - Provide an understanding of data sharing, including data format and standards that need to be met for different outcomes.
 - Suggest which data collection can be gathered through citizen science and what needs to be undertaken to a national standard to ensure usability and reliability.
62. The Trust believes it is a first step to finding a baseline for water monitoring in the region and identifying areas for improvement. This will become increasingly important for measuring progress towards meeting the incoming freshwater regulations.

Environmental Awards – Waimakariri Biodiversity Working Group

63. The Committee is excited about the new Environmental Awards being led by the Committee's Biodiversity Working Group. These awards are a way to acknowledge the groups and individuals that are going the extra mile to protect and enhance our local environment. These inaugural environmental awards will be presented alongside Waimakariri District Council's Community Awards in October. Promotion for entries is being called for across three criteria – as outlined below.
64. There will be three categories of awards:
 - Group, Organisation or Business: volunteer groups, commercial companies, NGOs, whether formal or informal.
 - Individual: An individual, landowner, or member of an organisation.
 - Youth: An individual or group, 18 years old or under. May also be eligible for categories 1 and 2.
65. All projects must align with at least one of the Water Zone Committee's Action Plan goals.
66. The awards will be run in conjunction with Waimakariri District Council's annual Community Awards in October. A panel with a broad range of expertise will assess each application and decide on the winners.
67. The awards are a chance for the Water Zone Committee to commend individuals, groups and organisations that undertake, champion, or inspire environmental protection, conservation, or restoration, within the zone.

Local projects supported by the CWMS Action Plan Budget 2023/24

68. At its 3 July 2023 meeting, the Waimakariri Water Zone Committee supported the recommendation for the following project utilising the \$75,000 of CWMS Action Plan Budget allocated in this financial year (2023/24).

Rakahuri Estuary Shorebird Monitoring – Ashley Rakahuri Rivercare Group

69. This project will continue monitoring the breeding of shorebirds around the Ashley-Rakahuri /Saltwater Creek estuary – the species, their nest locations, and their breeding outcomes.
70. Such work has been undertaken by the Rivercare Group on the Rakahuri riverbed above the estuary for almost 20 years but has not been done before around the estuary itself.
71. The main species monitored would be banded dotterel (turiwhatu), pied stilt (piako), black-fronted and white-fronted tern (tarapirohe and tara), S. Island pied oystercatcher (torea) and black-billed and black-backed gull (tarapuka and karoro).
72. The establishment of this estuary monitoring project was supported by the Waimakariri Water Zone Committee in 2021/22 utilising the CWMS Action Plan Budget.

Hurunui Water and Land Committee update

Local Projects supported by the CWMS Action Plan Budget 2022/23

73. The \$50,000 of CWMS Action Plan Budget was able to be utilised in the Hurunui Waiau Uwha Water Zone in the 2022/23 financial year. Endorsement of allocating this funding to the Hurunui Waiau Braided River Birds Flagship programme was received from the Water and Land Committee at its 3 May 2023 meeting.

Hurunui Water and Land Committee

74. Hurunui Mayor, Marie Black, has provided the following update on the proposal to form the Hurunui Water and Land Committee.
75. *“The Hurunui District Council stepped away from the Hurunui Waiau Uwha Water Zone Committee in late 2020 and following that began some early discussion to develop a replacement forum.*
76. *Our early preparations considered a Water and Land Committee, however these plans have taken a backstep with the heavy workload of government reform, and the restrictions of the Covid-19 pandemic.*
77. *We have kept regular liaison with Environment Canterbury which reports to our full Council and are now looking towards further developing the Hurunui Land and Water committee proposal in collaboration with Environment Canterbury and Rūnanga.*
78. *This promises to be positive step forward and will be further developed in the not-too-distant future.”*

Cost, compliance and communication

Financial implications

79. The CWMS Action Plan budget was established in Environment Canterbury's Long-Term Plan 2021-31 and set \$500,000 across the region in 2022-23. This has been increased to \$750,000 across the region in 2023/24 and is being implemented across the CWMS zone committees with \$75,000 available in each zone.

Engagement, Significance and Māori Participation

80. The CWMS Action Plans have been guided by the priorities of Environment Canterbury and the respective Territorial Authorities for each zone committee. These priorities are presented on the Action Plans.
81. Rūnanga representatives on the CWMS zone committees are contributing to the priority setting of both the Zone Committee Action Plans and the budget supporting the implementation of these plans.

Consistency with council policy

82. The CWMS Action Plans and budget, and refresh of the CWMS Regional Committee, align with the implementation of the CWMS and Council's policies in support of the following Level of Service (LoS 1) for the 'Working together for healthy water and land' programme within the Water and Land Portfolio:
- Facilitate the Canterbury Water Management Strategy zone and regional committees to support achievement of the 2025 goals, in partnership with Ngāi Tahu and the Canterbury region's city and district councils.

Climate Change Impacts

83. The CWMS and its effective implementation are one of the adaptation strategies Canterbury has in place to respond to climate change and support community resilience.

Communication

84. All CWMS Zone Committee Action Plans are now available on the Environment Canterbury website under the respective Water Zones Committees.

Next steps

85. CWMS zone committees will continue implementing their action plans as well as consolidating outstanding priority projects for budget support.
86. ECan's Facilitation Lead and Zone Manager for North Canterbury will continue to liaise with HDC on the formation of the Hurunui Water and Land Committee, as a basis for establishing Environment Canterbury representation on this new committee.

Attachments

1. Waimakariri Water Zone Brochure – Top Ten Tips for Lifestyle Block owners

| | |
|-----------------------|---|
| Legal review | |
| Peer reviewers | Cameron Smith, Senior Strategy Manager Judith Earl-Goulet, General Manager – Regulatory Services |

WAIMAKARIRI HAS MORE THAN 6,500 LIFESTYLE BLOCKS COVERING NEARLY 13% OF THE DISTRICT – ABOUT 29,780HA AND GROWING.

Collectively, lifestyle blocks can have a significant impact on our environment as they typically have more people and infrastructure on a smaller land area, and are concentrated in areas where they become the dominant land use.

Check out the Waimakariri Water Zone Committee's **TOP TEN TIPS** to love your land and help keep our rivers and streams healthy.

Advice and support is available from NZ Landcare Trust, Waimakariri Biodiversity Trust, Environment Canterbury and Waimakariri District Council.

Top Ten Tips for Lifestylers was produced by Waimakariri Zone Committee with support from NZ Landcare Trust, Environment Canterbury and Waimakariri District Council.

Visit ecan.govt.nz/get-involved/news-and-events/zone-news/waimakariri/keep-your-block-tip-top



KEEP YOUR BLOCK TIP TOP!

PROTECTING OUR WATERWAYS, WETLANDS, DRAINS, SPRINGS, DAMS AND PONDS – ANYTHING THAT CONNECTS TO A WATERWAY WHETHER NATURAL OR MAN-MADE, PERMANENT OR TEMPORARY.

HERE ARE YOUR TOP TEN TIPS

1 UNDERSTAND YOUR LAND

Know where water flows and where it goes! What's it like in a drought? And in a flood? Know where NOT to put fences, troughs and buildings. Avoid blockages and potential contaminants getting into water by clearing branches and debris, especially near culverts. Keep stored materials, equipment, containers and animal facilities away from areas that flood.

2 KEEP ANIMALS OUT

Heavy animals such as cattle, deer, horses and pigs can damage soil, drain and stream banks, and put mud, faeces and urine in our water.

3 STABILISE AND BUFFER

Keep waterway and drain banks well vegetated as bare banks can easily collapse and erode. Spot spray weeds if needed. Have a wide buffer strip each side – long grass does a good job of filtering sediment.

4 WATER IS PRECIOUS

Ensure that trough ballcocks are well protected from stock. Check troughs and tanks regularly for leaks and fix straight away. If irrigating, monitor soil moisture to determine requirements, make sure water use is within any take limits*, and avoid ponding, run-off, and wasting water.

5 LOVE YOUR NATIVE PLANTS AND ANIMALS

Big and small! Get help* to identify and protect what you have, and plan to enhance. Control weeds and pests to protect these native treasures. Bring back your natives e.g. *Carex secta* is an ideal native grass for bank protection and drain/waterway weed suppression.

6 MANAGE YOUR STOCK

Match your animal numbers to the pasture you can grow. Avoid overgrazing and pugging paddocks. Fewer well fed stock stay in better health and can give better returns than under-fed stock. If in doubt, get advice.

7 MONITOR SEPTIC TANKS

If it pongs, something's wrong! If your tank hasn't been emptied for more than 5 years consider getting a septic tank contractor to pump it out. Regularly check the land application area to make sure effluent is not ponding. Filters need cleaning 3-6 monthly or get your system serviced by a professional. Use eco-friendly cleaning and laundry products to keep your wastewater treatment bugs happy.

8 FIND YOUR HOT SPOTS

Identify areas of bare ground and spots that become muddy when it's wet, making our water dirty. Keep animals out with temporary fencing and only graze when dry.

9 MANAGE FERTILIZER AND MANURE

Apply in warmer months when pasture is actively growing and best able to absorb nutrients. Avoid spreading if heavy rain is forecast and keep well away from waterways and gullies. Seek professional advice to avoid over-application.

10 RESPONSIBLE RUBBISH DISPOSAL

Recycle waste such as baleage wrap, expired chemicals and containers, and household waste. Rubbish holes and waste can degrade your land and cause contamination. Compost dead stock or bury well away from waterways. Burning dry tree trimmings produces less smoke than green/wet.

*Help is available! Go to ecan.govt.nz/get-involved/news-and-events/zone-news/waimakariri/keep-your-block-tip-top



Annual Groundwater Quality Survey

2022



| | |
|-----------------------|--|
| Author: | Melanie Knottenbelt, Science Analyst: Groundwater Science |
| Reviewed by: | Lisa Scott, Senior Scientist: Groundwater Science Marta Scott, Senior Scientist: Groundwater Science Kurt van Ness, Scientist: Groundwater Science |
| Approved for release: | Carl Hanson, Groundwater Science Section Manager |

Introduction

What is the annual groundwater quality survey?

Each year, Environment Canterbury (Kaunihera Taiao ki Waitaha) collects groundwater samples from wells across the region. The samples are analysed for a range of water quality parameters. We generally conduct the survey in the springtime, during the months of September to December.

Why do we care about groundwater quality?

Communities in Canterbury need access to safe drinking-water sources and healthy waterways. Groundwater is the major source of drinking-water supply in Canterbury and provides the baseflow to streams and lakes.

Why do we carry out an annual survey?

The survey provides data for evaluating long-term, regional-scale changes in groundwater quality. It also provides an annual snapshot of groundwater quality in the Canterbury region.

The wells we sample are a mix of public and privately-owned wells used for a range of purposes. They give us an indication of the quality of *untreated* source water and baseflow to surface water across the region. We don't specifically monitor drinking-water supplies – this is the responsibility of the water supplier.

How do we conduct our annual groundwater quality survey?

Every year, Environment Canterbury field officers visit over 300 wells across Canterbury to collect water samples. For the most part, we return to the same wells year after year, but there are also a few changes every year, for various reasons. We sample in the spring and early summer months (September to December), after the higher groundwater recharge which generally happens over winter.

We collect samples according to Environment Canterbury's standard procedure for the collection of groundwater quality samples, which is consistent with the [National Environmental Monitoring Standard](#) for groundwater quality sampling (NEMS, 2019).

The process includes purging wells by pumping out at least three well volumes or by pumping the well at a low flow rate with the pump intake at the level of the well screens. We take the samples using our own pump, or from a sampling tap as close to the wellhead as we can get when the well is already equipped for pumping.

As we are purging the well, we measure various properties of the purge water, such as temperature, pH, electrical conductivity and dissolved oxygen concentrations. When these parameters reach a steady state, we are confident that the well has been purged and the sample is representative of the local groundwater. Our groundwater samples are tested by an IANZ-accredited laboratory for nutrients (ammonia-nitrogen, nitrate-nitrogen, nitrite-nitrogen and dissolved reactive phosphorus), major ion chemistry (alkalinity, calcium, chloride, magnesium, potassium, sodium, and sulphate), iron, manganese, reactive silica, pH, electrical conductivity, hardness, bicarbonate and indicator bacteria (*E. coli* and total coliforms). In the 2022 survey we also included arsenic as a one-off measurement.

What do we do with the data?

All the data we collect are stored in our water quality database and are publicly available on Environment Canterbury's website via the [Well Search](#) or [Water Quality Data](#) functions.

In addition to analysing and presenting the data in reports like this one, we also send the data to the Ministry for the Environment (Manatū Mō Te Taiao) when the ministry compiles national statistics on the state of the environment in New Zealand. Some of these data (chloride, dissolved reactive phosphorus, *E. coli*, electrical conductivity, and nitrate-nitrogen) are available on the groundwater quality module on the [LAWA](#) website – Land, Air, Water Aotearoa. Our monitoring also supplements results from other investigations and is used to inform resource management decisions, such as regional planning and processing resource consent applications.

Glossary

Ammonia-nitrogen

This refers to the concentration of ammonia in water, calculated based on the mass of nitrogen in the ammonia molecule. Our standard convention is to record the concentration of ammonia-nitrogen in milligrams of nitrogen per litre of water (mg/L).

Baseflow

Baseflow is sustained low flow in a river during dry or fair-weather conditions, contributed mainly by the discharge of groundwater in springs.

CWMS zone

A water management zone in the Canterbury Region of New Zealand. There are 10 water management zones mapped in the Canterbury Water Management Strategy (Canterbury Mayoral Forum, 2009).

Denitrification

Denitrification refers to a series of microbially assisted chemical reactions in which the nitrate anion is converted to other forms such as nitrous oxide or nitrogen gas. It occurs primarily in environments where there is very low available oxygen (such as anoxic groundwater).

AV

AV stands for 'Aesthetic Value'. It has been set by Taumata Arowai – the Water Services Regulator under the Water Services Act 2021, as a threshold above which objectionable aesthetic effects may be observed, such as odour, taste, colour, corrosion, or staining problems (Taumata Arowai, 2022). The AV is not a health-based limit.

MAV

MAV stands for 'Maximum Acceptable Value'. These values have been set by Order in Council (Water Services (Drinking Water Standards for New Zealand) Regulations 2022) under section 47 of the Water Services Act 2021, to define water suitable for human consumption and hygiene. The MAV for most chemical parameters is the highest concentration at which, based on present knowledge, drinking 2 litres per day for 70 years does not pose a significant health risk to the consumer.

For two of the parameters that we test, nitrate-nitrogen and *E. coli*, the MAV has been set a bit differently. For nitrate-nitrogen, the MAV is a short-term exposure limit established to protect bottle-fed infants against blue baby syndrome. For *E. coli*, a concentration above the MAV may indicate a significant risk of contracting a waterborne disease.

Median

In statistics, the median is the middle value in an ordered list of numbers. We use the median rather than the arithmetic mean (average) to summarise water quality because the mean may be biased by samples with very high or very low concentrations.

Nitrate-nitrogen

This refers to the concentration of nitrate in water, calculated based on the mass of nitrogen in the nitrate anion. Our standard convention is to record the concentration of nitrate-nitrogen in milligrams of nitrogen per litre of water (mg/L).

Vadose Zone

The vadose zone is the term used to describe the zone between the ground surface and the groundwater table. It includes the soil and any unsaturated aquifer material/sediment.

The 2022 annual survey

From September to December 2022, we collected samples from 341 wells across Canterbury.

Survey coverage

Figure 1 shows the locations of the wells we sampled. They cover the areas in Canterbury where groundwater is used. The annual survey covered nine out of the ten Canterbury Water Management Strategy (CWMS) zones. The exception was Banks Peninsula, where there is not much groundwater resource potential and water supplies are derived mainly from surface water resources. The Selwyn-Waihora and Ashburton zones are heavy users of groundwater, and these two zones together account for 35% of the wells in the survey.

Well depths

We sample groundwater from a range of depths and locations (Figure 1). Most of the wells draw groundwater from the upper part of the groundwater system near the water table. The shallowest well in our network is 3 m deep and the deepest is 294 m deep.

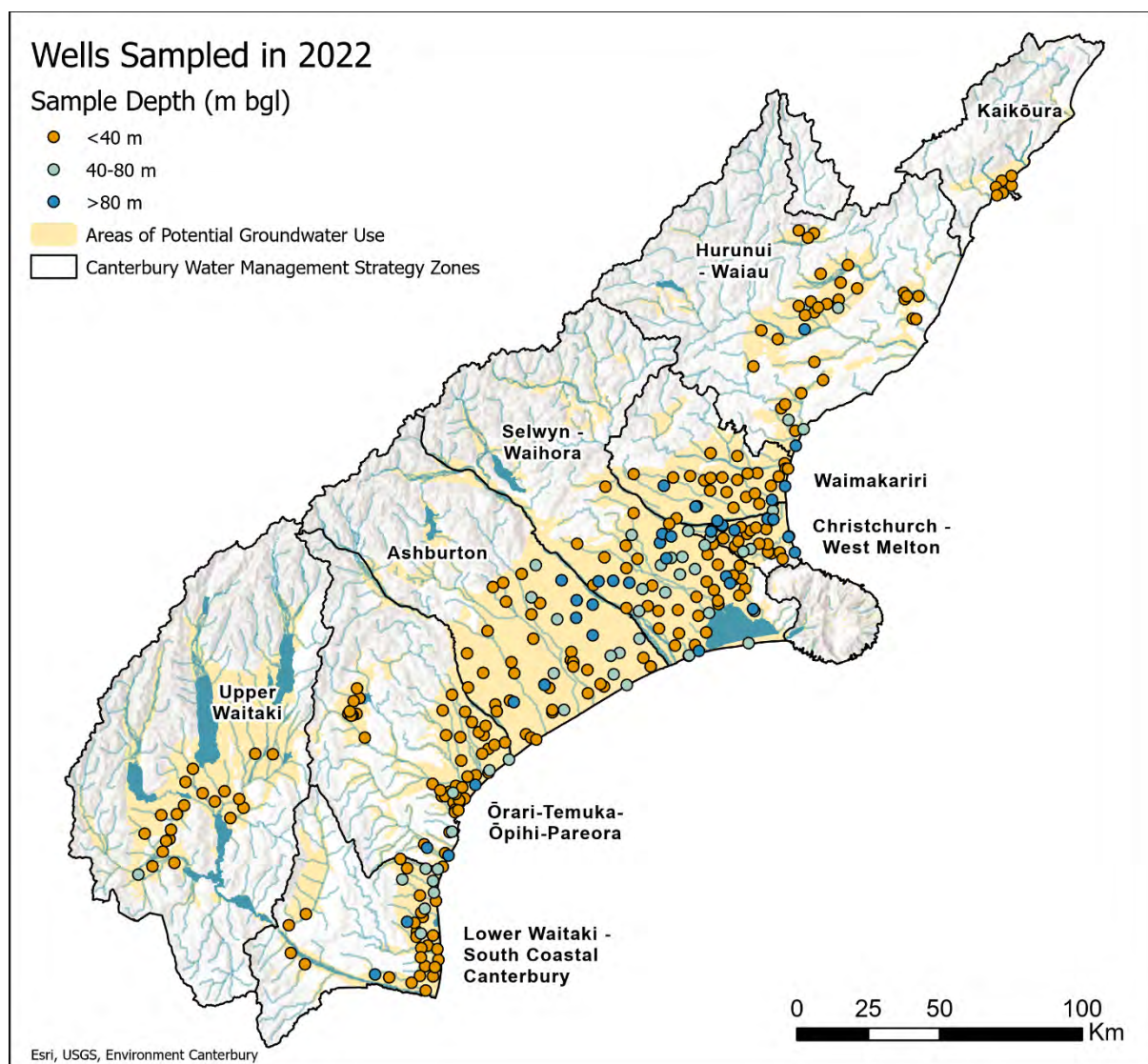


Figure 1: Locations and depths of groundwater samples in the 2022 annual survey

Regional summary

Table 1 below is a summary of the water quality statistics from groundwater samples collected at all 341 wells in our 2022 survey.

Table 1: Summary of groundwater quality parameters collected in the 2022 annual survey

| Water Quality Parameters | Units | Median | Range |
|--|-----------|--------|-----------------|
| Microbiological indicators | | | |
| <i>E. coli</i> | MPN/100mL | <1 | <1 to 48 |
| Total coliforms | MPN/100mL | <1 | <1 to >2420 |
| Nutrients | | | |
| Nitrate-nitrogen | mg/L | 3.5 | <0.002 to 28 |
| Ammonia-nitrogen | mg/L | <0.01 | <0.01 to 3.2 |
| Dissolved reactive phosphorus | mg/L | 0.0058 | <0.001 to 1.43 |
| Cations (dissolved metals) | | | |
| Total hardness (Ca + Mg as CaCO ₃) | mg/L | 71 | 10 to 330 |
| Calcium | mg/L | 19.5 | 1.9 to 96 |
| Sodium | mg/L | 10.7 | 1.99 to 119 |
| Magnesium | mg/L | 5.1 | 0.39 to 28 |
| Potassium | mg/L | 1.29 | 0.14 to 15.8 |
| Iron | mg/L | <0.02 | <0.02 to 14.6 |
| Manganese | mg/L | 0.0012 | <0.0005 to 3.1 |
| Anions | | | |
| Bicarbonate alkalinity (as HCO ₃ ⁻) | mg/L | 61 | 3.2 to 300 |
| Chloride | mg/L | 9.7 | 0.7 to 190 |
| Sulphate | mg/L | 10.5 | <0.5 to 182 |
| Arsenic | mg/L | <0.001 | <0.001 to 0.083 |
| Other parameters | | | |
| Electrical conductivity at 25°C (lab) | mS/m | 21.3 | 2.5 to 107 |
| pH (lab) | Unitless | 7.5 | 4.9 to 8.4 |
| pH (field)* | Unitless | 6.5 | 4.9 to 8.5 |
| Temperature (field) | °C | 12.5 | 2.1 to 16.5 |
| Oxidation Reduction Potential (field) | mV | 114.4 | -210 to 615 |
| Dissolved oxygen (field) | mg/L | 6.22 | 0 to 14.9 |
| Reactive silica (as SiO ₂) | mg/L | 16.3 | 6.7 to 43 |

* Based on our results, the pH of a sample usually increases due to loss of dissolved gases when it is removed from the ground and transported to the lab.

Comparison to New Zealand Drinking-water Standards

Canterbury groundwater is widely used as a source of untreated drinking water. We used the [Water Services \(Drinking Water Standards for New Zealand\) Regulations 2022](#) and the [Aesthetic Values for Drinking Water Notice](#) (Taumata Arowai, 2022) to assess the groundwater quality. Table 2 summarises the number of wells in each CWMS zone, and in the whole region, that did not meet the standards.

Table 2: Number of wells not meeting the drinking-water standards for 2022 annual survey

| Water quality parameter and drinking-water standards | Canterbury Region | CWMS Zone | | | | | | | | | |
|--|-------------------|-----------|----------------|-------------|--------------------------|----------------|-----------|----------------------------|--|---------------|---|
| | | Kaikōura | Hurunui-Waiiau | Waimakariri | Christchurch-West Melton | Selwyn-Waihora | Ashburton | Ōrari-Temuka-Ōpihi-Pareora | Lower Waitaki-South Coastal Canterbury | Upper Waitaki | |
| Number of wells sampled | 341 | 6 | 36 | 33 | 38 | 64 | 55 | 53 | 35 | 21 | |
| Health-based maximum acceptable value (MAV) - number of wells that did not meet the standard | | | | | | | | | | | |
| Nitrate-nitrogen | 11.3 mg/L | 44 | 0 | 4 | 0 | 8 | 22 | 6 | 4 | 0 | |
| <i>E. coli</i> | < 1 MPN/100 ml | 35 | 1 | 3 | 2 | 5 | 8 | 8 | 6 | 2 | |
| Manganese | 0.4 mg/L | 8 | 1 | 3 | 0 | 2 | 1 | 0 | 1 | 0 | |
| Arsenic | 0.01 mg/L | 4 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | |
| Aesthetic-based guideline value (AV) - number of wells that did not meet the standard | | | | | | | | | | | |
| pH (lab) * | 7.0 – 8.5 | 47 | 1 | 3 | 9 | 0 | 3 | 6 | 13 | 12 | 0 |
| Manganese (staining threshold) | 0.04 mg/L | 35 | 1 | 8 | 3 | 5 | 2 | 4 | 4 | 8 | 0 |
| Manganese (taste threshold) | 0.1 mg/L | 20 | 1 | 7 | 1 | 2 | 1 | 4 | 0 | 4 | 0 |
| Iron | 0.3 mg/L | 22 | 1 | 5 | 4 | 2 | 4 | 3 | 1 | 2 | 0 |
| Hardness (measured as CaCO₃) | 200 mg/L | 10 | 0 | 4 | 0 | 0 | 0 | 1 | 2 | 3 | 0 |
| Ammonia-nitrogen | 1.2 mg/L | 3 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| No wells exceeded the aesthetic guideline values for Chloride (250 mg/L), Sodium (200 mg/L), or Sulphate (250 mg/L). | | | | | | | | | | | |
| *pH results that did not meet AV were all less than 7. At these lower pH values, the water has an increased risk of dissolving trace levels of heavy metals such as lead and copper out of some household plumbing and fittings. | | | | | | | | | | | |

Drinking water quality

E. coli

Groundwater is vulnerable to contamination by human and animal faeces, especially after heavy rainfall. Bacteria and viruses in faecal material can cause diseases. We have been testing for the presence and quantity of *E. coli* bacteria in water as an indicator of faecal contamination in groundwater for over 20 years. Any detection of 1 or more *E. coli* bacterium per 100 mL exceeds the drinking water standards for New Zealand.

Current state of *E. coli* in groundwater (2022)

Groundwater throughout the region is vulnerable to faecal contamination. Detections of *E. coli* are found in all CWMS zones. They show no strong geographical pattern, but they are most common in shallower wells.

- *E. coli* were detected in 35 (10%) out of 341 wells we tested in spring 2022. The proportion of wells in which *E. coli* were detected varies from year to year, but 2022 was slightly above average for all the years we have been testing for *E. coli*.
- 23 samples with *E. coli* detections came from groundwater sampled less than 20 m below ground, six samples between 20 and 40 m below ground, three from between 40 and 80 m below ground, and three from greater than 80 m below ground.

Figure 2 shows wells where *E. coli* were detected in this year's sampling. Although most of the monitoring wells where *E. coli* were detected are not used for drinking water, if people were to consume untreated water from these wells, they would have a higher risk of contracting a water-borne infection from their water supply.

We also plotted the *E. coli* detections by groundwater sample depth below ground level in Figure 3. Because faecal bacteria are carried to groundwater from the surface and are filtered out or die-off over time as they travel through the vadose zone and aquifer, it is common that we see more detections in shallower wells.

We recommend that all owners of private water supply wells test their water regularly for *E. coli*, especially after heavy rain. If *E. coli* are detected, all water for consumption should be boiled or disinfected. Please visit [Our Drinking Water](#) webpage for more information about protecting your private water supply.

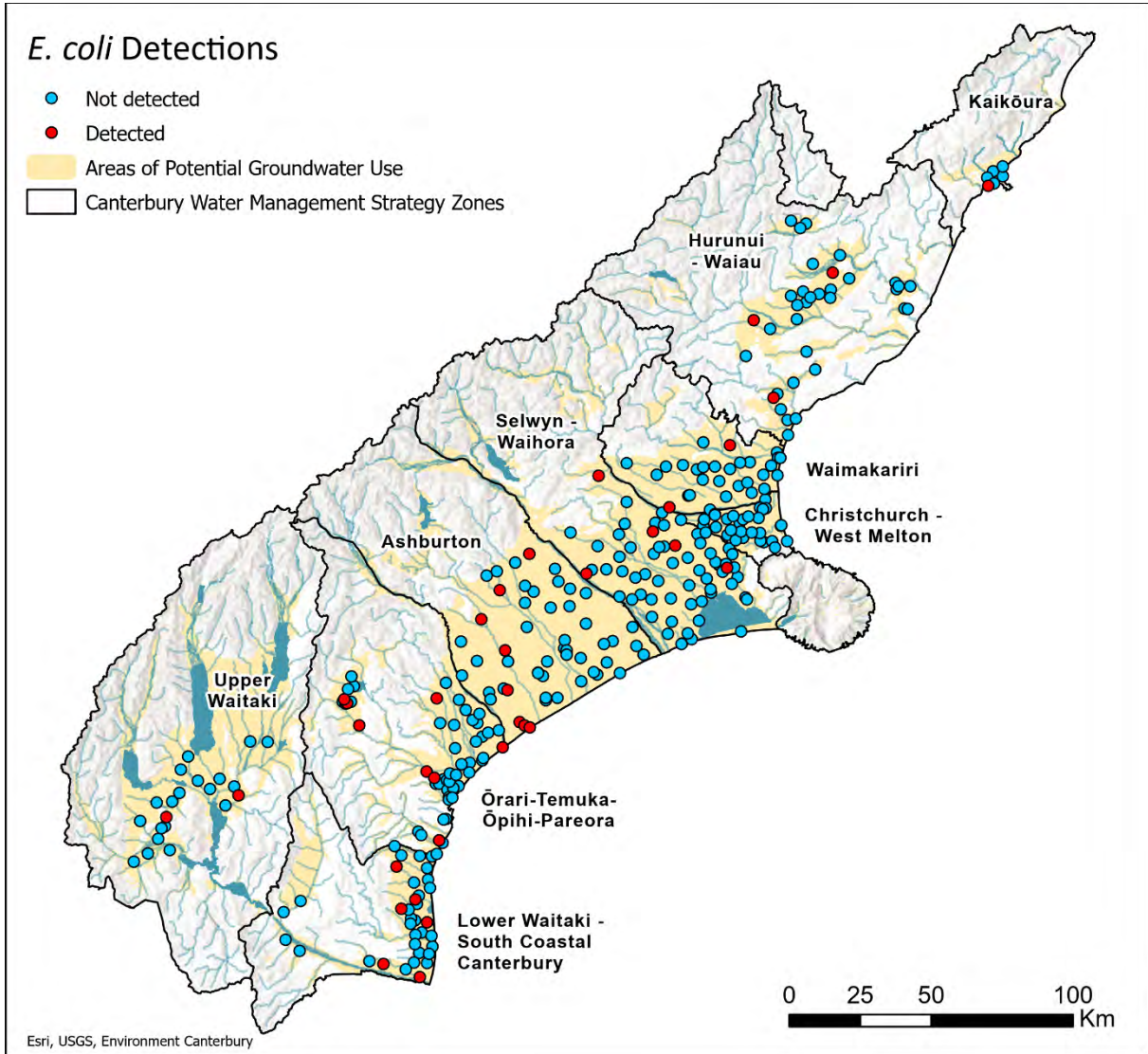


Figure 2: *E. coli* detections in wells sampled in the 2022 Annual Survey

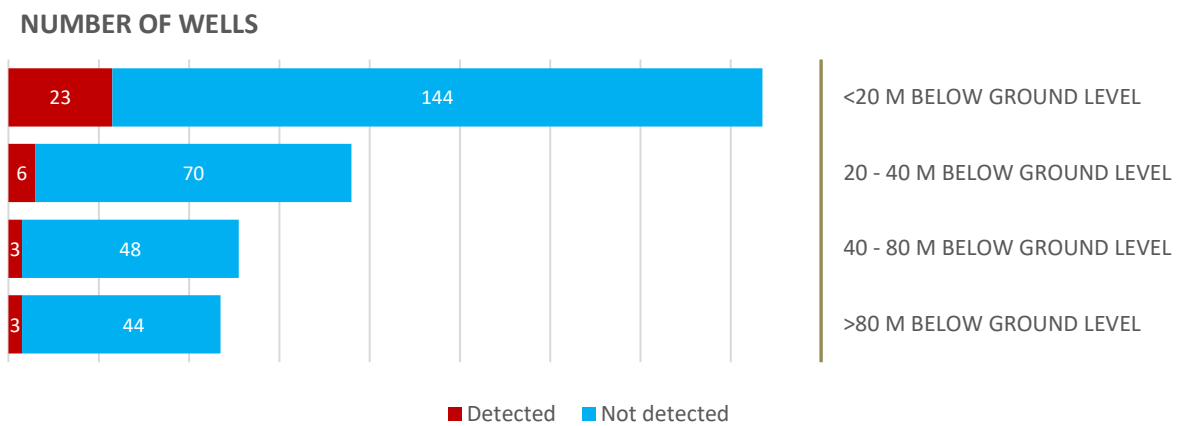


Figure 3: *E. coli* detections by groundwater sample depth in the 2022 Annual Survey

Nitrate-nitrogen

Nitrate-nitrogen in groundwater can affect its suitability for drinking-water supply. The Maximum Acceptable Value (MAV) for nitrate is 50 mg/L (equivalent to nitrate-nitrogen of 11.3 mg/L), based on a risk to bottle-fed babies. The [Ministry of Health](#) (Manatū Hauora) recommends applying this value to protect bottle-fed babies less than six months old and pregnant women.

Current state of nitrate-nitrogen in groundwater (2022)

Figure 4 summarises the nitrate-nitrogen concentrations found in our 2022 groundwater quality survey by CWMS zone. The concentrations are grouped into four categories, using the same categories that are used on the [LAWA](#) website – Land, Air, Water Aotearoa.

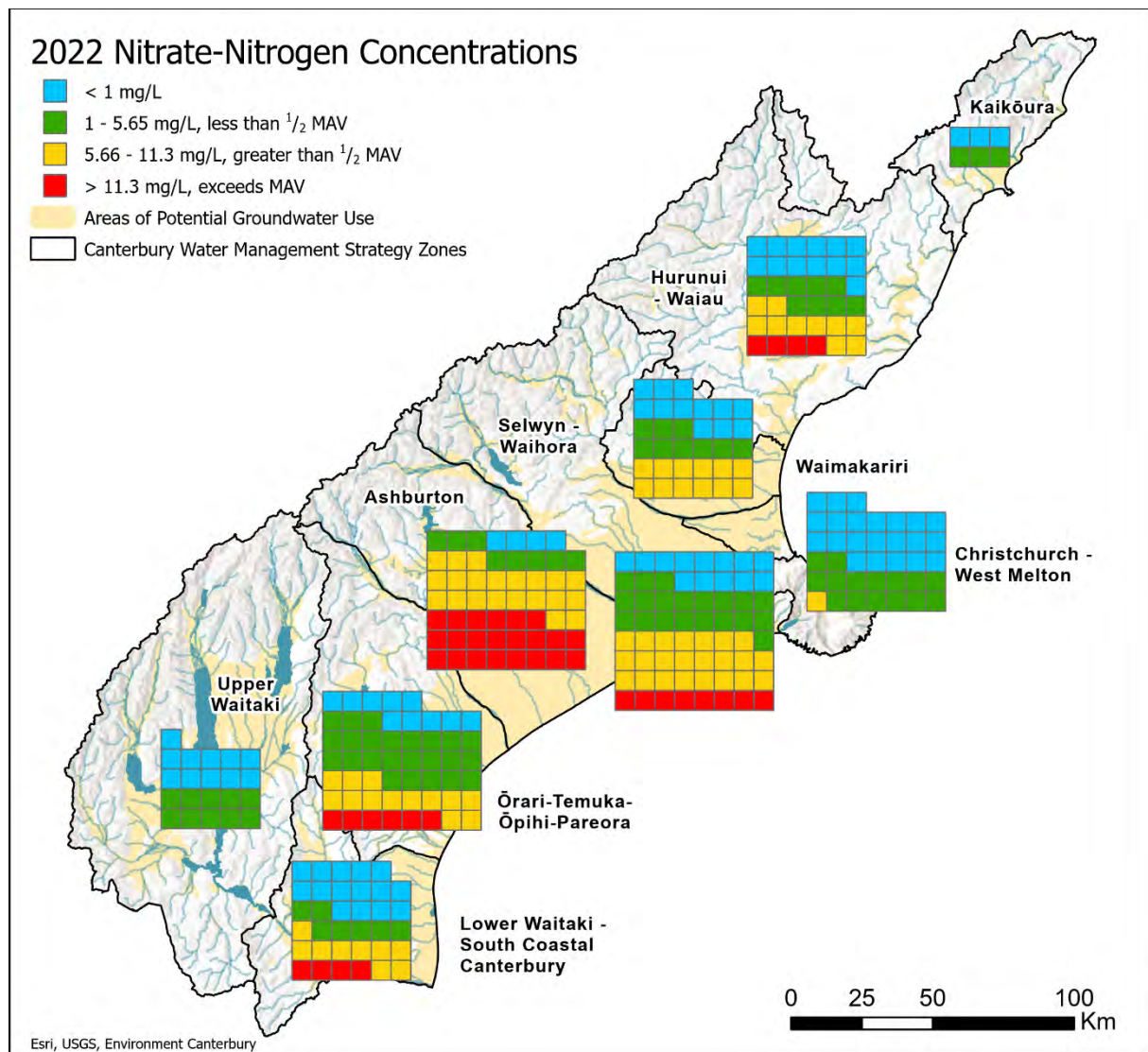


Figure 4: Summary of nitrate-nitrogen concentrations sampled in the 2022 annual survey for each CWMS zone. One square represents one well

Areas around and downstream of intensive agricultural land use tend to have higher nitrate-nitrogen concentrations in the groundwater than other areas. In some places, concentrations of nitrate-nitrogen leached from the soils can be decreased by natural dilution (especially adjacent to the major rivers) or by denitrification.

In the 2022 annual survey we found:

- the samples from 103 wells (30% of the wells we sampled) had nitrate-nitrogen concentrations below 1 mg/L (shown by blue squares).
- the samples from 105 (31%) wells had nitrate-nitrogen concentrations greater than or equal to 1 mg/L but less than half of the MAV (5.65 mg/L; shown by green squares).
- the samples from 89 (26%) wells had nitrate-nitrogen concentrations above half of the MAV (5.65 mg/L) but less than or equal to the MAV (11.3 mg/L; shown by yellow squares).
- the samples from 44 (13%) wells had nitrate-nitrogen concentrations above the MAV (> 11.3 mg/L; shown by red squares).

The proportion of samples exceeding the MAV (13%) is higher than the 10% found in 2021.

In 2022, Canterbury experienced significant rainfall events during winter, with July being the wettest month Christchurch has ever recorded (NIWA, 2022). In some of the wells that we monitor on a monthly or quarterly basis, we saw a peak in nitrate-nitrogen concentrations following these rainfall events.

Therefore, it is possible that the increase in the number of wells where nitrate-nitrogen exceeded the MAV in the 2022 annual survey may be attributed to the higher winter rainfall 'flushing' nutrients that had been stored in the soil over the previous drier period into groundwater.

In general, nitrate-nitrogen concentrations tend to decrease with depth when we compare samples from different depths at a given location. At a regional scale, this pattern becomes less clear, as shown in Figure 5.

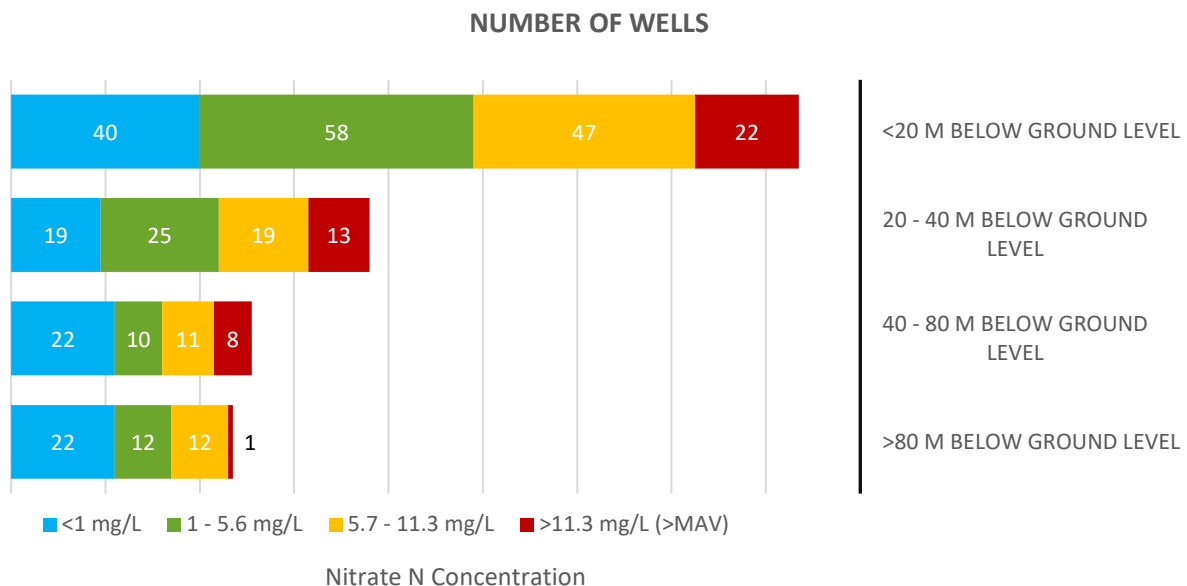


Figure 5: Summary of nitrate-nitrogen concentration by sample depth below ground level in the 2022 annual survey

Long-term trend of nitrate-nitrogen in groundwater (2013 – 2022)

Environment Canterbury conducts a statistical analysis each year to look for long-term trends in nitrate-nitrogen concentrations. Our trend analysis followed the methodology developed by Snelder *et al.* (2021) which is also used for the groundwater quality module on the LAWA website. Details of this methodology can be found on the [LAWA](#) website. The results are mapped in Figure 6. Where necessary, the approximate location has been used to prevent symbols overlapping.

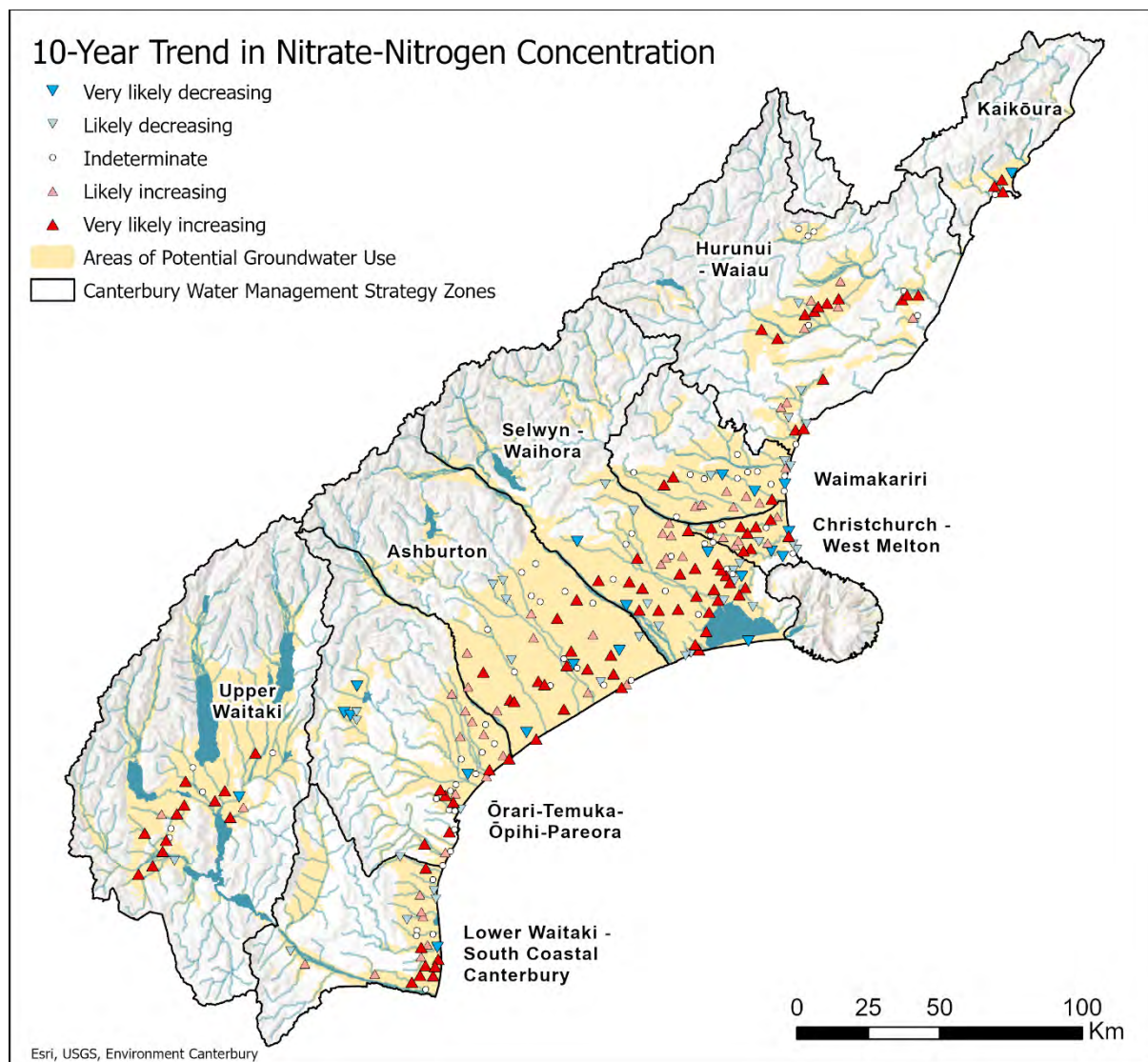


Figure 6: Ten-year trends (2013 to 2022) in nitrate-nitrogen concentrations in annual survey wells

From the 2013 to 2022 annual surveys, we found:

- 269 of the 341 wells sampled in 2022 had enough data to analyse trends (at least 8 samples each over the last ten years)
- 92 wells (34%) showed 'very likely increasing' trends in nitrate-nitrogen concentrations
- 51 wells (19%) showed 'likely increasing' trends in nitrate-nitrogen concentrations
- 36 wells (13%) showed 'likely decreasing' trends in nitrate-nitrogen concentrations
- 21 wells (8%) showed 'very likely decreasing' nitrate-nitrogen concentration trends

- 69 wells (26%) had no decreasing or increasing trend (labelled as indeterminate) in nitrate-nitrogen concentrations.

There are some differences between our results and those shown on LAWA, even though the analytical method is the same. There are two key reasons for this:

- 1) *different time periods*: in this report, we present trends calculated over the period 2013-2022, whereas LAWA presents trends calculated over the period 2012-2021
- 2) *different sampling frequencies*: the trends in this report are based on annual data, whereas LAWA trends were calculated using quarterly data. About a third of the wells in our annual survey are sampled four times a year. Those quarterly results are available on LAWA but we do not report them here.

The greatest difference between them is the number of wells analysed. For this report, we had sufficient data (at least 8 samples) to calculate trends for 269 of the 341 wells in our survey. In contrast, LAWA only has 83 quarterly wells that meet their data requirements for trend analysis. A second significant difference is that because LAWA uses quarterly data, it has more data points and therefore increases certainty in the trend. This means that some sites that show 'no trend' or a 'likely' trend in this report have a 'very likely' trend on LAWA.

Other contaminants

Health risks

Localised health risks may be present from drinking groundwater exceeding the MAV for arsenic and manganese in Canterbury. These substances tend to occur naturally in areas of anoxic groundwater (i.e. water with little or no dissolved oxygen). More information on the occurrence of arsenic and manganese in Canterbury groundwater can be found in our recently published [report](#) (Pearson *et al.*, 2022).

Manganese

Figure 7 shows the results for manganese graded by aesthetic (AV) and health-based (MAV) concentrations in 2022. Pink dots indicate wells where the manganese concentrations are high enough to cause potential staining of laundry (above 0.04 mg/L) and dark purple indicates potential health risks from long-term consumption of water with manganese above 0.4 mg/L. There is also an aesthetic value of 0.1 mg/L set as a threshold for objectionable taste (Taumata Arowai, 2022).

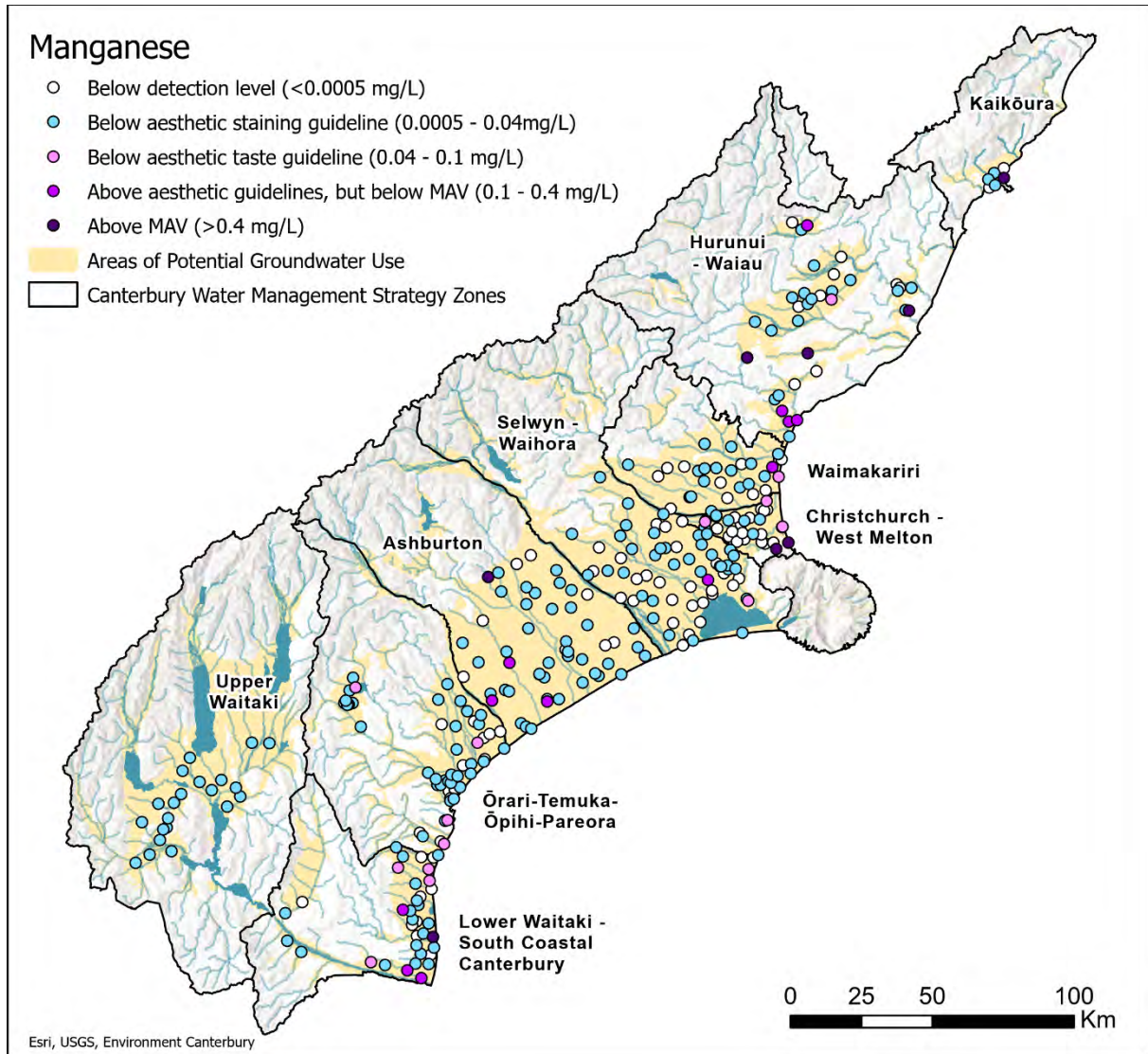


Figure 7: Manganese concentrations in groundwater from the 2022 annual survey assessed relative to drinking-water standards

Arsenic

Figure 8 shows the results for arsenic. Previously, we have only monitored arsenic in wells where high arsenic has been detected in the past. This year, we sampled 341 wells for arsenic. The red circles in Figure 8 show four wells (1%) with arsenic levels exceeding the MAV of 0.01 mg/L. These are areas where arsenic is known to be present in groundwater due to natural or anthropogenic sources (Pearson, 2022). The majority of wells (96%) showed arsenic levels below the detection limit of 0.001 mg/L.

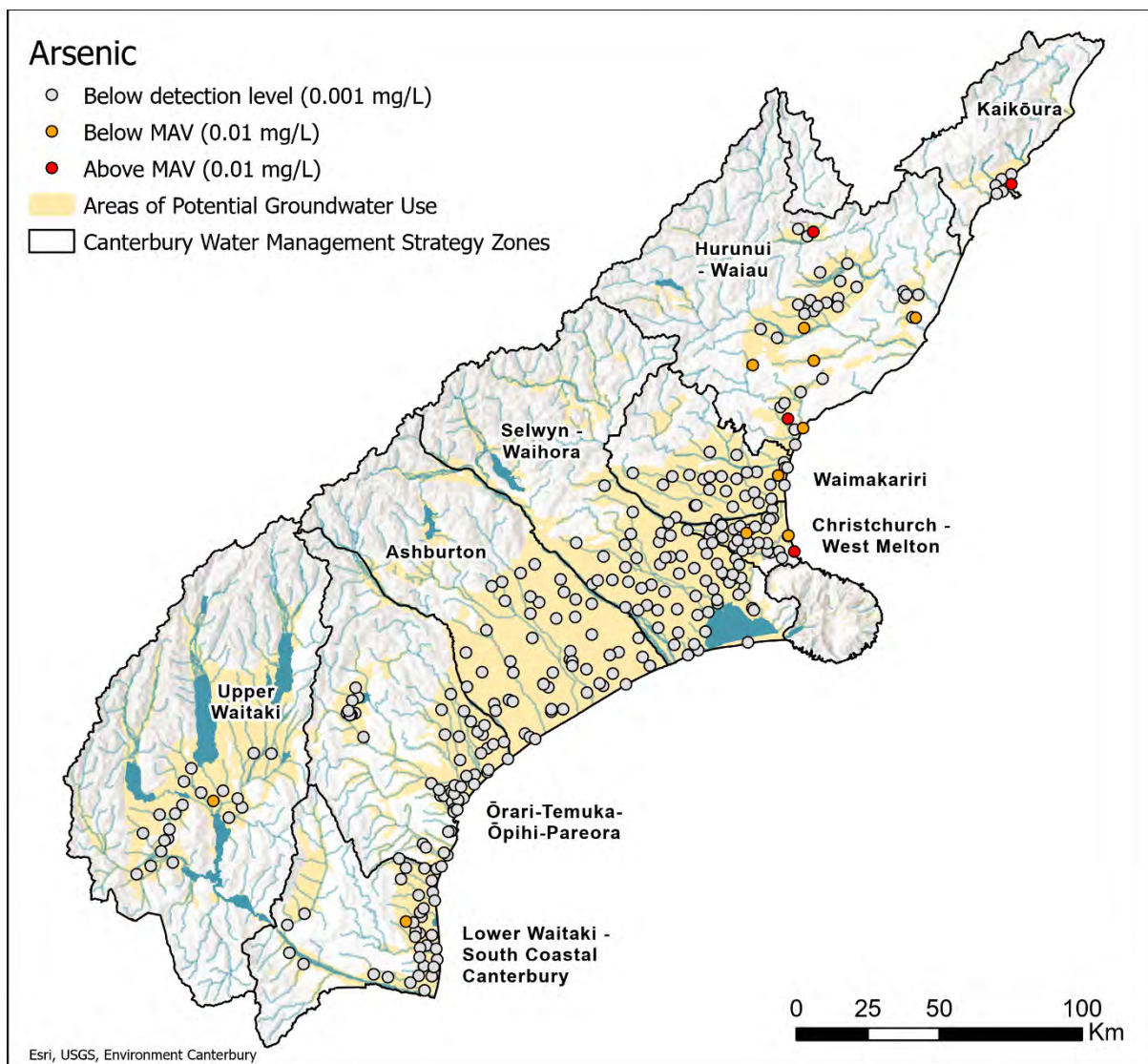


Figure 8: Arsenic concentrations in groundwater from the 2022 annual survey assessed relative to drinking-water standards

Aesthetic properties

The samples from some wells did not meet guideline values for contaminants that affect the aesthetic properties of the water, including pH, iron, manganese, ammonia, and hardness (see Table 2). These results were very similar to previous surveys. These contaminants do not pose a health risk, but they may be a nuisance because of corrosiveness, staining, poor taste, scale build-up or scum formation with certain types of soaps.

pH is the most common parameter that does not meet drinking-water guideline values. The pH of most Canterbury groundwater is mildly acidic. This is a natural effect from dissolved gases in the recharge and the low buffering capacity of our aquifer sediments. Water with a pH below 7 can pose a risk of dissolving metals from plumbing pipes (which the drinking-water standard refers to as *plumbosolvency*).

Healthy waterways

Many of our streams and lakes are fed by groundwater. Dissolved nutrients (nitrogen and phosphorus) transported via groundwater pose a threat to the health of these waterways. Nitrate can be directly toxic to fish or, together with phosphorus, can cause the growth of plants and algae that deplete oxygen in waterways.

To assess our groundwater monitoring results in this context, we have used nitrate-nitrogen and dissolved reactive phosphorus attribute bands for ecosystem health in rivers from the [National Policy Statement for Freshwater Management](#) (NPS-FM, MfE, 2020). We must note, though, that for surface water, these thresholds are based on median concentrations. Our groundwater results are based on single samples that do not capture the true median value across the year, so they can only indicate potential effects on rivers. These results are most relevant for rivers and streams where groundwater is the dominant source of flow in the river.

We identified a subset of 135 wells from our annual survey that are located in areas where groundwater may be discharging to surface water. This includes wells with a sample depth less than 20 m deep and water levels less than 6 m below ground level. For both nitrate-nitrogen and dissolved reactive phosphorus, we used the NPS-FM band classifications to categorise the concentrations we found in these 135 wells.

Nitrate-nitrogen

The NPS-FM classifies nitrate concentrations in rivers into four bands, based on toxicity and the potential effects on aquatic life. An annual median nitrate-nitrogen concentration of greater than 2.4 mg/L in rivers exceeds the NPS-FM 2020 National Bottom Line for ecosystem health.

In Figure 9 we have displayed the measured nitrate-nitrogen concentrations in the 135 wells used in this analysis. The yellow and orange symbols indicate areas where our sampling shows nitrate-nitrogen concentrations in groundwater that could be contributing to the risk of surface waterways exceeding the National Bottom Line for nitrate toxicity under the NPS-FM 2020.

In the 2022 annual survey we found:

- Samples from 33 wells (24%) had low nitrate-nitrogen concentrations (≤ 1.0 mg/L), shown by dark green circles. In rivers, an annual median nitrate-nitrogen concentration below 1.0 mg/L would be classed as band A in the NPS-FM – unlikely to cause effects even on sensitive species.
- Samples from 20 wells (15%) were in the range of 1.0 to 2.4 mg/L of nitrate-nitrogen, shown by light green circles. In rivers, an annual median nitrate-nitrogen concentration in this range would be classed as band B in the NPS-FM – some growth effects on up to 5% of species.
- Samples from 41 wells (30%) had concentrations in the range of 2.4 to 6.9 mg/L, shown by light yellow circles. In rivers, an annual median nitrate-nitrogen concentration in this range would be classed as band C in the NPS-FM – growth effects on up to 20% of species, mainly sensitive species.
- Samples from 41 wells (30%) had nitrate-nitrogen concentrations greater than 6.9 mg/L, shown by the orange circles. Annual median nitrate-nitrogen concentrations of greater than 6.9 mg/L in rivers would be classed as band D in the NPS-FM – could have potential impacts on the growth of multiple aquatic species.

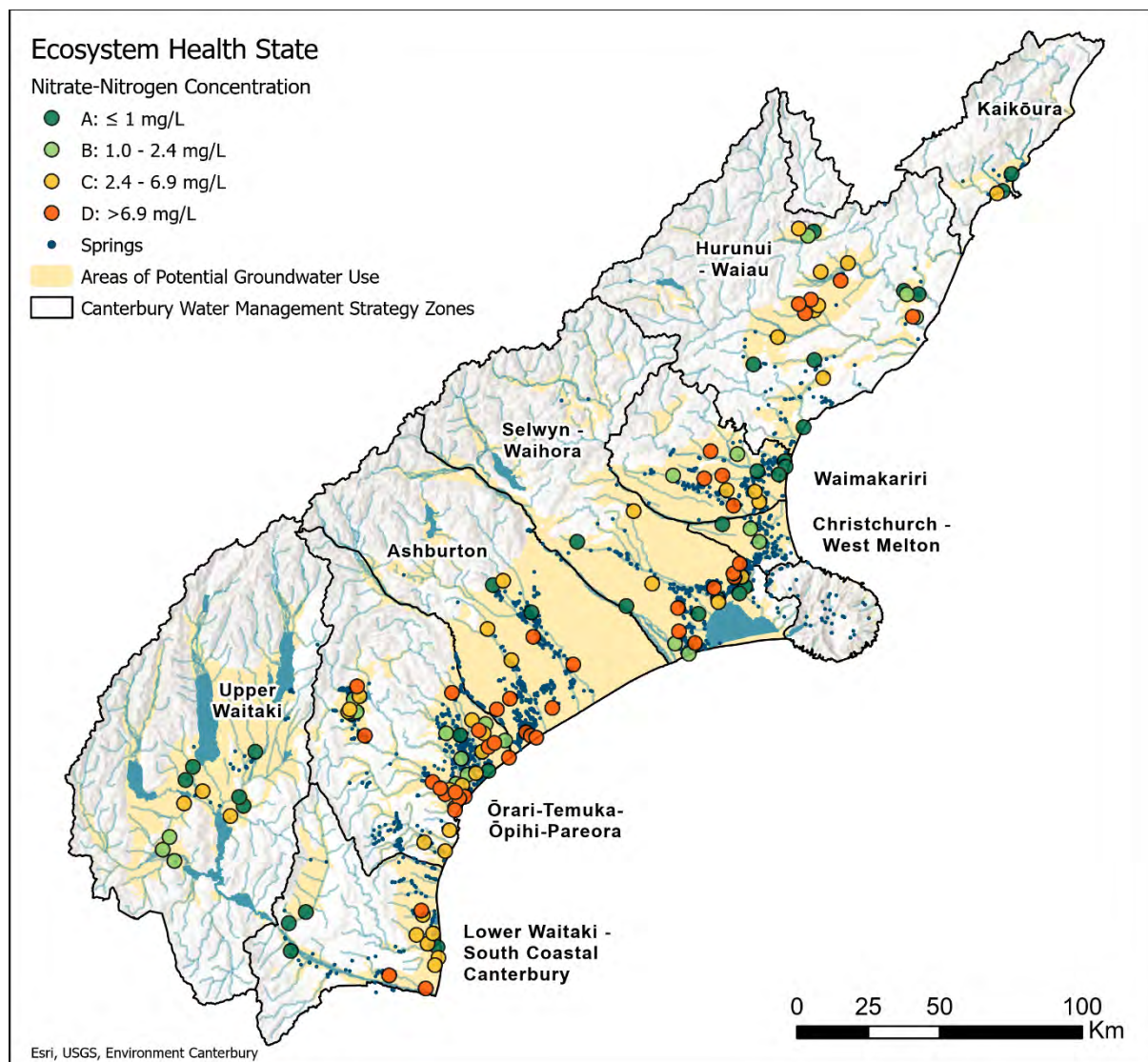


Figure 9: Groundwater nitrate-nitrogen concentrations from the 2022 annual survey. Concentrations are shown for wells in areas where groundwater potentially discharges to surface water. They are grouped by NPS-FM attribute band thresholds

Phosphorus

To assess our groundwater monitoring results for dissolved reactive phosphorus (DRP), we used the NPS-FM attribute bands.

High concentrations of nutrients in surface water bodies can cause excessive plant growth rates. With the exception of Banks Peninsula rivers, and possibly the Waipara and Pareora catchments, phosphorus is considered the main limiting nutrient for aquatic plant growth in Canterbury rivers (Hayward *et al.*, 2009). Surface runoff is widely recognised to be the major source of phosphorus in rivers, but where groundwater contributes to stream flow, the phosphorus concentration in the groundwater has the potential to affect the concentration in the stream. Phosphorus in groundwater could be coming from several sources, either natural or from human activities such as farming or discharge of effluent.

The NPS-FM classifies DRP into four bands, based on potential effects to aquatic life. In Figure 10, we apply this classification to the same subset of 135 shallow wells as used for the nitrate analysis in Figure 9.

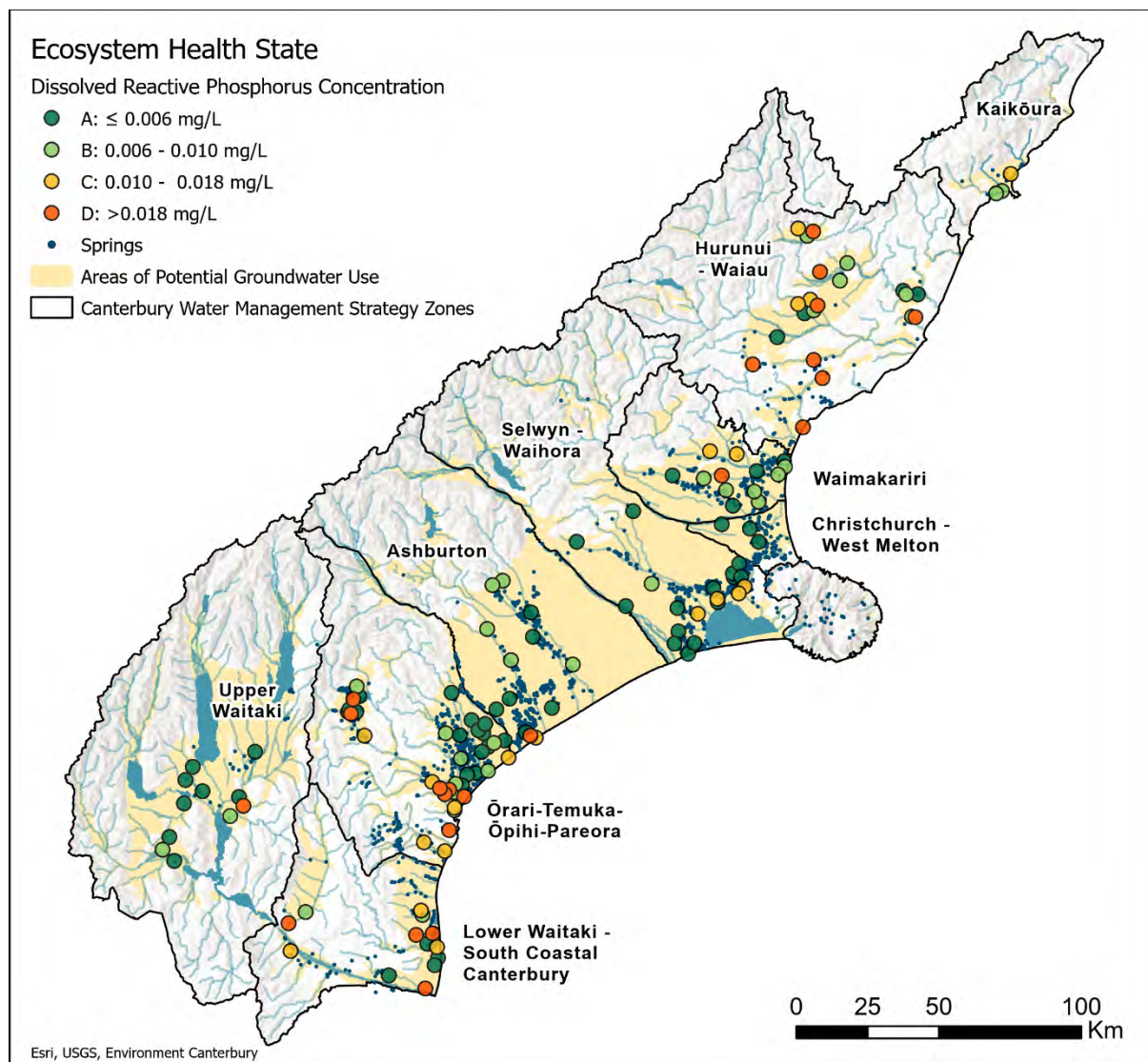


Figure 10: Groundwater DRP concentrations from the 2022 annual survey. Concentrations are shown for wells in areas where groundwater potentially discharges to surface water. They are grouped by NPS-FM attribute band thresholds

In the 2022 annual survey we found:

- Samples from 60 wells (44%) in areas of potential connection to surface water had low DRP concentrations (<0.006 mg/L). These are shown by the dark green circles. In rivers, a median DRP concentration below 0.006 mg/L would be classed as band A – no adverse effects from DRP enrichment are expected.
- Samples from 33 wells (24%) had DRP concentrations in the range of 0.006 – 0.010 mg/L, shown by light green circles. In rivers, a median concentration in this range is classed as band B, which can result in the loss of sensitive macroinvertebrate taxa.
- Samples from 20 wells (15%) had DRP concentrations of 0.010 – 0.018 mg/L, as shown by the yellow circles. In rivers, median concentrations in this range are classed as band C, which can result in the loss of sensitive macroinvertebrate and fish taxa.
- Samples from 22 wells (16%) had DRP concentrations greater than 0.018 mg/L, shown by the orange circles. In rivers, median DRP concentrations of greater than 0.018 mg/L are classed as band D, with potential impacts on the growth of multiple aquatic species, and significant changes in the macroinvertebrate and fish communities.

High DRP concentrations in some of the wells are probably from phosphorus-bearing rocks or sediments, especially in the Hurunui-Waiiau CWMS zone and the downlands of South Canterbury (Scott & Wong, 2016).

Summary and conclusion

- We sampled groundwater from 341 wells across the Canterbury region in our 2022 annual groundwater quality survey.
- The samples from 44 wells (13%) had nitrate-nitrogen concentrations above the health-based Maximum Acceptable Value (MAV). This was higher than the previous year's survey (34 wells or 10% of sampled wells) and may be related to high groundwater recharge over the wetter than average winter in 2022.
- We found increasing trends in nitrate-nitrogen concentrations in 53% (34% very likely, 19% likely) of the wells with enough data to analyse trends over the past ten years. The concentrations in 26% of the wells showed no trend, and 21% of the wells showed decreasing trends (8% very likely, 13% likely).
- *E. coli* were detected in the samples from 35 wells (10%), which was slightly higher than the previous year's survey (29 wells or 9% of sampled wells had *E. coli* detected in 2021).
- More than half (60%) of the groundwater samples in areas where there is likely high connectivity with surface water (82 out of a total of 135 samples) had nitrate-nitrogen concentrations greater than 2.4 mg/L. Baseflow from such groundwater could contribute to some lowland rivers failing to meet the National Bottom Line concentration (of 2.4 mg/L annual median nitrate-nitrogen).
- Samples from 22 (16%) of the wells sampled in areas where there is likely high connectivity with surface water had dissolved reactive phosphorus (DRP) concentrations above 0.018 mg/L. Baseflow from this groundwater could contribute to some lowland rivers being given a D band classification for DRP (>0.018 mg/L annual median concentration).
- The samples from some wells did not meet the Aesthetic Value (AV) for hardness, iron, manganese, pH, and ammonia. These results were very similar to previous surveys.

Acknowledgements

This report was prepared by Melanie Knottenbelt of Environment Canterbury. The report was reviewed by Kurt van Ness, Lisa Scott and Marta Scott. Courtney Foster, Dave Evans, Ross Cressy, Shaun Philip Tom Johns and Tom Vincent collected the groundwater samples.

References

- Canterbury Mayoral Forum, 2009: Canterbury Water Management Strategy, Strategic Framework – November 2009, Report R19/122, <https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-water-management-strategy/>
- Hayward, S., Meredith, A. and Stevenson, M., 2009: *Review of proposed NRRP water quality objectives and standards for rivers and lakes in the Canterbury region*. Environment Canterbury Report R09/16.
- MfE, 2020: *National Policy Statement for Freshwater Management 2020 (amended 2022)*, Appendix 2, Attribute Tables.
- NEMS, 2019: Water Quality, Part 1 - Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data v.1.0.0, *National Environmental Monitoring Standards*, March 2019.
- NIWA, 2022: Aotearoa New Zealand Climate Summary: July 2022. https://niwa.co.nz/sites/niwa.co.nz/files/Climate_Summary_July_2022_Final-v3.pdf
- Pearson, A., Scott, L. and Wilkins, B. 2022. *Arsenic and manganese in Canterbury groundwater: occurrence, sources, and mechanisms*. Environment Canterbury Report R22/06.
- Scott, L. and Wong, R., 2016: Dissolved phosphorus in Canterbury groundwater. In: *Integrated nutrient and water management for sustainable farming*. (Eds L.D. Currie and R. Singh). <http://flrc.massey.ac.nz/publications.html>. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 10 pages.
- Snelder, T., Fraser, C., Larned, S. and Whitehead, A., 2021: *Guidance for the analysis of temporal trends in environmental data*, NIWA Client Report No: 2021017WN prepared for Horizons Regional Council and MBIE Envirolink, April 2021, 99 p.
- Taumata Arowai, 2022: *Aesthetic Values for Drinking Water Notice 2022*. <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. <https://www.legislation.govt.nz/regulation/public/2022/0168/latest/whole.html>

This page intentionally left blank

Environment Canterbury offices

Christchurch

200 Tuam Street
PO Box 345
Christchurch 8140

P 0800 324 636

Timaru

75 Church Street
Timaru 7940

Kaikōura

96 West End
Kaikōura 7340

Report number: R23/07

© Environment Canterbury 2023

E23/8060



Water quality for contact recreation: Annual summary report 2022-23 season

Environment Canterbury Science Summary:
R23/40



Water quality for contact recreation: Annual summary report 2022-23 season

Environment Canterbury Science Summary:
R23/40

Emily Gray

September 2023

Reviewed by: *Elaine Moriarty*
Section Manager – Surface Water Science

200 Tuam Street
PO Box 345
Christchurch 8140
Phone (03) 365 3828
Fax (03) 365 3194

75 Church Street
Timaru 7940
Phone (03) 687 7800
Fax (03) 687 7808



Website: www.ecan.govt.nz
Customer Services Phone 0800 324 636

Key messages

- ❖ Environment Canterbury staff routinely monitor 57 freshwater (rivers and lakes) and 46 coastal (estuary, beach, and harbour) popular contact recreational sites weekly over the summertime across the region. These sites are commonly used for swimming, boating, and paddling in summer months.
- ❖ At each of these sites water quality is sampled for Faecal Indicator Bacteria (*Escherichia coli* (*E. coli*) and/or enterococci) concentrations to establish suitability for swimming. We also undertake cyanobacteria surveys at freshwater sites where blooms of potentially toxic cyanobacteria may pose a risk to public health.
- ❖ At the conclusion of the 2022/23 summer, 78% of coastal sites (estuaries, harbours, and beaches) are generally suitable for swimming. The number of sites suitable for contact recreation has declined compared to previous years.
- ❖ Nearly half of sites within Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa have changed from being 'suitable for swimming' to 'unsuitable for swimming' over the previous two seasons.
- ❖ At the conclusion of the 2022/23 summer, 71% of the freshwater sites were graded as generally suitable for contact recreation. Out of these freshwater sites, 88% of the lakes were graded as suitable for contact recreation and 65% of rivers.
- ❖ During the 2022/23 summer, nine public health warnings were issued due to high faecal contamination. Eleven rivers and seven lakes also had health warnings issued due to potentially toxic cyanobacteria blooms.

Table of contents

| | |
|---|-----------|
| Key messages | i |
| 1 Introduction | 1 |
| 2 Microbial surveillance programme in 2022-23 season | 2 |
| 2.1 Surveillance Response Framework..... | 2 |
| 2.2 Weekly surveillance sampling sites | 2 |
| 2.3 Microbial water quality health warnings from surveillance monitoring..... | 3 |
| 3 Suitability for Recreation Grade (SFRG) for 2022/23 season | 5 |
| 3.1 Suitability for recreation grade assessment methodology | 5 |
| 3.2 Rainfall affected data | 5 |
| 3.3 Suitability for Recreation Grades for 2022/23..... | 6 |
| 3.3.1 Freshwater | 6 |
| 3.3.2 Coastal | 9 |
| 3.4 Summary..... | 11 |
| 4 Cyanobacteria monitoring | 12 |
| 4.1 Cyanobacteria response framework | 12 |
| 4.2 Benthic cyanobacterial surveillance results | 12 |
| 4.2.1 Planktonic Cyanobacteria | 14 |
| 5 Further assessments | 16 |
| 5.1 Microbial water quality investigations | 16 |
| 6 Recommendations and signage for 2023/24 season | 17 |
| 6.1 Recommendations | 17 |
| 6.2 Warning signage | 17 |
| 6.2.1 Freshwater | 17 |
| 6.2.2 Coastal | 18 |
| 7 References | 19 |
| Appendix 1: Two-year microbiological sampling result summaries | 20 |
| Appendix 2: 2022/23 SFRG district summary maps | 24 |
| Appendix 3: Waipara River Investigation | 37 |
| Appendix 4: Recreational Lakes within the Roto Kōhatu Reserve Investigation | 40 |
| Appendix 5: Memo on Lyttelton/Whakaraupō and Akaroa Faecal Source Tracking Investigation | 43 |

1 Introduction

Environment Canterbury's recreational water quality programme monitors key swimming sites in the region. The monitoring programme follows the national microbiological water quality guidelines for marine and freshwater recreational areas (MfE & MoH, 2003) and the interim national guidelines for cyanobacteria in recreational freshwaters (MfE & MoH, 2009). Full details of the programme can be found in the report by Arthur (2020).

Environment Canterbury staff routinely monitor popular freshwater (stream, river, and lake) and coastal (beach, harbour, and estuary) sites, sampling for *Escherichia coli* (*E. coli*) and/or enterococci (also called Faecal Indicator Bacteria (FIB)).

River sites are surveyed for potentially toxic cyanobacteria as required throughout the season, increasing to fortnightly in accordance with the MfE & MoH guidelines (MfE & MoH, 2009). Lake sites are tested for phytoplankton community abundance (including potentially toxic cyanobacteria biovolumes) throughout the year, with the monitoring frequency increasing if MfE & MoH (2009) Alert or Action trigger levels for phytoplankton cyanobacteria are exceeded. Monitoring is conducted weekly between mid-November and March each summer.

Microbial monitoring results are updated as soon as the data is available on the Land Air Water Aotearoa (LAWA) website (lawa.org.nz). Te Mana Ora – a branch of Te Whatu Ora National Public Health Service for Waitaha/Canterbury Region (previously known as Community and Public Health (CPH)) are notified of high-risk results (including exceedances of cyanobacteria guidelines) and may issue human health warnings. These are displayed on LAWA and Environment Canterbury websites (ecan.govt.nz/health-warnings).

The responsibility for various response actions falls to the different agencies involved (e.g., Environment Canterbury, relevant Territorial Authorities and District Health Boards). Prior to the start of each summer monitoring season, sampling and response protocols are established by the agencies for each district.

The purpose of this summary report is to report on:

- last season's microbial surveillance monitoring results,
- provide updated Suitability for Recreation Grade (SFRG) assessments for microbial quality,
- summary of cyanobacterial bloom surveillance results, and
- investigations from the 2022/23 season.

A summary of faecal coliform concentrations in marine waters over shellfish will be circulated in a separate memorandum and is therefore not included in this report.

2 Microbial surveillance programme in 2022-23 season

2.1 Surveillance Response Framework

Weekly surveillance monitoring is an essential component of the recreational water quality programme. It is particularly important for sites that are graded between 'good' and 'poor' which tend to have variable water quality and contaminant risks. While weekly monitoring results do not change a site's grading over the course a summer, it does detect discrete contamination events and informs the need for management interventions (e.g., erecting temporary warning signs). Seasonal surveillance monitoring also provides data for the reassessment of SFRGs at the end of each season.

During the summer monitoring season, individual sample results are used to determine surveillance response modes (Table 2-1). When a sample result exceeds the 'Alert' or 'Action' mode guideline values, the site is resampled as soon as possible. If two consecutive samples at a site exceed the 'Action' mode, the site may be put into a temporary warning by Te Mana Ora until sample results fall below the 'Alert' threshold. The sites that have 'poor' or 'very poor' grades have permanent warning signage in place and are not generally resampled following a high result.

Table 2-1: Response modes for sampling results during the summer monitoring period (MfE & MoH, 2003)

| Action level | Single sample result | Response protocol |
|---------------------|---|--|
| Surveillance | <ul style="list-style-type: none"> • ≤ 260 <i>E. coli</i>/100 mL • ≤ 140 enterococci/100 mL | <ul style="list-style-type: none"> • Continue routine monitoring |
| Alert | <ul style="list-style-type: none"> • 261 – 550 <i>E. coli</i>/100 mL • 141 – 280 enterococci/100 mL | <ul style="list-style-type: none"> • Increase sampling frequency • Identify and report on possible sources |
| Action | <ul style="list-style-type: none"> • > 550 <i>E. coli</i>/100 mL • > 280 enterococci/100 mL | <ul style="list-style-type: none"> • Increase sampling • Identify and report on possible sources • Erect warning signs • Inform public |

2.2 Weekly surveillance sampling sites

Faecal indicator bacteria concentrations are monitored at 57 freshwater and 46 coastal sites throughout Canterbury (Figure 2-1). There was no change to coastal monitoring sites, one freshwater monitoring site was moved (one site discontinued and one site added) within freshwater monitoring network. We also undertook microbial investigations in the Roto Kōhatu Reserve lakes, Lyttelton Harbour/Whakaraupō, Akaroa Harbour/Whakaroa, Waipara River and Otukaikino Stream.

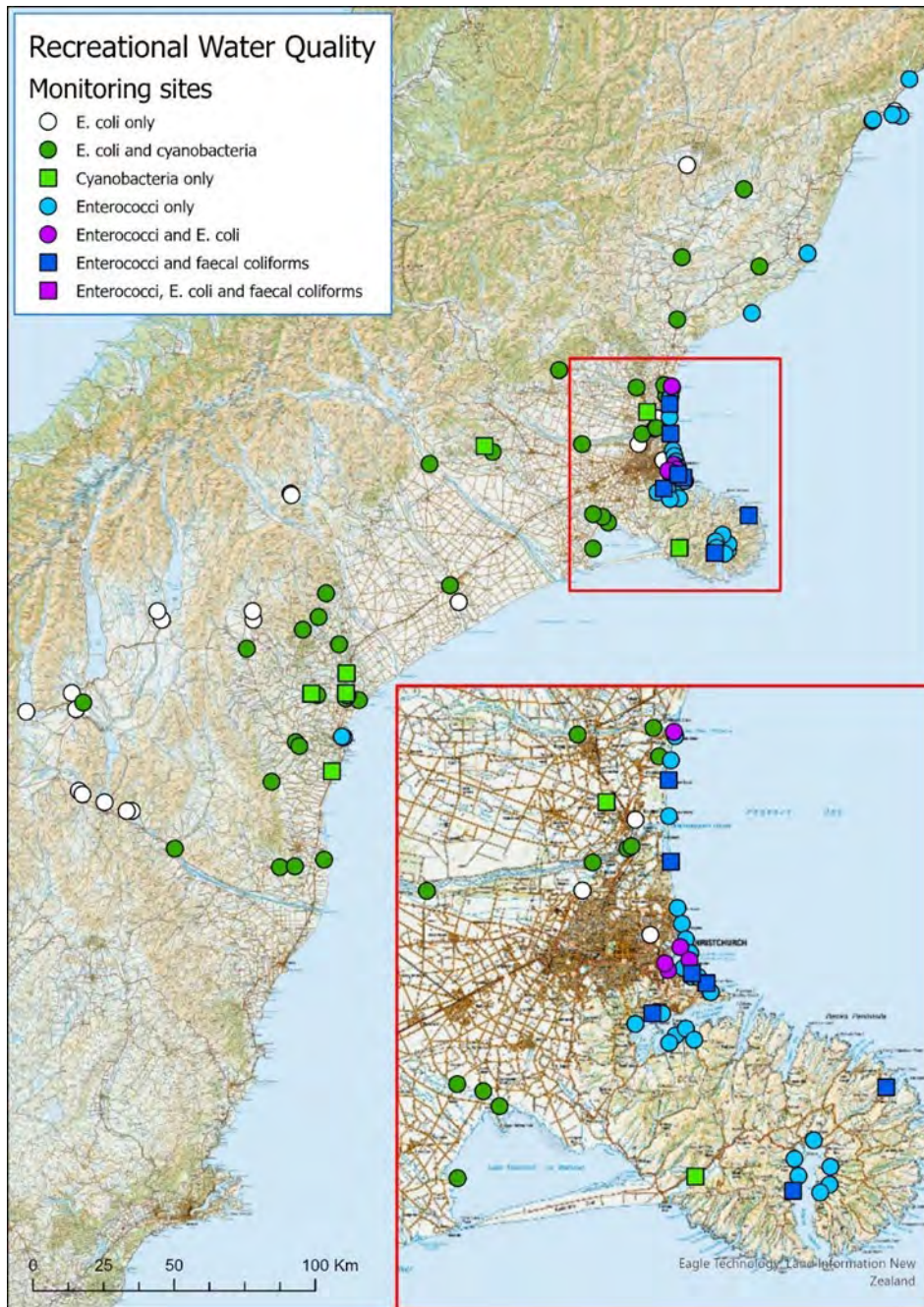


Figure 2-1: Map of contact recreation sites monitored for microbiological water quality (*E. coli* and enterococci) and cyanobacteria in Canterbury. Coastal recreation sites that are monitored for faecal coliforms, to determine health risks associated with shellfish consumption, are also included

2.3 Microbial water quality health warnings from surveillance monitoring

Temporary public health warnings are issued at the discretion of Te Mana Ora where the results of single or consecutive samples exceed the action levels for the microbial contamination of water. Temporary health warnings for 2022-23 season are outlined in Table 2-2.

Table 2-2: Temporary health warnings for exceedance of faecal indicator bacteria action level in 2022-23 season

| Site | Action | Date | Reason |
|----------------------------------|--|------------|---|
| Christchurch City | | | |
| Cass Bay | Temporary public health warning issued | 30/12/2022 | Result of 2720 enterococci MPN/100 mL on the 29/12/22 |
| | Warning removed | 10/01/2023 | Te Mana Ora removed the warning |
| Akaroa Harbour (all sites) | Temporary public health warning issued | 17/02/2023 | Multiple sites exceeded enterococci action level guidelines |
| | Warning removed | 20/02/2023 | Te Mana Ora removed the warning |
| Lyttelton Harbour (all sites) | Temporary public health warning issued | 17/02/2023 | Multiple sites exceeded enterococci action level guidelines |
| | Warning removed | 20/02/2023 | Te Mana Ora removed the warning |
| Waimate District | | | |
| Lake Aviemore at Waitangi | Temporary public health warning issued | 23/01/2023 | Result of >2420 <i>E. coli</i> MPN/100 mL on the 19/12/22 |
| | Warning removed | 26/01/2023 | Te Mana Ora removed the warning after two samples below alert |
| Lake Aviemore at Te Akatarawa | Temporary public health warning issued | 23/01/2023 | Result of 1203 <i>E. coli</i> MPN/100 mL on the 19/12/22 |
| | Warning removed | 26/01/2023 | Te Mana Ora removed the warning after two samples below alert |
| Pareora River at Evans Crossing | Temporary public health warning issued | 25/02/2023 | Two results over <i>E. coli</i> action level threshold |
| | Warning removed | 1/03/2023 | Te Mana Ora removed the warning |
| Otaio River at Gorge | Temporary public health warning issued | 25/02/2023 | Two results over <i>E. coli</i> action level guidelines |
| | Warning removed | 1/03/2023 | Te Mana Ora removed the warning |
| Waihao River at Gum Tree Road | Temporary public health warning issued | 25/02/2023 | Two results over <i>E. coli</i> action level guidelines |
| | Warning removed | 1/03/2023 | Te Mana Ora removed the warning |
| Waihao River at Bradshaws Bridge | Temporary public health warning issued | 25/02/2023 | Two results over <i>E. coli</i> action level guidelines |
| | Warning removed | 1/03/2023 | Te Mana Ora removed the warning |

Exceedances of the 'Alert' and 'Action' guidelines for *E. coli* and enterococci also occurred at other sampling sites but did not trigger the criteria for a public health warning to be issued by Te Mana Ora.

Rainfall events affected high results during routine monitoring which prompted health warning at some sites but cannot be attributed to all exceedances.

3 Suitability for Recreation Grade (SFRG) for 2022/23 season

3.1 Suitability for recreation grade assessment methodology

The MoH/MfE (2003) guidelines implement a qualitative risk assessment of potential faecal contamination within a waterbody's catchment to determine a Sanitary Inspection Category (SIC). This is coupled with faecal indicator bacteria concentration data (used to determine a Microbiological Assessment Category (MAC)) to assign each bathing site a Suitability for Recreation Grade (SFRG). The SFRG describes the general condition of a site at any given time and the health risks associated with microbial water quality at a site. A complete outline of the SIC and MAC methodology can be found in Arthur (2020). Table 3-1 outlines the SFRG assessment matrix.

The most recent five seasons of microbiological monitoring results are used to calculate the MAC. For new sites, at least three seasons of data are needed before a MAC can be calculated. Sites with at least three seasons of data but less than five years, will receive an interim grade. SIC assessments are generally reassessed every five years. SIC assessments were reviewed this year resulting in some SIC assessments changing.

Escherichia coli (*E. coli*) is measured in freshwaters and enterococci in marine waters. Both *E. coli* and enterococci are monitored in brackish environments (e.g., estuaries) where freshwater and saline influences are dynamic due to tidal cycles and river flows.

Table 3-1: Suitability for Recreation Grading assessment matrix for freshwater and marine sites adapted from MfE & MoH (2003)

| | | Microbiological Assessment Category (MAC) (95 th percentile - max. 5 seasons data) | | | |
|---|-----------|--|-----------------------------------|-----------------------------------|--------------------------------|
| | | A | B | C | D |
| Freshwater | | ≤ 130 <i>E. coli</i> /100 mL | 131-260 <i>E. coli</i> /100 mL | 261-550 <i>E. coli</i> /100 mL | >550 <i>E. coli</i> /100 mL |
| Marine | | ≤ 40 enterococci/100 mL | 41-200 enterococci/100 mL | 201-500 enterococci/100 mL | >500 enterococci/100 mL |
| Sanitary Inspection Category (SIC) | Very low | Very good | Very good | Follow-up* | Follow-up* |
| | Low | Very good | Good | Fair | Follow-up* |
| | Moderate | Follow-up* | Good | Fair | Poor |
| | High | Follow-up* | Follow-up* | Poor | Very poor |
| | Very high | Follow-up* | Follow-up* | Follow-up* | Very poor |

* Indicates unexpected results requiring investigation (e.g., reassessment of SIC).

The risk of illness from swimming increases progressively at sites graded from 'very good' to 'very poor'. Sites graded as 'very good', 'good' and 'fair' are generally considered suitable for contact recreation although may at times not be suitable (e.g., after heavy rainfall resulting in high bacterial concentrations). Sites graded as 'poor' and 'very poor' are generally considered unsuitable for contact recreation. Public notification is therefore recommended via permanent signage at these sites and media releases. Note that suitability for swimming grades only considers microbial health risks and does not consider other aspects of sites such as physical features or other contaminants.

3.2 Rainfall affected data

Many of Canterbury's freshwater and marine bathing sites have reasonably good microbial water quality during periods of dry, stable weather. However, increased runoff from moderate to heavy rainfall events often increase bacterial concentrations in waterbodies for short periods (1-2 days).

MACs for river bathing sites where rainfall is known to influence results, were calculated on a subset of data that had rainfall-affected results removed. The key assumption with this approach in rivers is that high flows and turbid waters after moderate to heavy rainfall will be effective at deterring swimmers. The removal of rainfall-affected data was based on assessments of flow, rainfall data (if available) and field observations noted at the time of sampling. The exclusion of data collected during these conditions allows an assessment of microbial water quality during times when swimming is more likely to occur in rivers.

The criteria for removing rainfall-affected data aimed to only remove data that match climatic conditions that would deter people from swimming at a site. The criteria are:

- moderate to heavy rain on the day of, or day before sampling;
- river in flood, i.e., high flows (max. 2 days following peak flood);
- water is reported as turbid, i.e., flood continues to influence water quality.

River sites that have a better suitability for swimming grade when rainfall-affected datapoints are removed (i.e., were graded “poor” or “very poor” and are now “fair” or better), are assigned that corresponding rainfall adjusted grade. **Permanent signage is required at rainfall adjusted sites to inform the public that the human health risks from microbial contamination may persist up to 48 hours after significant rainfall.** River sites where suitability for swimming remains unchanged after rainfall assessment will retain their original grade to provide consistency with the LAWA approach (<https://www.lawa.org.nz/learn/factsheets/coastal-and-freshwater-recreation-monitoring>). The summary results of rainfall adjusted grades are provided in Appendix 1.

In open water (marine, estuarine and lake sites), there may not be visible indications that heavy rainfall has occurred within the last 48 hours (e.g., turbid water or high flow/flooded waters are not apparent) that would deter people from swimming. Therefore, the risk that people will swim within 1-2 days of a heavy rainfall is much higher. We can't assume that everyone will assess if rainfall had fallen in the 1-2 days prior to visiting a marine or lake environment so a cautionary approach is applied and the MACs at lake, estuarine and marine sites are not rainfall adjusted.

This approach is consistent with the LAWA approach to assessing suitability for swimming grades for lakes and marine sites.

3.3 Suitability for Recreation Grades for 2022/23

The SFRGs (also referred to as ‘grades’) for the 2022/23 season are presented in Table 3-2 and Table 3-3, along with the grades for the previous four seasons as a comparison. The summary results for the MAC and SIC grades for each site are provided in Appendix 1.

3.3.1 Freshwater

At the conclusion of the 2022/23 summer, 71% of monitored freshwater sites (lakes and rivers) were graded as being generally suitable for swimming (i.e., a grade of ‘fair’ or better) (Table 3-2 & Figure 3-1). Fifteen sites (27%) were graded as being unsuitable for swimming (i.e., a grade of ‘poor’ or ‘very poor’) and are mostly located in the lower reaches of rivers.

Two river sites, one which had a location change and treated as a new site to the programme this year, and one lake site, remain ungraded due to having insufficient data (i.e., less than three season's data). No sites have interim grades.

Most monitored lake sites (88%) were graded as ‘fair’ to ‘very good’ compared to 65% of graded river sites (Figure 3-1). Two river sites have declined from suitable to unsuitable for contact recreation, resulting in thirteen river sites being unsuitable for contact recreation.

Five freshwater sites had an improved grade, while four freshwater sites had a deteriorated grade as follows:

- Lake Tekapo/Takapō Beach had an improved grade from “good” to “very good”.
- Waiiau Uwha at Waiiau (SH70), Ashley River/ Rakahuri above Rangiora-Loburn Bridge and Opihi River/Ōpihi at SH1 grades have improved from “fair” to “good” however, they are still considered unsuitable for swimming 48 hours after rainfall.
- Rakaia River at Gorge had an improved grade from “fair” to “good”.
- Lake Aviemore at Waitangi and Orari River at Gorge declined from a SFRG of “good” to “fair” and remain generally ‘suitable for swimming’.
- Ōtūkaikino River at Swimming Hole and Paeroa River/Pureora at Evans Crossing are now graded ‘unsuitable for swimming’ after being downgraded from a SFRG of “fair” to “poor”.

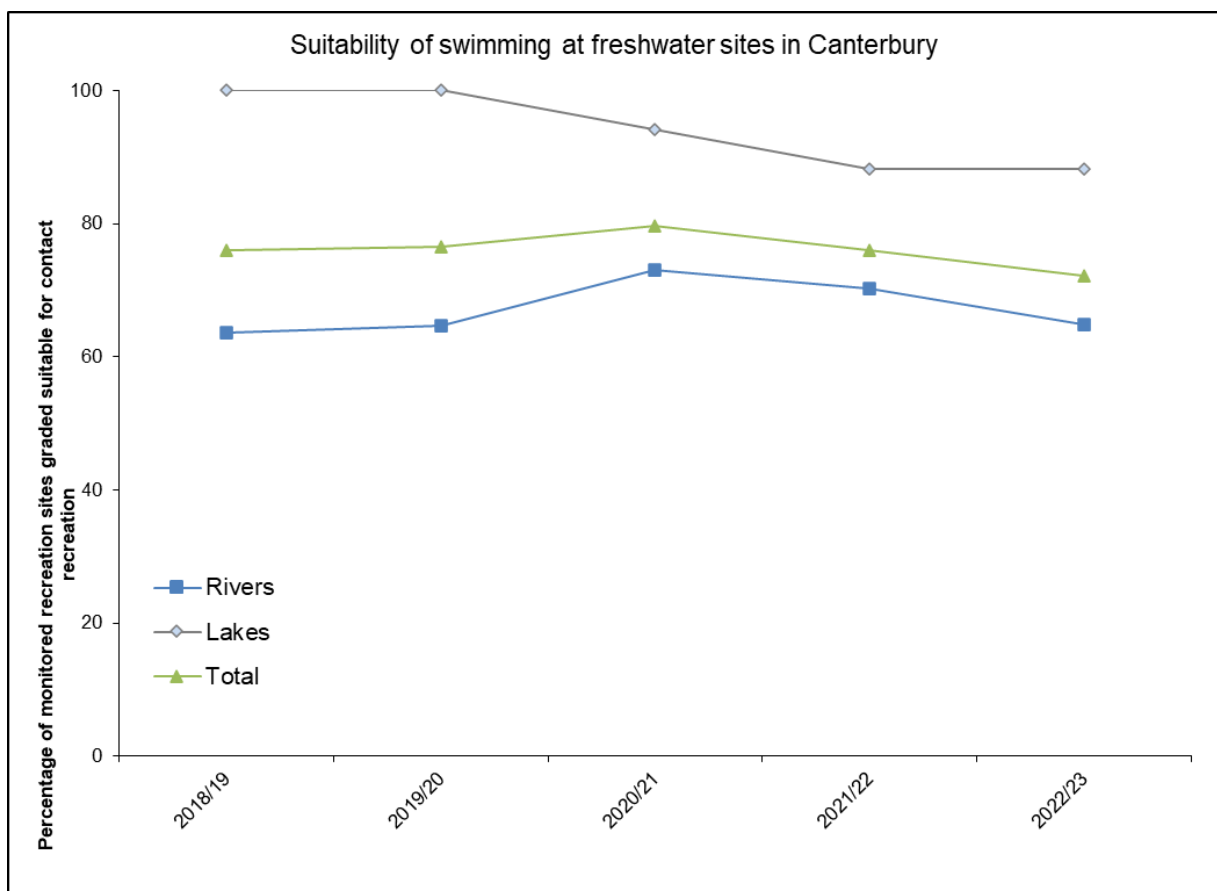


Figure 3-1: Freshwater bathing sites in Canterbury graded as generally ‘suitable for swimming’ for the last 5 seasons

Table 3-2: Suitability for Recreation Grades (SFRGs) over the past 5 years at freshwater sites in Canterbury. Arrows represent an improvement (↑) or degradation (↓) in SFRG after the 2022/23 season

| Site | Suitability for Recreation Grade (*excludes rainfall data) | | | | | Change in grade |
|--|--|-------------------|-----------|-------------------|-------------------|-----------------|
| | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 | |
| Kaikoura District | | | | | | |
| Kahutara River at SH1 | Good* | Good* | Good* | Fair | Fair | |
| Lyell Creek/Waikōau Lagoon | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | |
| Hurunui District | | | | | | |
| Hanmer River at Hanmer Road | - | - | - | Insufficient data | Insufficient data | |
| Hurunui River at SH1 | Fair* | Poor | Fair* | Fair* | Fair* | |
| Hurunui River at SH7 | Poor | Poor | Poor | Very Poor | Very Poor | |
| Waiau Uwha River upstream SH70 | Good | Good | Good | Fair | Good* | ↑ |
| Waipara River at Swimming Hole | Fair | Fair | Fair | Poor | Poor | |
| Waimakariri District | | | | | | |
| Ashley River/Rakahuri above Rangiora-Loburn bridge | Good* | Good* | Good* | Fair | Good* | ↑ |
| Ashley River/Rakahuri at SH1 | Insufficient data | Insufficient data | Good* | Good* | Good* | |
| Ashley River/Rakahuri u/s Gorge Bridge | Good* | Good* | Good* | Good* | Good* | |
| Kaiapoi River at Boat Ramp | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | |
| Pegasus Lake at Moto Quay | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Christchurch City | | | | | | |
| Avon River/Ōtākaro at Kerrs Reach | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | ↓ |
| Ōtūkaikino Creek at swimming hole | Poor | Poor | Poor | Fair* | Poor | |
| Roto Kōhatu Reserve at Lake Tahī | Good | Good | Good | Good | Good | |
| Waimakariri River at Rock Spur | Poor | Fair* | Fair* | Fair* | Fair* | |
| Waimakariri River u/s old Highway Bridge | - | - | - | - | Insufficient data | |
| Selwyn District | | | | | | |
| Te Waihora/Lake Ellesmere at Lakeside Domain | Fair | Fair | Fair | Poor | Poor | ↑ |
| Rakaia River at Gorge | Insufficient data | Insufficient data | Good* | Fair | Good | |
| Selwyn River/Waikirikiri at Chamberlains Ford | Good | Good | Good* | Good* | Good* | |
| Selwyn River/Waikirikiri at Coes Ford | Poor | Poor | Poor | Poor | Poor | |
| Selwyn River/Waikirikiri at Glentunnel | Fair* | Fair* | Fair* | Fair* | Fair* | |
| Selwyn River/Waikirikiri at Upper Huts | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | |
| Waimakariri River at Thompsons Road (The Willows) | Poor | Poor | Poor | Poor | Poor | |
| Ashburton District | | | | | | |
| Ashburton River/Hakaterere at SH1 | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | |
| Lake Camp at beach | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Lake Clearwater west of huts | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Lake Hood at Bayliss Beach | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Timaru District | | | | | | |
| Hae Hae Te Moana River at Gorge | Good* | Good* | Good | Fair | Fair | ↑ |
| Ōpihi River at Saleyards Bridge | Good* | Good* | Good* | Good* | Good* | |
| Ōpihi River at SH1 | Good | Good | Good | Fair | Good* | |
| Ōpihi River at Waipopo Huts | Good* | Good* | Good* | Good* | Good* | |
| Ōrāri River at Gorge | Good* | Good* | Good | Good | Fair | ↓ |
| Temuka River/Te Umu Kaha at SH1 | Fair* | Fair* | Fair* | Fair* | Fair* | |
| Waihi River at Gorge | Fair | Good* | Good* | Good* | Good* | |
| Waihi River at Wilson St footbridge | Insufficient data | Poor | Fair* | Fair* | Fair* | |
| Mackenzie District | | | | | | |
| Lake Alexandrina at bottom huts | Fair | Good | Good | Good | Good | |
| Lake Opuha at Ewatts Corner Boat ramp | Fair | Fair | Poor | Poor | Poor | |
| Lake Opuha at Recreation Reserve | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Lake Ruataniwha at camping ground | Very Good | Fair | Very Good | Very Good | Very Good | |
| Lake Tekapo/Takapō Beach | Very Good | Very Good | Good | Good | Very Good | ↑ |
| Loch Cameron at South Bank | - | - | - | Insufficient data | Insufficient data | |
| Ōpihi River at SH79/Fairlie | Insufficient data | Insufficient data | Good* | Good* | Good* | |
| Twizel River/Whakatipu at picnic area | Good* | Fair* | Fair* | Fair* | Good* | |
| Waimate District | | | | | | |
| Pareora River/Pureora at Evans Crossing | Fair* | Fair* | Fair* | Fair* | Poor | ↓ |
| Pareora River/Pureora at Pareora Huts | Poor | Fair* | Fair* | Poor | Poor | |
| Hakataramea River at SH82 | Good* | Good* | Good* | Fair | Fair | |
| Lake Aviemore at Te Akatarawa Camp | Good | Good | Good | Fair | Fair | |
| Lake Aviemore at Waitangi | Good | Good | Good | Good | Fair | ↓ |
| Otaio River/Ōtaia at Gorge | Good* | Good* | Good* | Fair | Fair | |
| Waihao River at Black Hole | Very Poor | Very Poor | Very Poor | Very Poor | Very Poor | |
| Waihao River at Bradshaws Bridge | Good* | Good* | Good* | Good* | Good* | |
| Waihao River at Gum Tree Flat Rd (Don's Hole) | Fair* | Fair* | Fair* | Fair* | Fair* | |
| Waitaki District | | | | | | |
| Lake Aviemore at Loch Laird | Fair | Fair | Fair | Fair | Fair | |
| Lake Benmore at Pumpkin Bay | Good | Good | Good | Good | Good | |
| Lake Benmore at Sailors Cutting | Good | Good | Good | Good | Good | |
| Lake Middleton at north end of lake | Fair | Fair | Fair | Fair | Fair | |

3.3.2 Coastal

This year's grading of coastal water quality indicates that 78% of coastal sites (estuaries, harbours and beaches) are generally suitable for swimming (i.e., a SFRG of "fair" or better) (Table 3-3 & Figure 3-2). This is a decrease in the sites suitable for swimming when compared to the previous five years (where the % of sites ranged from 83% to 91%).

There were no sites that had improved grades and five sites where the grades have declined. Two of those sites have degraded from being suitable to unsuitable for swimming. Overall, there are ten coastal sites that are unsuitable for swimming. The 2022/23 season had significant rainfall events which is the likely cause of a decline in water quality in our coastal sites. As discussed above in section 3.2, open water (including coastal sites) is not rainfall adjusted.

Most of the beach sites (95%) have SFRGs of "fair" or better and are therefore considered suitable for swimming (Figure 3-2), except West Caroline Bay which has "poor" water quality.

The number of harbour sites graded "fair" or better declined in the 2022/23 season with only 53% (from 60% in 2021/22 and 93% in the 3 years prior) of sites considered suitable for swimming (Figure 3-2). Three harbour sites have declined a grade:

- Duvauchelle Bay and Charteris Bay at Paradise Beach have declined from "good" to "fair" but remain 'suitable for swimming'.
- Tikao Bay is graded 'unsuitable for swimming' after being downgraded from "fair" to "poor".

Most estuary sites are considered 'suitable for swimming' with 78% of SFRGs are "fair" or better (Figure 3-2). Avon-Heathcote Estuary/Ihutai at South Spit has declined from a SFRG of "good" to "fair". The remaining sites have the same grade as the 2021/22 season.

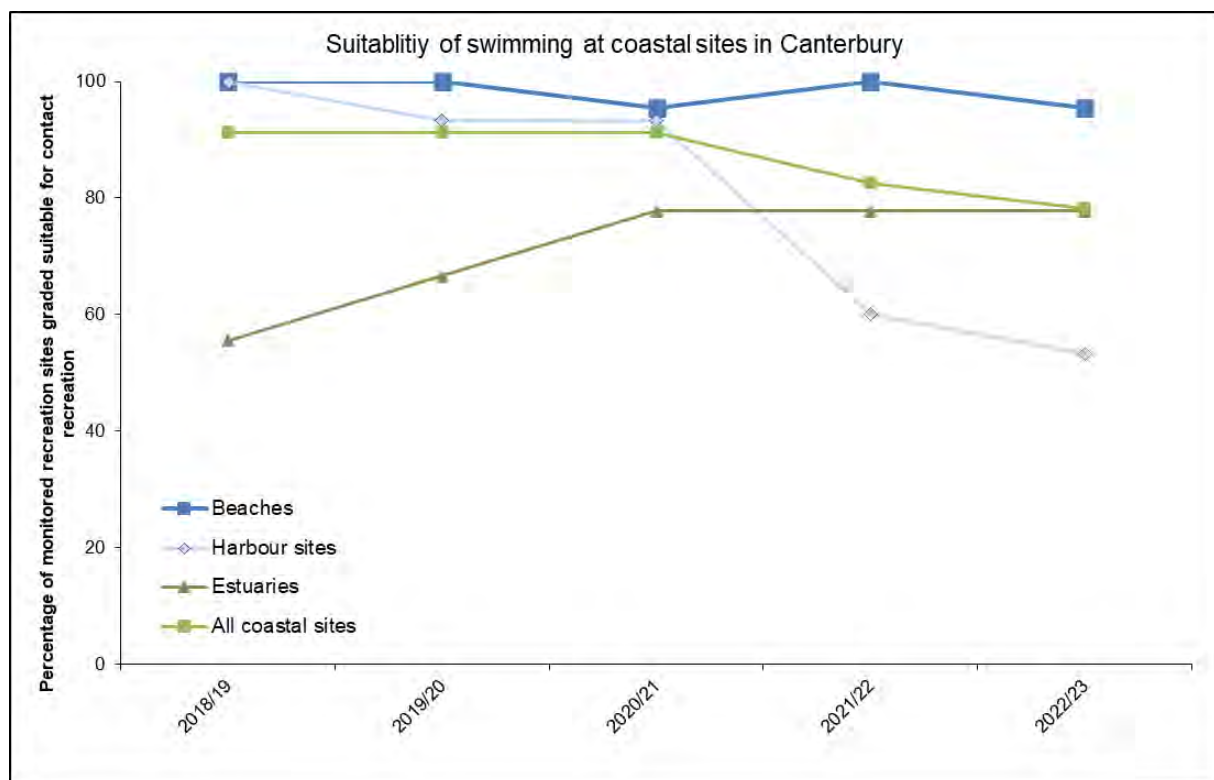


Figure 3-2: Coastal bathing sites in Canterbury graded as generally 'suitable for swimming' for the last 5 seasons

Table 3-3: Suitability for Recreation Grades (SFRGs) over the past 5 years at marine sites in Canterbury. Arrows represent an improvement (↑) or degradation (↓) in SFRG after the 2022/23 season

| Site | Suitability for Recreation Grade (*excludes rainfall data - adjustment ceased 2020) | | | | | Change in grade |
|--|--|------------|-----------|-----------|-----------|-----------------|
| | 2018/19 | 2019/20 | 2020/21 | 2021/22 | 2022/23 | |
| Kaikoura District | | | | | | |
| Armers Beach | Good | Good | Good | Good | Good | |
| Gooches Beach | Good | Good | Good | Good | Good | |
| Mangāmāunu | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Peketa Beach | Good | Good | Good | Good | Good | |
| South Bay/Te Hiku-o-te-waeroa Beach | Good | Good | Good | Good | Good | |
| Hurunui District | | | | | | |
| Gore Bay/Pariroa | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Motunau Beach | Very Good | Very Good | Very Good | Good | Good | |
| Waimakariri District | | | | | | |
| Ashley River/Rakahuri Estuary | Poor | Poor | Poor | Poor | Poor | |
| Pegasus township | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Pines Beach | Good | Good | Good | Fair | Fair | |
| Waikuku Beach | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Woodend Beach | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Christchurch City | | | | | | |
| Avon-Heathcote Estuary/Ihutai at Beachville Rd jetty | Good | Good | Good | Good | Good | |
| Avon-Heathcote Estuary/Ihutai at Humphreys Drive | Poor | Poor | Poor | Poor | Poor | |
| Avon-Heathcote Estuary/Ihutai at Moncks Bay | Good | Good | Good | Good | Good | |
| Avon-Heathcote Estuary/Ihutai at Mt Pleasant Yacht Club | Fair | Fair | Fair | Fair | Fair | |
| Avon-Heathcote Estuary/Ihutai at Penguin Street | Poor | Poor | Fair | Fair | Fair | |
| Avon-Heathcote Estuary/Ihutai at South New Brighton Park | Poor | Fair* | Fair | Fair | Fair | |
| Avon-Heathcote Estuary/Ihutai at South Spit | Good | Good | Good | Good | Fair | ↓ |
| New Brighton Beach at surf club | Good | Good | Good | Good | Good | |
| Scarborough Beach | Good* | Good* | Fair | Fair | Fair | |
| South Brighton Beach at Caspian St | Good | Good | Good | Good | Good | |
| South Brighton Beach at surf club | Good | Good | Good | Good | Good | |
| Spencerville Beach | Very Good | Very Good | Very Good | Very Good | Very Good | |
| Sumner Beach | Good | Good | Good | Good | Good | |
| Taylor's Mistake/Te Onepoto | Good | Good | Very Good | Good | Good | |
| Waimairi Beach | Good | Good | Good | Fair | Fair | |
| Lyttelton Harbour/Whakaraupō | | | | | | |
| Cass Bay/Motu-kauati-rahi | Good | Good | Good | Fair | Fair | |
| Church Bay/Kaioruru | Fair | Fair | Fair | Fair | Fair | |
| Corsair Bay/Motu-kauati-iti | Good* | Good* | Fair | Poor | Poor | |
| Diamond Harbour/Te Waipapa Beach | Fair | Good* | Fair | Poor | Poor | |
| Charteris Bay/Te Wharau at Paradise Beach | Good | Good | Good | Good | Fair | ↓ |
| Purau Bay | Good | Good | Good | Poor | Poor | |
| Rāpaki Bay | Good | Good* | Fair | Poor | Poor | |
| Sandy Bay | Fair | Poor | Poor | Poor | Poor | |
| Banks Peninsula/Te Pātaka-o-Rākaihautū | | | | | | |
| Akaroa main beach | Good | Good | Good | Poor | Poor | |
| Duvauchelle Bay | Good | Good | Good | Good | Fair | ↓ |
| French Farm Bay Boatsheds | Very Good | Very Good | Good | Good | Good | |
| Glen Bay | Good | Good | Good | Fair | Fair | |
| Okains Bay Estuary | Good* | Good* | Good | Fair | Fair | |
| Takamatua Beach | Fair | Fair | Fair | Fair | Fair | |
| Tikao Bay/Ōkoroapeke | Fair | Fair | Fair | Fair | Poor | ↓ |
| Wainui Beach | Good | Good* | Fair | Fair | Fair | |
| Timaru District | | | | | | |
| Caroline Bay mid beach | Good* | Good* | Good | Fair | Fair | |
| Timaru Coast Yacht Club | Very Good* | Very Good* | Very Good | Very Good | Very Good | |
| West Caroline Bay | Fair* | Fair* | Poor | Fair | Poor | ↓ |

3.4 Summary

The majority of Canterbury's freshwater and coastal swimming sites that are monitored seasonally for microbial water quality are suitable for swimming according to MfE & MoH (2003) microbial water quality guidelines (Figure 3-1 & Figure 3-2). Overall, 75% of graded sites are considered suitable for swimming and other full-immersion recreational activities. This number has decreased from the previous season (79%). Three sites in the monitoring network have insufficient data to calculate a SFRG because they were added to the programme in the last two years. Appendix 2 provides district maps of the swimming sites and their SFRGs, which are to be adopted for the 2023/24 season.

The microbiological water quality at 88% of lake sites is considered 'swimmable' with 65% of these containing a SFRG of "good" or "very good". There are two lake sites that are not suitable for swimming and another lake sites that is ungraded as it was only added to the monitoring network in 2021/22.

River sites in Canterbury are variable with most (65%) considered to be suitable for swimming under stable flow conditions. Many rivers which are not considered suitable for swimming are in the lower reaches of catchments that have predominantly urban or agricultural catchments. They are particularly prone to elevated *E. coli* concentrations even under baseflows.

Coastal beach sites generally had low concentrations of faecal indicator bacteria during the 2022/23 summer. Most harbour sites had incidences of high concentrations of faecal indicator bacteria, with only 53% considered 'suitable for swimming'. This was a decrease from the previous season (60%). This decrease in grade was largely due to high rainfall events which occurred during the 2022/23 season, which causes a high faecal load into the harbours. However, not all high results were a result of rainfall, and the causes of those exceedances are not known.

4 Cyanobacteria monitoring

4.1 Cyanobacteria response framework

The *New Zealand Guidelines for Cyanobacteria in Recreational Fresh Waters: Interim Guidelines* (MfE & MoH, 2009) outlines a monitoring and response framework for benthic and planktonic cyanobacteria in streams, rivers and lakes (Table 4-1). It addresses the public health risks associated with bathing in recreational waters, but not drinking water. The guidelines do not address the health risks to animals (e.g., dogs or livestock) from contact or ingesting cyanobacteria.

Table 4-1: Response framework for cyanobacterial monitoring of popular contact recreational waters

| Alert level | Observations of benthic cyanobacteria | Observations of planktonic cyanobacteria | Actions |
|--------------|--|--|---|
| Surveillance | <ul style="list-style-type: none"> Up to 20% coverage of potentially toxic cyanobacteria attached to substrate. | <ul style="list-style-type: none"> The cell concentration of total cyanobacteria does not exceed 500 cells/mL; or The biovolume equivalent for the combined total of all cyanobacteria does not exceed 0.5 mm³/L. | <ul style="list-style-type: none"> Undertake weekly or fortnightly visual inspections and/or water samples. |
| Alert | <ul style="list-style-type: none"> 20-50% coverage of potentially toxic cyanobacteria attached to substrate. | <ul style="list-style-type: none"> Biovolume equivalent of 0.5 to < 1.8 mm³/L of potentially toxic cyanobacteria; or 0.5 to < 10 mm³/L total biovolume of all cyanobacterial material. | <ul style="list-style-type: none"> Increase visual inspections and/or water sampling. Notify public health unit. Multiple sites should be inspected and sampled |
| Action | <ul style="list-style-type: none"> Greater than 50% coverage of potentially toxic cyanobacteria attached to substrate; or 20-50% where potentially toxic cyanobacteria are visibly detaching from substrate, accumulating along river's edge or becoming exposed on the river's edge as the river levels drop. | <ul style="list-style-type: none"> ≥ 12 µg/L total microcystins; or biovolume equivalent of ≥ 1.8 mm³/L of potentially toxic cyanobacteria; or ≥ 10 mm³/L total biovolume of all cyanobacterial material; or cyanobacterial scums consistently present. | <ul style="list-style-type: none"> Continue monitoring as for alert (amber mode); If potentially toxic taxa are present, then consider testing samples for cyanotoxins; Notify the public of a potential risk to health. |

4.2 Benthic cyanobacterial surveillance results

During the 2022/23 monitoring season, 10 river sites exceeded the 'Action' level threshold for benthic cyanobacteria cover in rivers and had health warnings issued for them (Table 4-2). This is similar to last year, where 11 river sites had warnings issued during the 2021/22 season. Some cyanobacterial blooms

began early in the season and were persistent, lasting longer than previous years. Table 4-2 below highlights the occurrence of cyanobacterial blooms prompting health warnings at sites.

Table 4-2: Benthic cyanobacteria health warnings for 2022/23 season. (Note: cyanobacterial bloom monitoring and health warnings may extend beyond summertime period)

| Site | Action | Date | Reason |
|--|--|------------|--|
| Waimakariri District | | | |
| Ashley River/Rakahuri at SH1 | Temporary public health warning issued | 24/01/2023 | Phormidium - 25% cover with exposed and detaching mats |
| | Warning removed | 10/03/2023 | <20% cover |
| Ashley River/Rakahuri at Rangiora-Loburn Bridge | Temporary public health warning issued | 9/02/2023 | Phormidium - 28% cover with exposed and detaching mats |
| | Warning removed | 21/03/2023 | <20% cover |
| Selwyn District | | | |
| Selwyn River/Waikirikiri at Glentunnel | Temporary public health warning issued | 15/11/2022 | Phormidium - 41% cover with detaching mats |
| | Warning removed | 20/04/2023 | <20% cover |
| Selwyn River/Waikirikiri upstream Whitecliffs Road (picnic area) | Temporary public health warning issued | 23/02/2023 | Phormidium - 38% cover with exposed and detaching mats |
| | Warning removed | 12/05/2023 | <20% cover |
| Selwyn River/Waikirikiri at Whitecliffs Domain (camping area) | Temporary public health warning issued | 13/12/2022 | Phormidium - 20% cover with detaching mats |
| | Warning removed | 20/04/2023 | <20% cover |
| Timaru District | | | |
| Ōpihi River at SH1 | Temporary public health warning issued | 08/02/2023 | Phormidium - 31% cover with exposed and detaching mats |
| | Warning removed | 10/05/2023 | <20% cover |
| Waimate District | | | |
| Pareora River/Pureora at Pareora Huts | Temporary public health warning issued | 04/01/2023 | Phormidium - 37% cover with detaching mats |
| | Warning removed | 13/02/2023 | <20% cover |
| Waihao River at Bradshaws Road | Temporary public health warning issued | 15/11/2022 | Phormidium - 20% cover with detaching mats |
| | Warning removed | 09/01/2023 | <20% cover |
| | Temporary public health warning issued | 16/01/2023 | Phormidium - 24% cover with detaching mats |
| | Warning removed | 01/03/2023 | <20% cover |
| Waihao River at Black Hole | Temporary public health warning issued | 16/01/2023 | Phormidium - 24% cover with detaching mats |
| | Warning removed | 13/02/2023 | <20% cover |
| Waihao River at Gumtree Flat Rd (Dons Hole) | Temporary public health warning issued | 15/11/2022 | Phormidium - >20% cover with detaching mats |
| | Warning removed | 01/03/2023 | <20% cover |

Unfortunately, there was one dog death suspected because of cyanobacteria poisoning reported to Environment Canterbury this monitoring season. The dog reportedly drunk from a site on the Avon River on 16th December 2022 and died the following day. Visual inspections were undertaken by Environment Canterbury across the Avon River/Ōtākaro sites, and a very small amount of benthic cyanobacteria

cover was found at these sites. The percentage cover was well below exposure guidelines for protecting human health and therefore no health warnings were issued.

Analysis of an algae sample from this location on the Avon River/Ōtākaro for cyanotoxins did detect toxins that might pose a risk to dogs. Due to the isolated location of the mats, we did not consider this a health risk to humans, but signage was erected by Christchurch City Council to advise river users of its presence.

Environment Canterbury received numerous reports of dog illness from suspected cyanobacteria presence in waterways throughout the season, mainly within the Christchurch City area. Environment Canterbury worked with Christchurch City Council to identify the presence of any cyanobacteria. The advice was to erect signage to inform river/park users of cyanobacteria if it was confirmed to be present. However, often if it was identified it was found in very low quantities and therefore no health warnings were issued.

Environment Canterbury monitored the cyanobacteria cover at the Ōtūkaikino Creek at the Groynes dog park during the 2022/23 season, in response to reports of dog illness in previous seasons. The presence of benthic cyanobacteria was recorded between early December through to early March, peaking at 15% cover in throughout January-February 2023. Signage was erected by the Christchurch City Council Park Rangers to inform dog users of the risk. Monitoring of the Ōtūkaikino Creek at the Groynes dog park will not be continued by Environment Canterbury because it's not a human health risk but may continue to be monitored by Christchurch City Council staff to inform dog park users.

4.2.1 Planktonic Cyanobacteria

Several lakes had blooms of cyanobacteria during the 2022/23 recreational season. The table below highlights the occurrence of planktonic cyanobacterial blooms at lake sites and one river site. (Note: cyanobacterial bloom monitoring and health warnings may extend beyond summertime period).

Table 4-3: Planktonic Cyanobacteria health warnings for 2022/23

Locations in bold text remain in warning at the time of publishing.

| Site | Action | Date | Reason |
|------------------------------------|---|------------|----------------------------------|
| Kaikoura District | | | |
| Lake Rotorua | Permanent public health warning issued | 09/03/2019 | Lake in permanent warning |
| Hurunui District | | | |
| St Annes Lagoon/ Mata Kōpae | Temporary public health warning issued | 7/07/2022 | Biomass exceeded guidelines |
| | Permanent public health warning issued | 31/08/2022 | Permanent warning issued |
| Waimakariri District | | | |
| Pegasus Lake | ADVISORY NOTE | 30/08/2022 | Benthic mats present |
| | Temporary public health warning issued | 2/11/2022 | Biomass exceeded guideline |
| | Warning removed | 11/05/2023 | Biomass below guideline |
| Christchurch City | | | |
| Lake Forsyth/Wairewa | Temporary public health warning issued | 31/01/2023 | Biomass exceeded guideline |
| | Warning removed | 20/04/2023 | Biomass below guideline |

| Site | Action | Date | Reason |
|--|---|-----------------|---------------------------------------|
| Selwyn District | | | |
| Te Waihora/Lake Ellesmere | Temporary public health warning issued | 8/02/2022 | Biomass exceeded guideline |
| | Warning removed | Ongoing warning | |
| Ashburton District | | | |
| Lake Hood | Temporary public health warning issued | 16/03/2023 | Visible scums |
| | Warning removed | 15/05/2023 | Biomass below guideline |
| Timaru District | | | |
| Saltwater Creek/Ōtipua at SH1 | Temporary public health warning issued | 19/10/2022 | Scums and biomass exceeded guidelines |
| | Warning removed | 9/12/2022 | Biomass below guideline |
| Saltwater Creek/Ōtipua from Centennial Park to mouth (incl. SH1) | Temporary public health warning issued | 9/01/2023 | Scums and biomass exceeded guidelines |
| | Warning area extended from SH1 north to Centennial Park | 23/02/2023 | Scums observed at Centennial Park |
| | Warning removed | 15/05/2023 | Biomass below guideline |
| Mackenzie District | | | |
| Lake Opuha | Temporary public health warning issued | 1/03/2023 | Scums and biomass exceeded guidelines |
| | Warning removed | 27/07/2023 | Biomass below guideline |

5 Further assessments

5.1 Microbial water quality investigations

Several investigations relating to the microbial quality of recreational waters were undertaken during the 2022/23 bathing season. Some were in response to temporary public health warnings at sites, while others were pre-planned or ongoing. These are summarised below; the full details can be found in Appendices 3-5.

Waipara River at
Waipara Adventure Camp

Waipara River at Swimming Hole was graded unsuitable for swimming in 2021/22 season. This caused concerns for the Waipara Adventure Camp who managed the swimming hole and regularly use it as part of their outdoor education programme. Environment Canterbury collected samples for faecal source tracking (FST) in the swimming hole and additional samples upstream of the diversion and further up the Waipara River catchment to understand the source of the poor water quality. No samples were viable for FST analysis. A full summary of the investigation is provided in Appendix 3.

Roto Kōhatu Reserve lakes

At the end of the 2021/22 season, the Christchurch City Council Park Rangers requested that two additional monitoring sites within Roto Kōhatu Reserve – one site at Lake Rua (which is popular for swimming) and one site at the canoe lake were added. Environment Canterbury already monitors Lake Tahi, which is used by powered craft (largely jet skis). This is to understand the suitability of all the lakes within the Roto Kōhatu Reserve for swimming. We recommend that ongoing monitoring for contact recreational purposes is undertaken at the main monitoring site within the reserve to Lake Rua because it is the primary swimming lake and its increasing popularity which is likely to grow as Christchurch City Council improves access and facilities at the reserve. A full summary of the investigation is provided in Appendix 4.

Lyttelton Harbour/Whakaraupō
and Akaroa Harbour/Whakaroa

Following an increase in the number of sites with poor 'suitability for swimming' grades in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa, the unexplained occurrence of high faecal contamination, and the popularity of these bays, Environment Canterbury carried out several investigations to assess the source of the faecal contamination. While faecal source tracking identified a number of contributing sources (human, dog, birds and ruminants), the prominence of human sources present at these sites is of concern to public health, as they pose a higher risk of pathogens being present. A full summary of the investigation is provided in Appendix 5.

6 Recommendations and signage for 2023/24 season

6.1 Recommendations

Many sites in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa are continuing to indicate poor microbial water quality. Environment Canterbury has undertaken an investigation to identify the sources of faecal contamination, the results of the investigation are provided in Appendix 6. Following this investigation, Environment Canterbury have begun work to develop a predictive model can communicate the health risk of swimming at these sites based on rainfall. Once the model is developed and validated, it will be made publicly available.

The Christchurch City Council is working to identify infrastructure which could be linked to human faecal contamination found during the 2022/23 investigations in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa.

Environment Canterbury intend to undertake further faecal source tracking during wet weather at some of the sites in Akaroa Harbour (particularly at Tikao Bay/Ōkoropeke) following the decrease in suitability for swimming.

Based on the investigation into the of Roto Kōhatu reserve lakes and their popularity, we recommend relocating the regular monitoring site from Lake Tahi to Lake Rua to reflect where full emersion recreational activities take place.

Environment Canterbury intends to review the current monitoring network to enable us to focus our monitoring resources on the most popular swimming sites within the Canterbury region.

6.2 Warning signage

6.2.1 Freshwater

The following monitoring sites are recommended to have permanent warning signage erected to warn the public that swimming is not recommended (NB: bolded sites require new action):

* sites are no longer monitored but known to be unsuitable for swimming

- Lyell Creek/Waikōau Lagoon;
- Hurunui River at State Highway 7;
- Waipara River at Swimming Hole;
- Kaiapoi River at Boat Ramp;
- **Ōtūkaikino Creek at swimming hole (revised signage);**
- Avon River/Ōtākaro at Kerrs Reach;
- Avon River/Ōtākaro at Margaret Mahy Playground*;
- Avon River/Ōtākaro at Fendalton Road*;
- Heathcote River/Ōpāwaho at Catherine Street*;
- Te Waihora/ Lake Ellesmere at Lakeside Domain;
- Waimakariri River at Thompsons Road (The Willows);
- Selwyn River/Waikirikiri at Upper Huts;
- Selwyn River/Waikirikiri at Coes Ford;
- Ashburton River/Hakatere at State Highway 1;
- **Paeroa River/Pureora at Evan's Crossing (revised signage);**
- Paeroa River/Pureora at Paeroa Huts;

- Lake Opuha at Ewarts Corner boat ramp; and
- Waihao River at Black Hole.

Additional signage warning that sites may be unsuitable for swimming up to 48 hours after rainfall is recommended at:

- Hurunui River at State Highway 1;
- Waiau Uwha River upstream State Highway 70;
- Ashley River/Rakahuri at State Highway 1;
- **Ashley River/Rakahuri above Rangiora-Loburn bridge;**
- Ashley River/Rakahuri at Gorge;
- Waimakariri River at Rock Spur;
- Selwyn River/Waikirikiri at Glentunnel;
- Selwyn River/Waikirikiri at Chamberlains Ford;
- Ōpihi River at Saleyards Bridge;
- **Ōpihi River at State Highway 1;**
- Ōpihi River at Waipopo Huts;
- Paeroa River/Pureora at Evans Crossing;
- Temuka River/Te Umu Kaha at State Highway 1;
- Waihi River at Gorge;
- Waihi River at Wilsons Street footbridge;
- Ōpihi River at State Highway 79 (Fairlie);
- Twizel River/Whakatipu at picnic area;
- Waihao River at Bradshaws Bridge; and
- Waihao River at Gum Tree Flat Road (Dons Hole).

6.2.2 Coastal

It is advised that the following monitoring sites have permanent warning signs erected informing the public that swimming is not recommended (NB: bolded sites require new action):

- Ashley River/Rakahuri – Saltwater Creek Estuary;
- Avon-Heathcote Estuary/Ihutai at Humphreys Drive;
- Corsair Bay/Motu-kauati-iti;
- Rāpaki Bay;
- Sandy Bay;
- Diamond Harbour Beach;
- Purau Beach;
- Akaroa Main Beach;
- **Tikao Bay/Ōkoropeke (new signage);** and
- **West Caroline Bay (new signage).**

7 References

- Arthur, J.B. (2020). *Canterbury water quality monitoring for primary contact recreation: annual summary report 2019/20*. Report R20/56. Environment Canterbury, Christchurch.
- Gray, E.C.M (2022). *Water quality for contact recreation: Annual summary report 2021-22 season*. Report R22/32. Environment Canterbury, Christchurch.
- Ministry for the Environment and Ministry of Health (2003). *Microbiological water quality guidelines for marine and freshwater recreational areas*. Ministry for the Environment, Wellington.
- Ministry for the Environment and Ministry of Health (2009). *New Zealand Guidelines for Cyanobacteria in Recreational Fresh Waters – Interim Guidelines*. Prepared for the Ministry for the Environment and the Ministry of Health by SA Wood, DP Hamilton, WJ Paul, KA Safi and WM Williamson. Wellington: Ministry for the Environment.

Appendix 1: Two-year microbiological sampling result summaries

Freshwater (*E. coli*)

| Site | SIC | End of 2021-22 season | | | | | | | End of 2022-23 season | | | | | | |
|--|-----|--|-----|-------------------|--|-----|-------------------|--|--|-----|------------------|--|-----|------------------|--|
| | | All data | | | Rainfall affected data removed | | | SFRG (*excludes rainfall-affected data) | All data | | | Rainfall affected data removed | | | SFRG (*excludes rainfall-affected data) |
| | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | |
| Kaikoura District | | | | | | | | | | | | | | | |
| Kahutara River at SH1 | M | 455 | C | Fair | 179 | B | Good* | Fair | 481 | C | Fair | 169 | B | Good | Fair |
| Lyell Creek/Waikōau Lagoon | H | 2355 | D | Very poor | 1986 | D | Very poor | Very poor | 1923 | D | Very poor | 1733 | D | Very poor | Very Poor |
| Hurunui District | | | | | | | | | | | | | | | |
| Hanmer River Hanmer Road | TBC | 947 | D | Insufficient data | 177 | B | Insufficient data | Insufficient data | 285 | C | Fair | 168 | B | Good | Insufficient data |
| Hurunui River at SH1 | M | 1688 | D | Poor | 444 | C | Fair* | Fair* | 1426 | D | Poor | 443 | C | Fair* | Fair* |
| Hurunui River at SH7 | H | 1203 | D | Very poor | 980 | D | Poor | Very poor | 1308 | D | Very poor | 1120 | D | Very poor | Very Poor |
| Waiau Uwha River at SH70 | M | 402 | C | Fair | 219 | B | Good* | Fair | 618 | D | Poor | 212 | B | Good* | Good* |
| Waipara River at Boys Brigade Swimming Hole | M | 1560 | D | Poor | 799 | D | Poor | Poor | 1948 | D | Poor | 1250 | D | Poor | Poor |
| Waimakariri District | | | | | | | | | | | | | | | |
| Ashley River/Rakahuri above Rangiora-Loburn bridge | M | 461 | C | Fair | 197 | B | Good* | Fair | 828 | D | Poor | 112 | A | Good* | Good* |
| Ashley River/Rakahuri at SH1 | M | 606 | D | Poor | 126 | A | Good* | Good* | 363 | C | Fair | 120 | A | Good* | Good* |
| Ashley River/Rakahuri u/s Gorge Bridge | M | 605 | D | Poor | 200 | B | Good* | Good* | 640 | D | Poor | 200 | B | Good* | Good* |
| Kaiapoi River at Boat Ramp | H | 2420 | D | Very poor | 2420 | D | | Very poor | 2420 | D | Very poor | 2420 | D | Very poor | Very Poor |
| Pegasus Lake at Moto Quay | VL | 69 | A | Very Good | | | | Very Good | 36 | A | Very good | | | | Very Good |
| Christchurch City | | | | | | | | | | | | | | | |
| Avon River/Ōtākaro at Kerrs Reach | H | 2420 | D | Very poor | 2420 | D | Very poor | Very poor | 2420 | D | Very poor | 2420 | D | Very poor | Very Poor |
| Ōtūkaikino Creek at Swimming Hole | M | 2248 | D | Poor | 545 | C | Fair* | Fair* | 2317 | D | Poor | 792 | D | Poor | Poor |
| Roto Kōhatu Reserve at Lake Tahī | M | 179 | B | Good | | | | Good | 154 | B | Good | | | | Good |
| Waimakariri River at Rock Spur | M | 895 | D | Poor | 438 | C | Fair* | Fair* | 770 | D | Poor | 266 | C | Fair* | Fair* |
| Waimakariri River u/s old HB | TBC | | | | | | | | 895 | D | Poor | 234 | B | Good* | Insufficient data |
| Waimakariri River downstream of SH1 | M | 1218 | D | Poor | 389 | C | Fair* | Fair* | | | | | | | Site moved |
| Selwyn District | | | | | | | | | | | | | | | |
| Te Waihora/Lake Ellesmere at Lakeside Domain | M | 575 | D | Poor | | | | Poor | 551 | D | Poor | | | | Poor |
| Rakaia River at Gorge | L | 341 | C | Fair | 157 | B | Good* | Fair | 191 | B | Good | 140 | B | Good | Good |
| Selwyn River/Waikirikiriri at Chamberlains Ford | M | 2077 | D | Poor | 223 | B | Good* | Good* | 2076 | D | Poor | 248 | B | Good* | Good* |
| Selwyn River/Waikirikiriri at Coes Ford | M | 2420 | D | Poor | 950 | D | Poor | Poor | 2420 | D | Poor | 1214 | D | Poor | Poor |
| Selwyn River/Waikirikiriri at Glentunnel | M | 2420 | D | Poor | 340 | C | Fair* | Fair* | 2420 | D | Poor | 274 | C | Fair* | Fair* |
| Selwyn River/Waikirikiriri at Upper Huts | H | 2420 | D | Very poor | 406 | C | Poor | Very poor | 2420 | D | Very poor | 730 | D | Very poor | Very Poor |
| Waimakariri River at Thompsons Road (The Willows) | M | 1030 | D | Poor | 816 | D | Poor | Poor | 952 | D | Poor | 816 | D | Poor | Poor |
| Ashburton District | | | | | | | | | | | | | | | |
| Ashburton River/Hakaterere at SH1 | H | 2420 | D | Very Poor | 1136 | D | Very Poor | Very Poor | 2420 | D | Very poor | 698 | D | Very poor | Very Poor |
| Lake Camp at beach | VL | 28 | A | Very Good | | | | Very Good | 28 | A | Very good | | | | Very Good |
| Lake Clearwater west of huts | VL | 80 | A | Very Good | | | | Very Good | 79 | A | Very good | | | | Very Good |
| Lake Hood at Bayliss Beach | L | 87 | A | Very Good | | | | Very Good | 110 | A | Very good | | | | Very Good |
| Timaru District | | | | | | | | | | | | | | | |
| Hae Hae Te Moana River at Gorge | L | 300 | C | Fair | 271 | C | Fair | Fair | 308 | C | Fair | 228 | B | Good | Fair |
| Ōpihi River at Saleyards Bridge | M | 866 | D | Poor | 233 | B | Good* | Good* | 780 | D | Poor | 226 | B | Good* | Good* |
| Ōpihi River at SH1 | M | 293 | C | Fair | 162 | B | Good* | Fair | 991 | D | Poor | 187 | B | Good* | Good* |
| Ōpihi River at Waipopo Huts | M | 708 | D | Poor | 195 | B | Good* | Good* | 929 | D | Poor | 206 | B | Good* | Good* |
| Ōrāri River at Gorge | M | 239 | B | Good | 114 | A | Good* | Good | 272 | C | Fair | 112 | A | Good* | Fair |
| Temuka River/Te Umu Kaha at SH1 | M | 1878 | D | Poor | 291 | C | Fair* | Fair* | 1986 | D | Poor | 389 | C | Fair* | Fair* |
| Waihi River at Gorge | M | 336 | C | Fair | 201 | B | Good* | Good* | 361 | C | Fair | 183 | B | Good* | Good* |
| Waihi River at Wilson St footbridge | M | 1300 | D | Poor | 305 | C | Fair* | Fair* | 2420 | D | Poor | 488 | C | Fair* | Fair* |

Canterbury water quality monitoring for contact recreation – Annual summary report 2022/23

| Site | SIC | End of 2021-22 season | | | | | | | End of 2022-23 season | | | | | | |
|---|-----|--|-----|-------------------|--|-----|------------------|--|--|-----|------------------|--|-----|------------------|--|
| | | All data | | | Rainfall affected data removed | | | SFRG (*excludes rainfall-affected data) | All data | | | Rainfall affected data removed | | | SFRG (*excludes rainfall-affected data) |
| | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | |
| Mackenzie District | | | | | | | | | | | | | | | |
| Lake Alexandrina at bottom huts | M | 190 | B | Good | | | | Good | 208 | B | Good | | | | Good |
| Lake Opuha at Ewatts Corner Boat ramp | M | 560 | D | Poor | | | | Poor | 1002 | D | Poor | | | | Poor |
| Lake Opuha at Recreation Reserve | VL | 137 | B | Very Good | | | | Very Good | 152 | B | Very good | | | | Very Good |
| Lake Ruataniwha at camping ground | VL | 252 | B | Very Good | | | | Very Good | 137 | B | Very good | | | | Very Good |
| Lake Tekapo/Takapō Beach | VL | 307 | C | Good | | | | Good | 191 | B | Very good | | | | Very Good |
| Loch Cameron at South Bank | TBC | 121 | A | Insufficient data | | | | Insufficient data | 79 | A | Very good | | | | Insufficient data |
| Ōpihi River at SH79 (Fairlie) | M | 2042 | D | Poor | 236 | B | Good* | Good* | 1419 | D | Poor | 210 | B | Good* | Good* |
| Twizel River/Whakatipu at picnic area | M | 757 | D | Poor | 414 | C | Fair* | Fair* | 769 | D | Poor | 240 | B | Good* | Good* |
| Waimate District | | | | | | | | | | | | | | | |
| Pareora River/Pureora at Evans Crossing | M | 2420 | D | Poor | 321 | C | Fair* | Fair* | 2420 | D | Poor | 586 | D | Poor | Poor |
| Pareora River/Pureora at Huts | M | 2420 | D | Poor | 638 | D | Poor | Poor | 2420 | D | Poor | 719 | D | Poor | Poor |
| Hakataramea River at SH82 | M | 283 | C | Fair | 111 | A | Good* | Fair | 323 | C | Fair | 112 | A | Good | Fair |
| Lake Aviemore at Te Akatarawa Camp | M | 264 | C | Fair | | | | Fair | 154 | B | Good | | | | Fair |
| Lake Aviemore at Waitangi | M | 233 | B | Good | | | | Good | 286 | C | Fair | | | | Fair |
| Otaio/Ōtaia River at Gorge | M | 401 | C | Fair | 409 | C | Fair | Fair | 509 | C | Fair | 515 | C | Fair | Fair |
| Waihao River at Black Hole | H | 2118 | D | Very poor | 883 | D | Very poor | Very poor | 2420 | D | Very poor | 921 | D | Very poor | Very Poor |
| Waihao River at Bradshaws Bridge | M | 475 | C | Poor | 143 | B | Good* | Good* | 585 | D | Poor | 186 | B | Good* | Good* |
| Waihao River at Gum Tree Flat Rd (Don's Hole) | M | 1625 | D | Poor | 344 | C | Fair* | Fair* | 1625 | D | Poor | 282 | C | Fair* | Fair* |
| Waitaki District | | | | | | | | | | | | | | | |
| Lake Aviemore at Loch Laird | M | 429 | C | Fair | | | | Fair | 421 | C | Fair | | | | Fair |
| Lake Benmore at Pumpkin Bay | M | 125 | A | Good | | | | Good | 255 | B | Good | | | | Good |
| Lake Benmore at Sailors Cutting | M | 68 | A | Good | | | | Good | 81 | A | Good | | | | Good |
| Lake Middleton at north end of lake | M | 387 | C | Fair | | | | Fair | 425 | C | Fair | | | | Fair |

Coastal (enterococci)

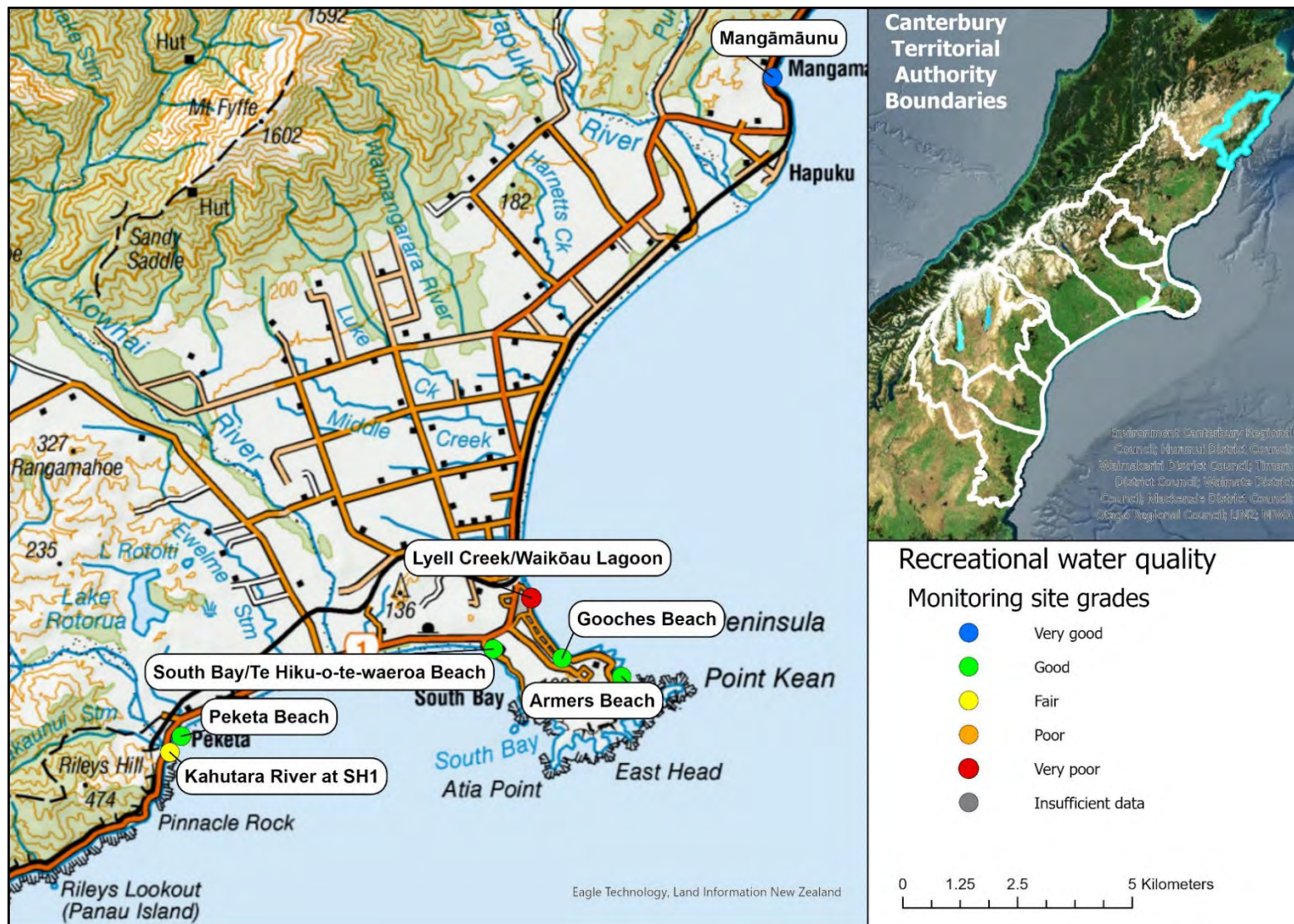
| Site | SIC | End of 2021-22 season | | | | End of 2022-23 season | | | |
|--|-----|--|-----|------------------|---|--|-----|------------------|---|
| | | All data | | | SFRG (* Grade is based on E. coli data) | All data | | | SFRG (* Grade is based on E. coli data) |
| | | Enterococci 95 th percentile | MAC | Provisional SFRG | | Enterococci 95 th percentile | MAC | Provisional SFRG | |
| Kaikoura District | | | | | | | | | |
| Armors Beach | M | 196 | B | Good | Good | 125 | B | Good | Good |
| Gooches Beach | M | 81 | B | Good | Good | 60 | B | Good | Good |
| Mangāmāunu | VL | 49 | B | Very Good | Very Good | 49 | B | Very Good | Very Good |
| Peketa Beach | M | 139 | B | Good | Good | 167 | B | Good | Good |
| South Bay/Te Hiku-o-te-waeroa Beach | M | 60 | B | Good | Good | 60 | B | Good | Good |
| Hurunui District | | | | | | | | | |
| Gore Bay/Pariroa | L | 20 | A | Very Good | Very Good | 28 | A | Very Good | Very Good |
| Motunau Beach | L | 103 | B | Good | Good | 78 | B | Good | Good |
| Waimakariri District | | | | | | | | | |
| Ashley River/Rakahuri Estuary | M | 1203 | D | Poor | Poor | 1123 | D | Poor | Poor |
| Pegasus township | VL | 48 | B | Very Good | Very Good | 45 | B | Very Good | Very Good |
| Pines Beach | M | 238 | C | Fair | Fair | 238 | C | Fair | Fair |
| Waikuku Beach | VL | 41 | B | Very Good | Very Good | 38 | A | Very Good | Very Good |
| Woodend Beach | VL | 60 | B | Very Good | Very Good | 60 | B | Very Good | Very Good |
| Christchurch City | | | | | | | | | |
| Avon-Heathcote Estuary/Ihutai at Beachville Rd jetty | M | 89 | B | Good | Good | 59 | B | Good | Good |
| Avon-Heathcote Estuary/Ihutai at Humphreys Drive | M | 3112 | D | Poor | Poor | 3219 | D | Poor | Poor |
| Avon-Heathcote Estuary/Ihutai at Moncks Bay | M | 28 | A | Good | Good | 29 | A | Good | Good |
| Avon-Heathcote Estuary/Ihutai at Mt Pleasant Yacht Club | M | 355 | C | Fair | Fair | 205 | C | Fair | Fair |
| Avon-Heathcote Estuary/Ihutai at Penguin Street | M | 166 | B | Good | Fair* | 63 | B | Good | Fair* |
| Avon-Heathcote Estuary/Ihutai at South New Brighton Park | M | 63 | B | Good | Fair* | 84 | B | Good | Fair* |
| Avon-Heathcote Estuary/Ihutai at South Spit | M | 66 | B | Good | Good | 358 | C | Fair | Fair |
| New Brighton Beach at surf club | M | 86 | B | Good | Good | 52 | B | Good | Good |
| Scarborough Beach | M | 481 | C | Fair | Fair | 356 | C | Fair | Fair |
| South Brighton Beach at Caspian St | M | 49 | B | Good | Good | 31 | A | Good | Good |
| South Brighton Beach at surf club | M | 52 | B | Good | Good | 31 | A | Good | Good |
| Spencerville Beach | VL | 78 | B | Very Good | Very Good | 49 | B | Very Good | Very Good |
| Sumner Beach | M | 132 | B | Good | Good | 95 | B | Good | Good |
| Taylor's Mistake/Te Onepoto | M | 82 | B | Good | Good | 48 | B | Good | Good |
| Waimairi Beach | M | 378 | C | Fair | Fair | 378 | C | Fair | Fair |
| Lyttelton Harbour/Whakaraupō | | | | | | | | | |
| Cass Bay/Motu-kauati-rahi | M | 277 | C | Fair | Fair | 361 | C | Fair | Fair |
| Church Bay/Kaioruru | L | 476 | C | Fair | Fair | 356 | C | Fair | Fair |
| Corsair Bay/Motu-kauati-iti | M | 542 | D | Poor | Poor | 1615 | D | Poor | Poor |
| Diamond Harbour/Te Waipapa Beach | L | 859 | D | Poor | Poor | 859 | D | Poor | Poor |
| Charteris Bay/Te Wharau at Paradise Beach | L | 184 | B | Good | Good | 402 | C | Fair | Fair |
| Purau Bay | L | 651 | D | Poor | Poor | 651 | D | Poor | Poor |
| Rāpaki Bay | M | 590 | D | Poor | Poor | 639 | D | Poor | Poor |
| Sandy Bay | M | 2047 | D | Poor | Poor | 2090 | D | Poor | Poor |
| Banks Peninsula/Te Pātaka-o-Rākaihautū | | | | | | | | | |
| Akaroa main beach | M | 547 | D | Poor | Poor | 646 | D | Poor | Poor |
| Duvauchelle | M | 190 | B | Good | Good | 280 | C | Fair | Fair |
| French Farm | M | 84 | B | Good | Good | 151 | B | Good | Good |
| Glen Bay | M | 209 | C | Fair | Fair | 205 | C | Fair | Fair |
| Okains Bay Estuary | M | 65 | B | Good | Fair* | 63 | B | Good | Fair* |
| Takamatua | M | 344 | C | Fair | Fair | 344 | C | Fair | Fair |
| Tikao Bay/Ōkoroapeke | L | 462 | C | Fair | Fair | 666 | D | Poor | Poor |
| Wainui Beach | M | 365 | C | Fair | Fair | 438 | C | Fair | Fair |
| Timaru District | | | | | | | | | |
| Caroline Bay mid beach | M | 210 | C | Fair | Fair | 175 | B | Good | Good |
| Timaru Coast Yacht Club | VL | 71 | B | Very Good | Very Good | 63 | B | Very Good | Very Good |
| West Caroline Bay | M | 484 | C | Fair | Fair | 545 | D | Poor | Poor |

Coastal (*E. coli*)

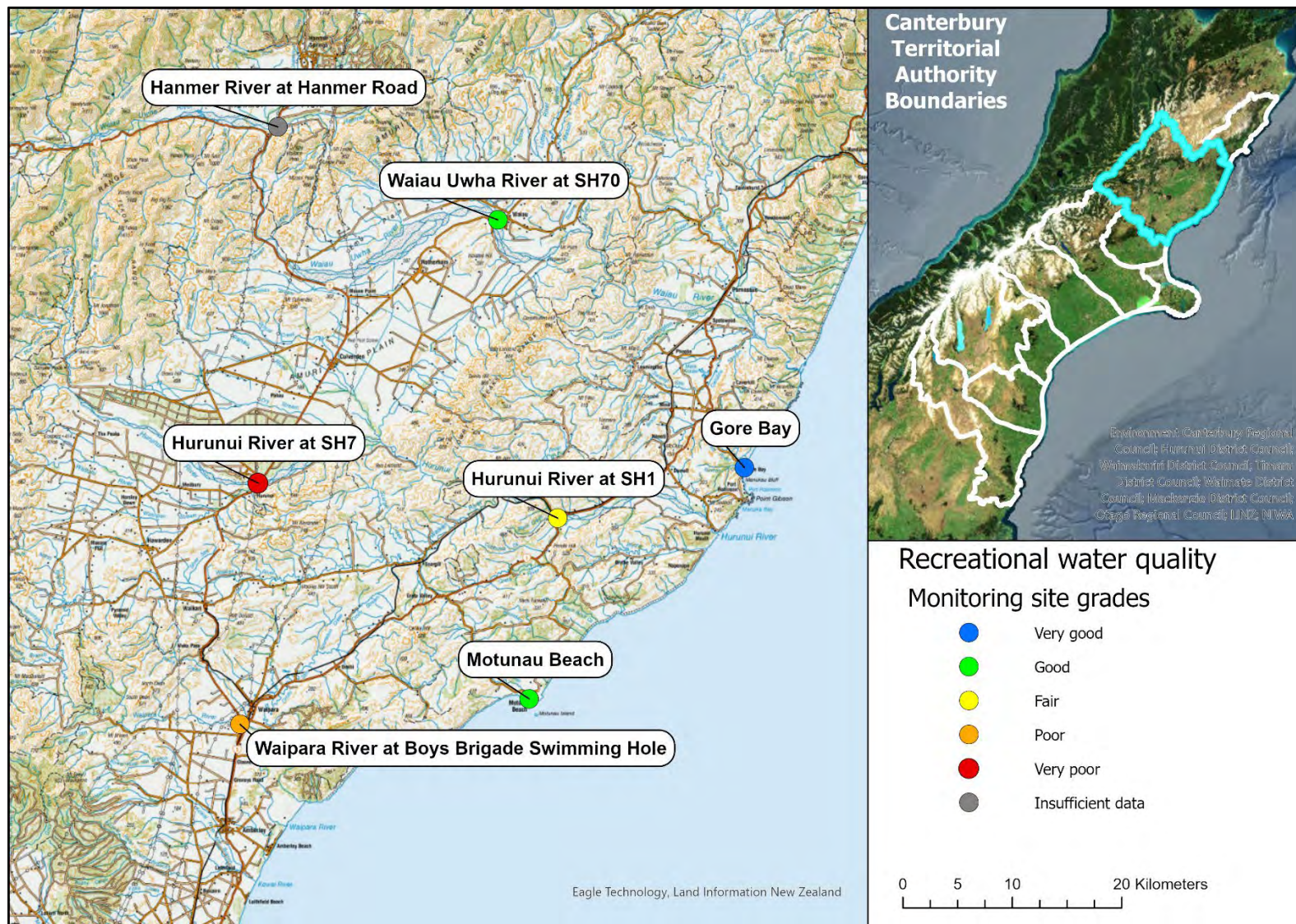
| Site | SIC | End of 2021-22 season | | | | End of 2022-23 season | | | |
|--|-----|--|-----|------------------|-------------|--|-----|------------------|-------------|
| | | All data | | | SFRG | All data | | | SFRG |
| | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | | <i>E. coli</i> 95 th percentile | MAC | Provisional SFRG | |
| Waimakariri District | | | | | | | | | |
| Ashley River/Rakahuri at Estuary | M | 2574 | D | Poor | Poor | 2168 | D | Poor | Poor |
| Christchurch City | | | | | | | | | |
| Avon-Heathcote Estuary/Ihutai at Beachville Rd jetty | M | 71 | A | Good | Good | 61 | A | Good | Good |
| Avon-Heathcote Estuary/Ihutai at Humphreys Drive | M | 3208 | D | Poor | Poor | 3190 | D | Poor | Poor |
| Avon-Heathcote Estuary/Ihutai at Mt Pleasant Yacht Club | M | 444 | C | Fair | Fair | 381 | C | Fair | Fair |
| Avon-Heathcote Estuary/Ihutai at Penguin Street | M | 474 | C | Fair | Fair | 261 | C | Fair | Fair |
| Avon-Heathcote Estuary/Ihutai at South New Brighton Park | M | 464 | C | Fair | Fair | 353 | C | Fair | Fair |
| Banks Peninsula/Te Pātaka-o-Rākaihautū | | | | | | | | | |
| Okains Bay Estuary | M | 388 | C | Fair | Fair | 380 | C | Fair | Fair |

Appendix 2: 2022/23 SFRG district summary maps

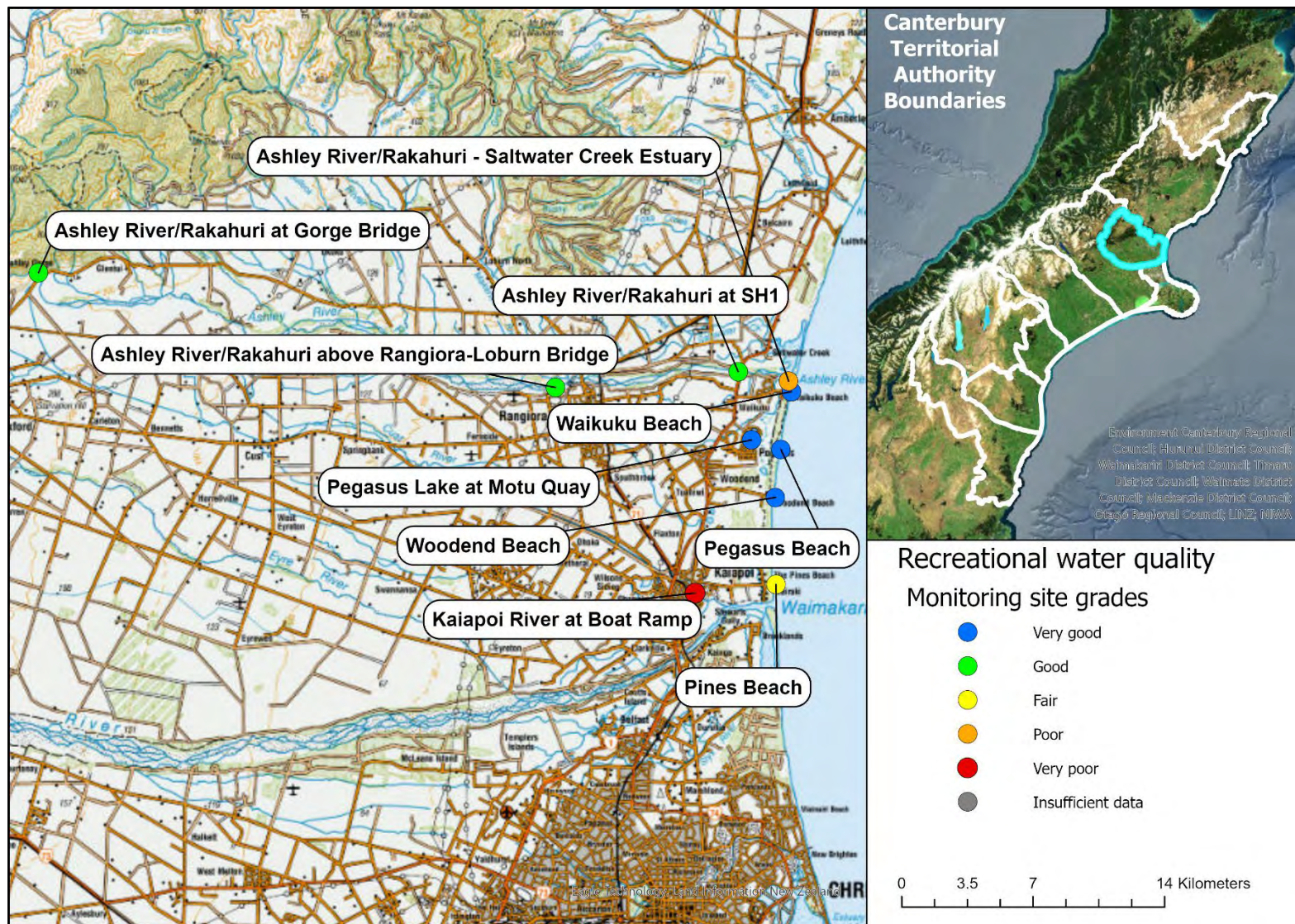
Kaikōura District



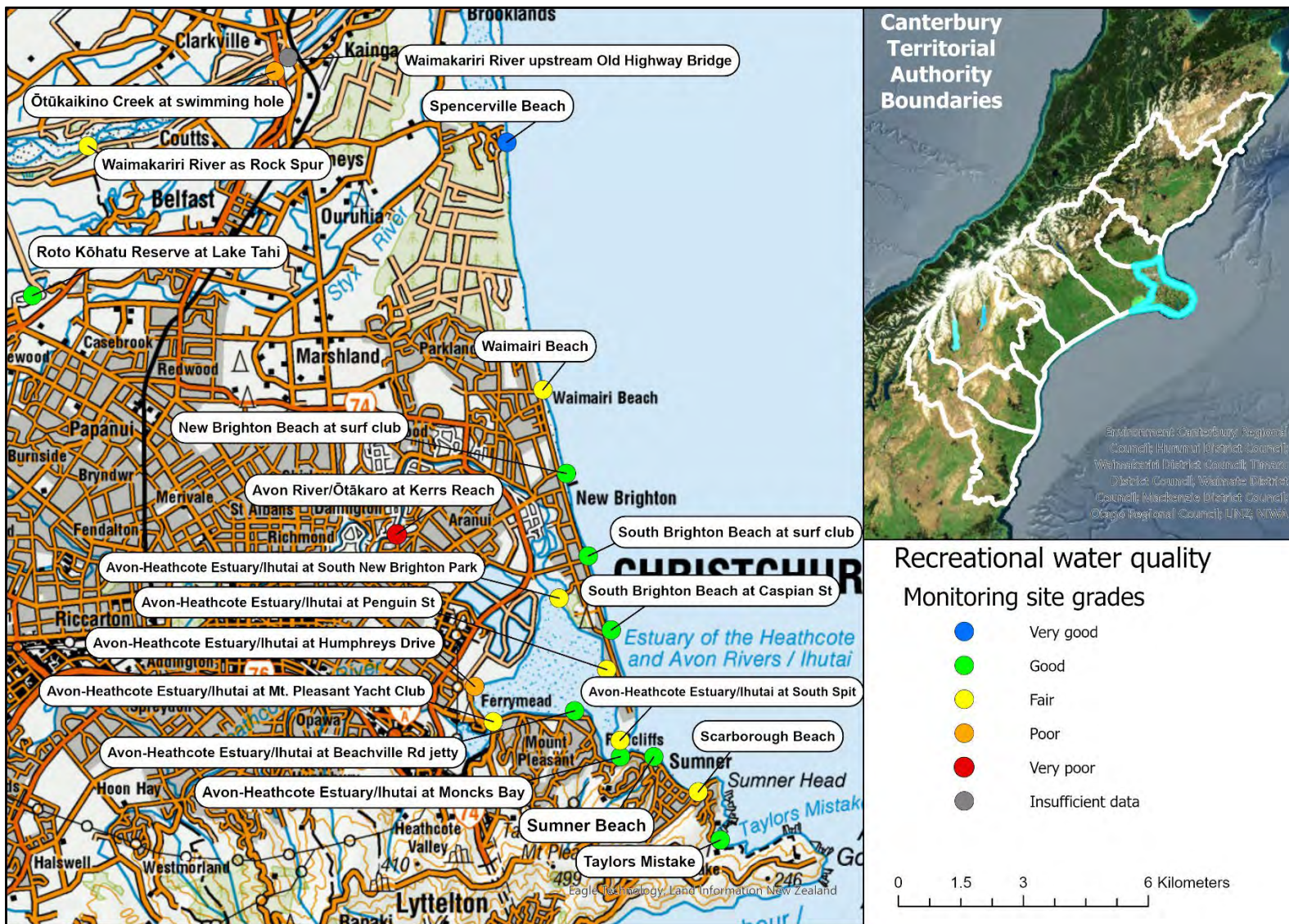
Hurunui District



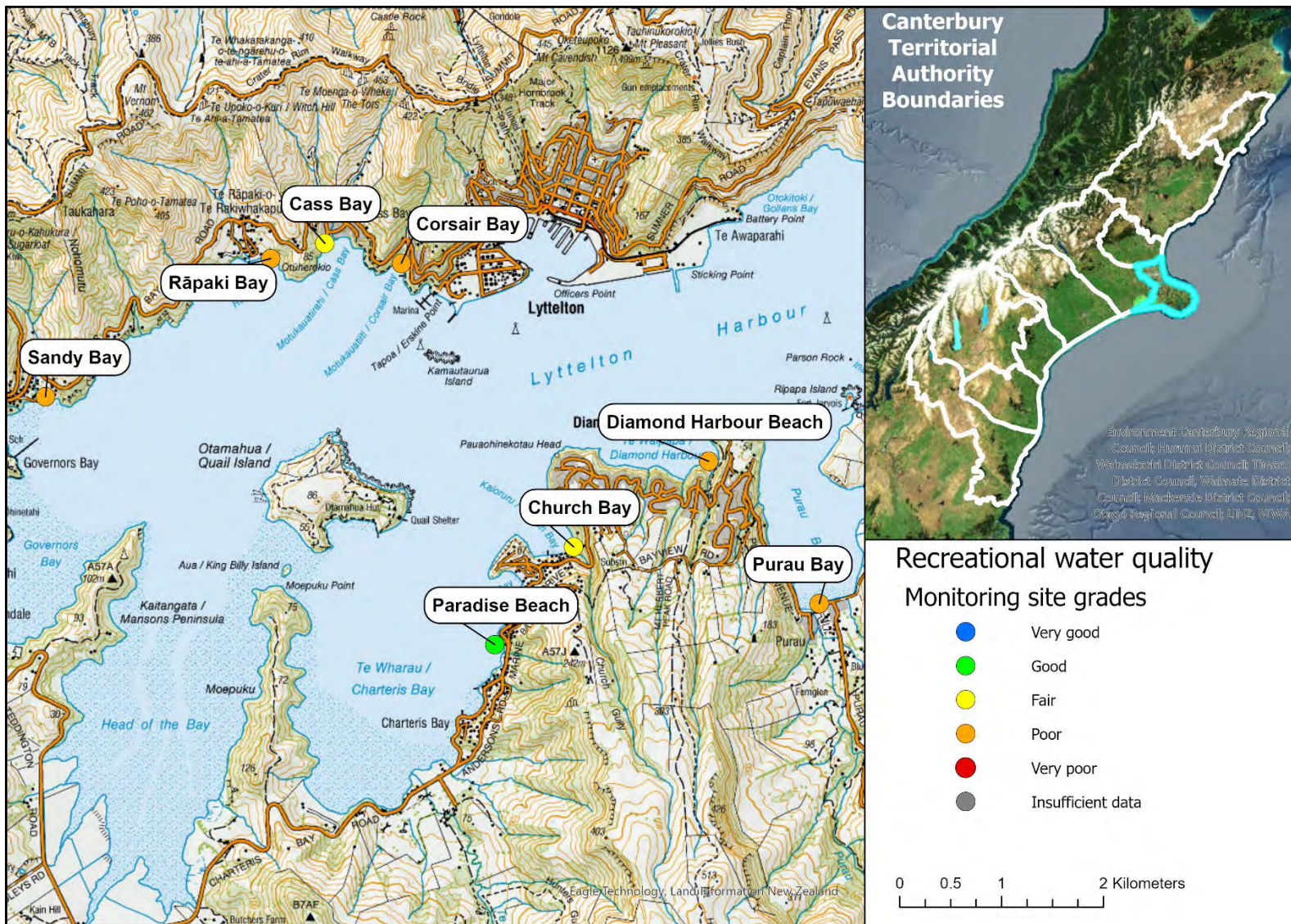
Waimakariri District



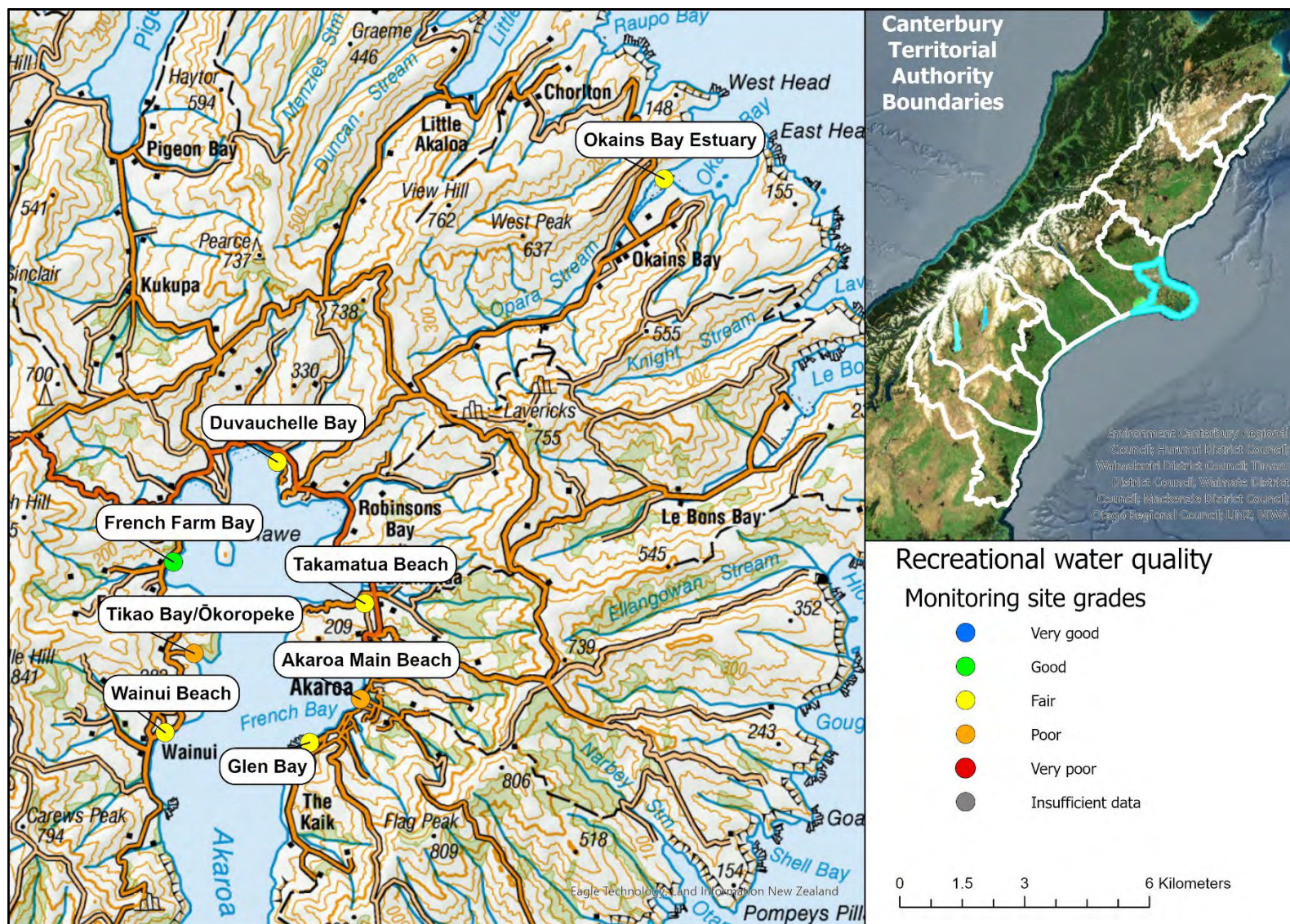
Christchurch City



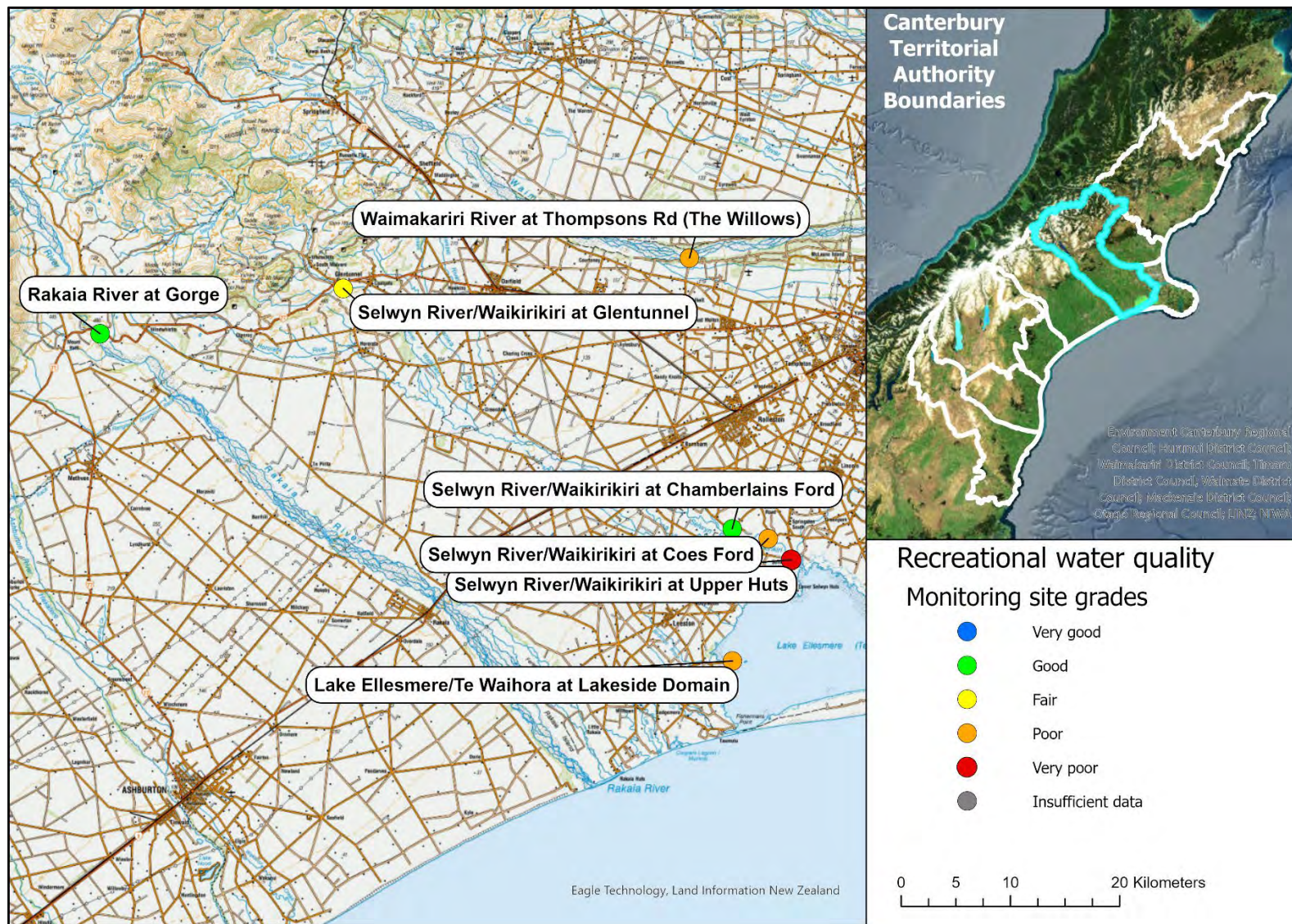
Lyttelton Harbour/Whakaraupō



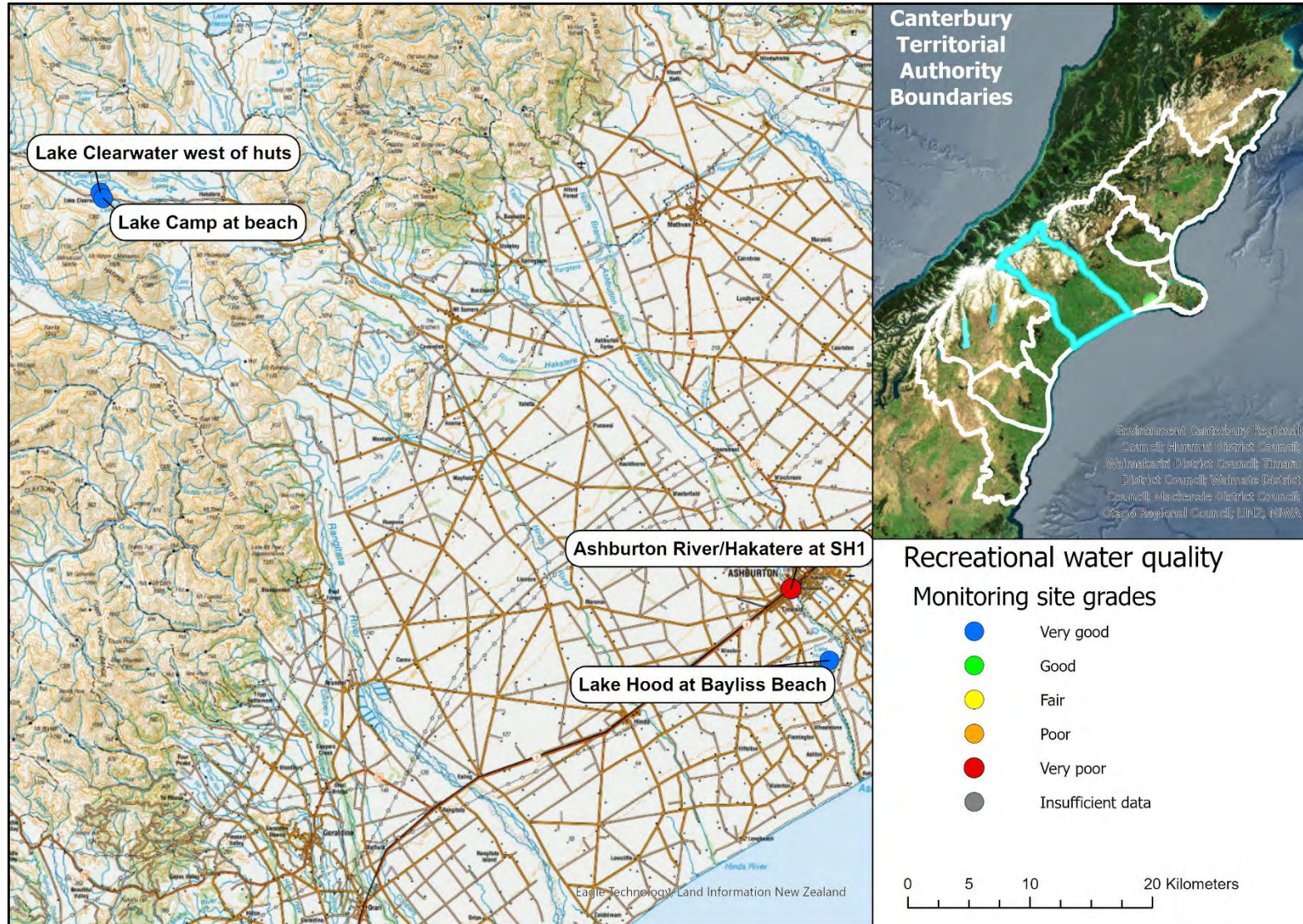
Banks Peninsula/Te Pātaka-o-Rākaihautū – Akaroa Harbour and Okains Bay Estuary



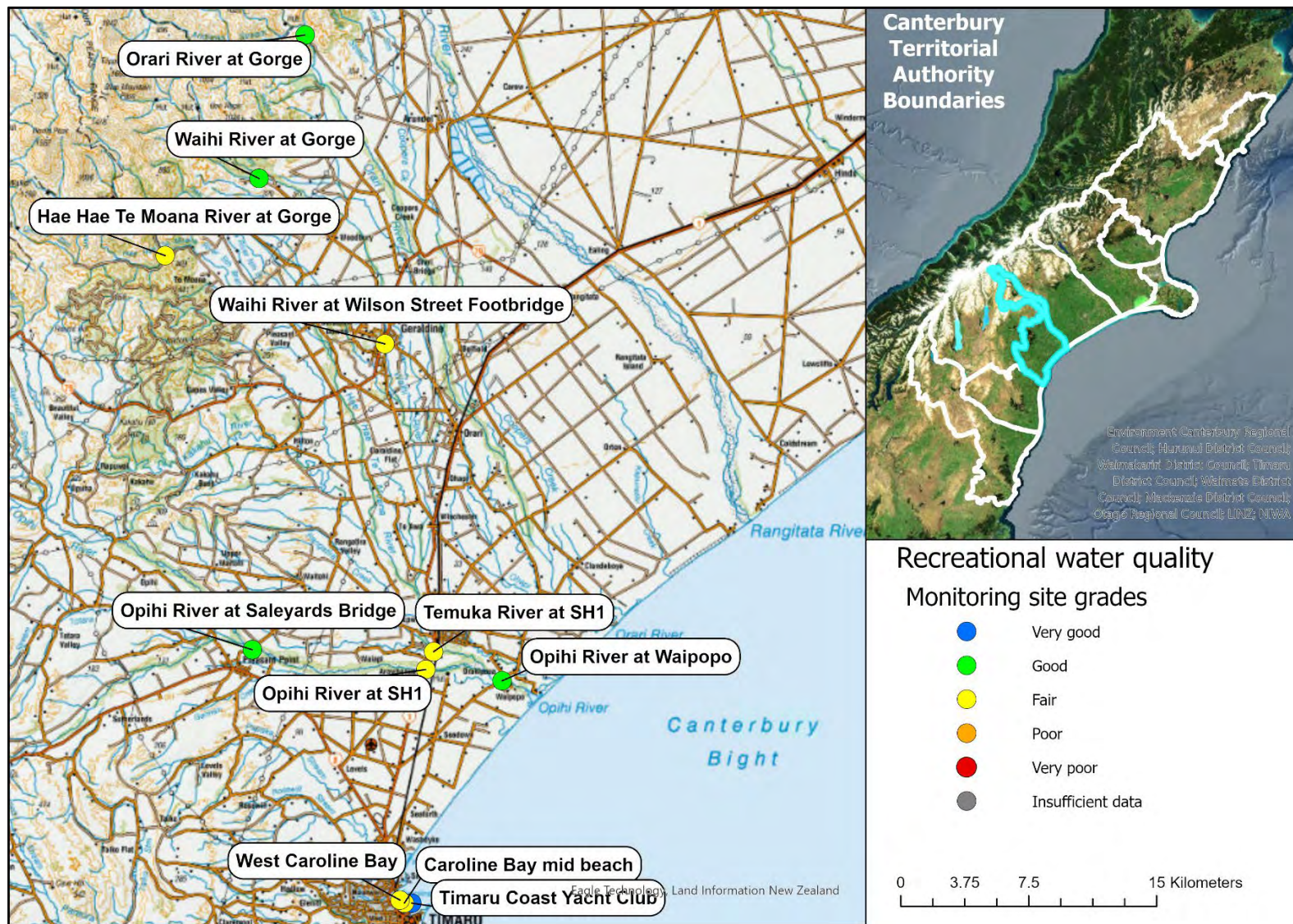
Selwyn District



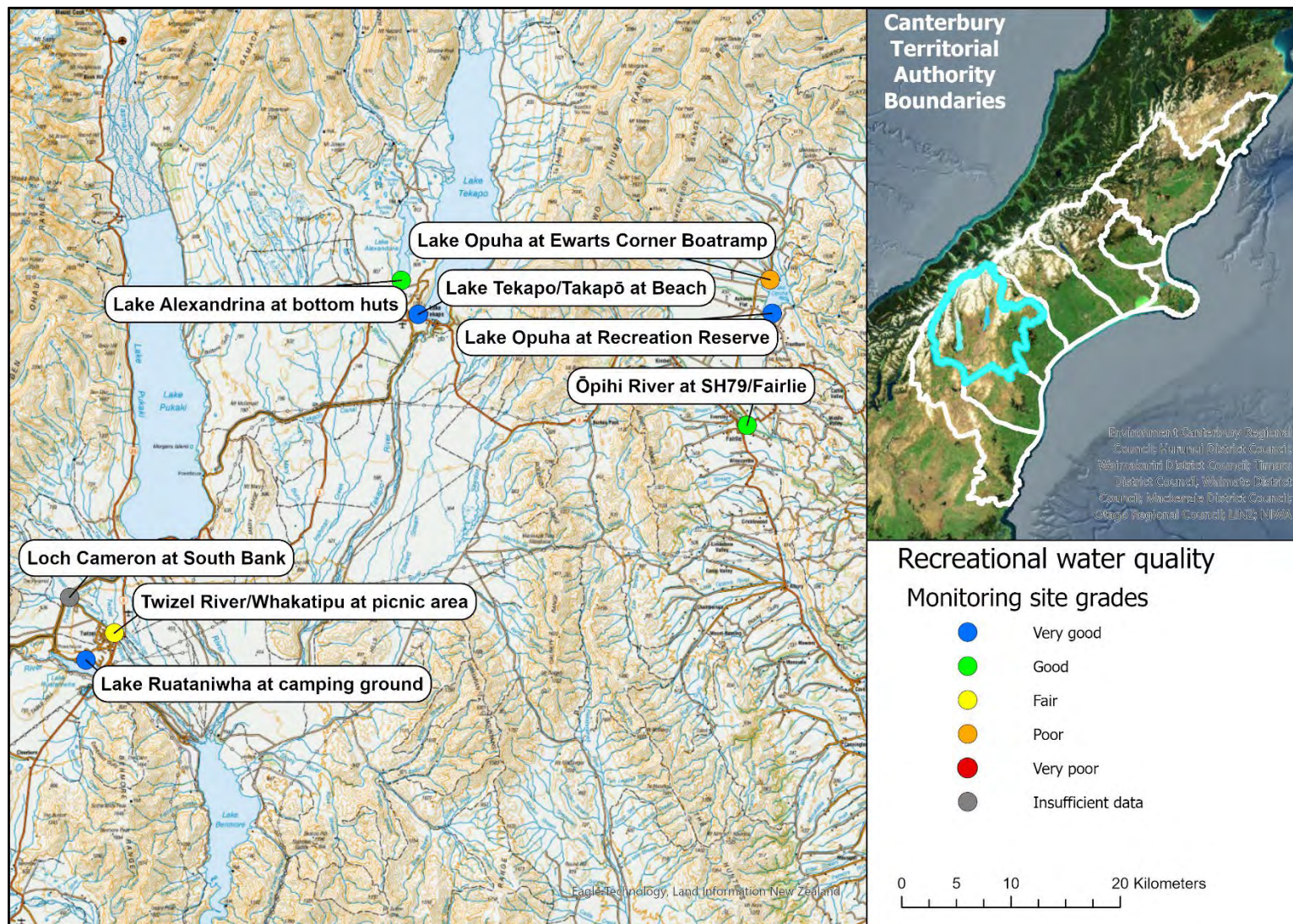
Ashburton District



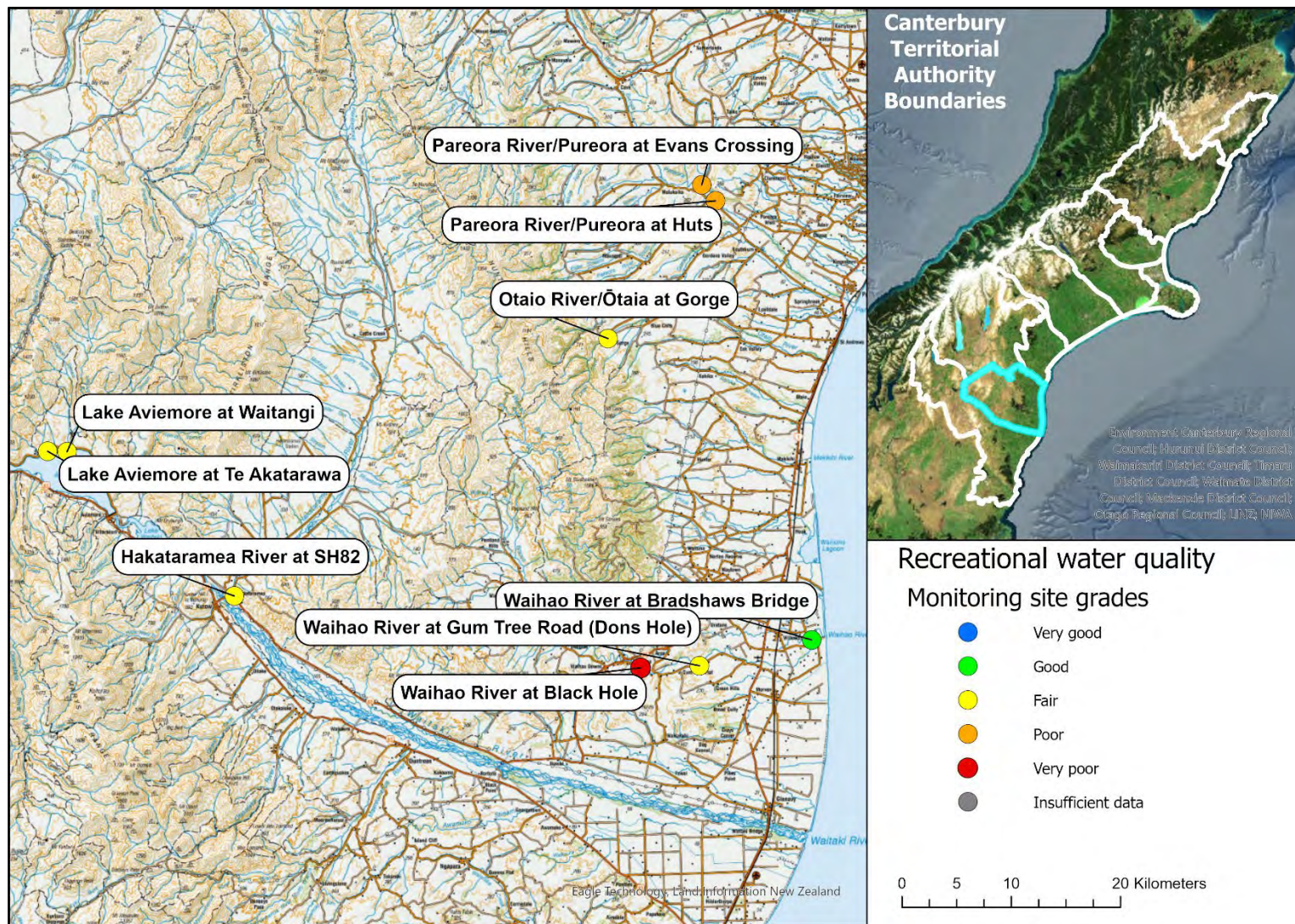
Timaru District



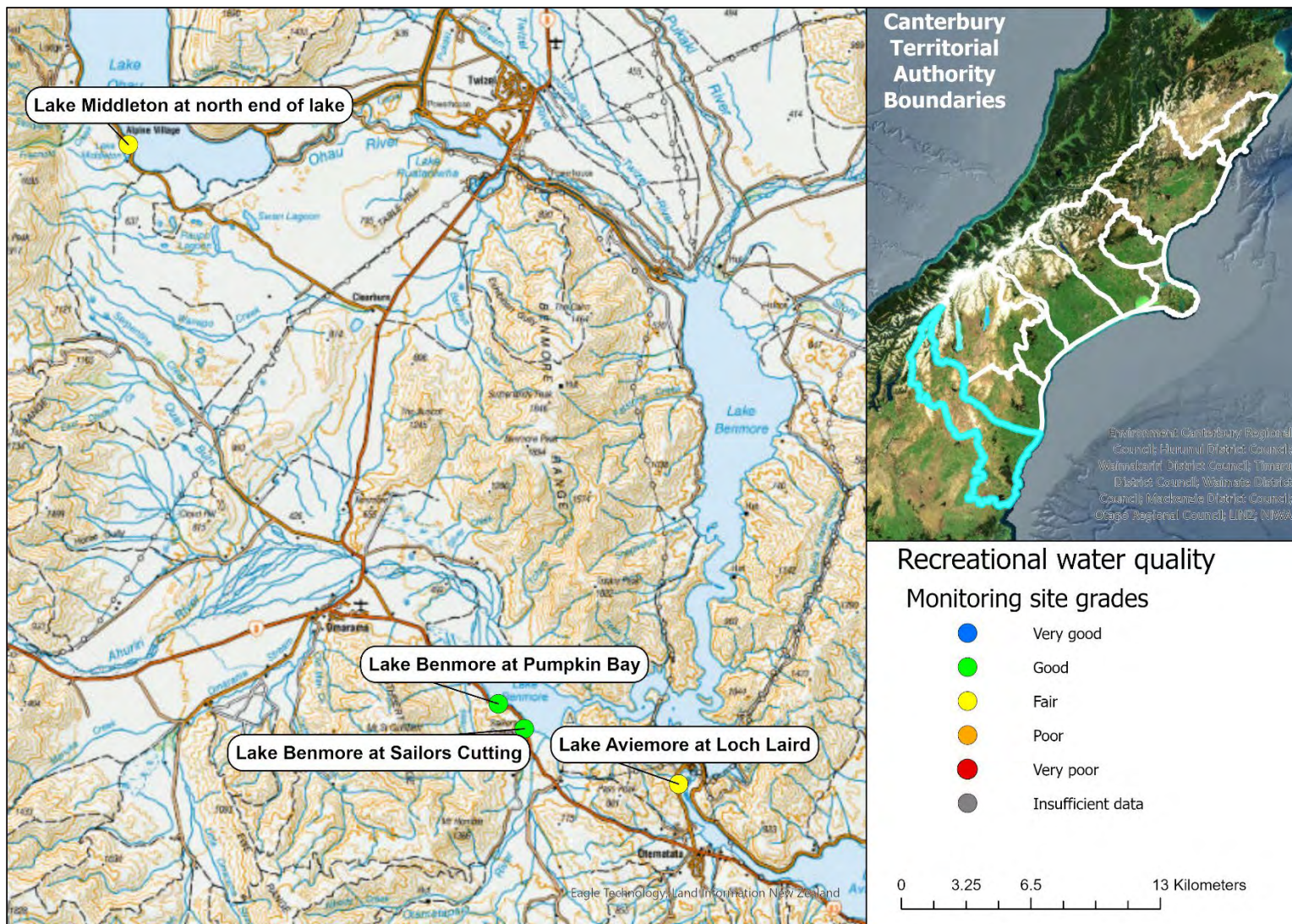
Mackenzie District



Waimate District



Waitaki District



Appendix 3: Waipara River Investigation

Suitability for Contact Recreation Investigation – Sources of faecal contamination in the Waipara River Swimming Hole

A3.1 Background of investigation

The Waipara River Swimming Hole site upstream of SH1 was graded unsuitable for swimming in 2021/22 season. This was the first time the site was graded unsuitable for swimming since monitoring began in 2002.

The Waipara Adventure Centre (WAC), who managed the river diversion to the swimming hole, regularly use it as part of their outdoor education programme. WAC regularly host school camps and began to receive enquiries from concerned school boards, principles, and parents about the water quality of swimming hole, resulting in some cancelations. Environment Canterbury, Hurunui District Council and Te Mana Ora met with the Manager of the Waipara Adventure Centre to discuss the results, the health risk and further monitoring options.

It was agreed that Environment Canterbury and Te Mana Ora would create an information document to communicate the health risks to customers of the risk from recreating in the swimming hole. Environment Canterbury also agreed to investigate the cause and potential source of poor water quality within the swimming hole.

A3.2 Purpose

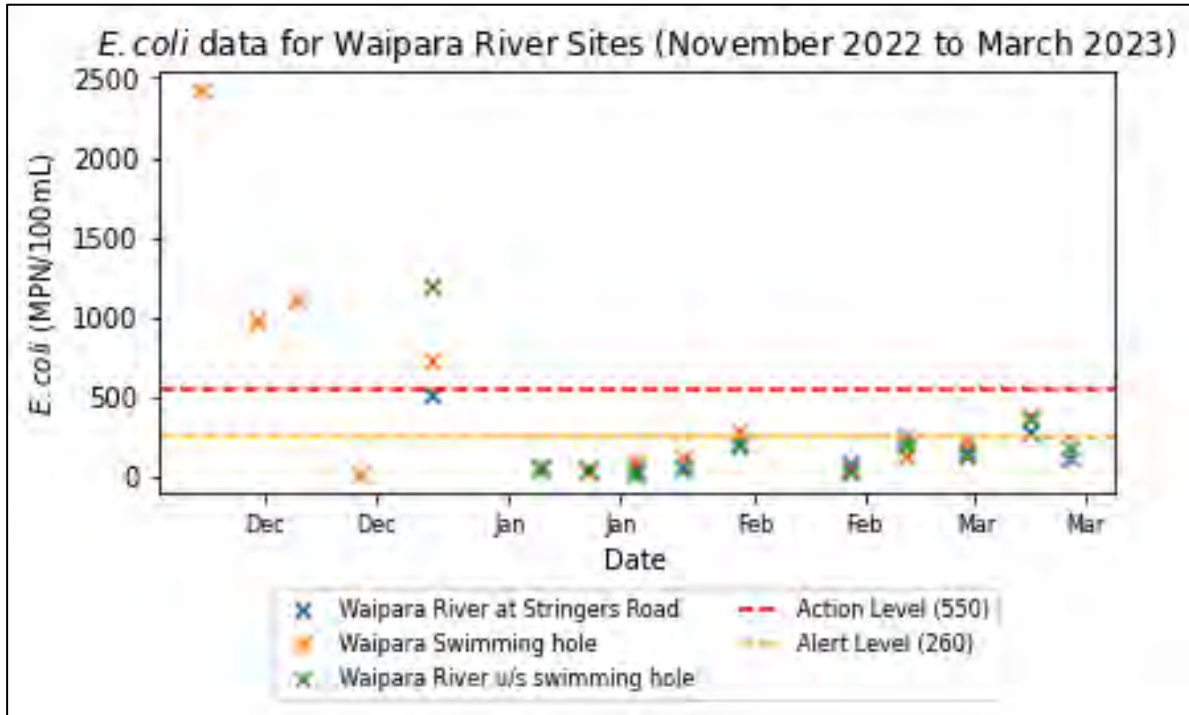
To understand if the source of contamination was from the Waipara River or local to the swimming hole. If it was the latter, what was the faecal source.

A3.3 Results

Environment Canterbury collected samples for Faecal Source Tracking (FST) in the swimming hole as part of the weekly routine monitoring. However, no elevated faecal contamination events occurred that warranted processing of samples for FST.

The additional samples for *E. coli* were collected on the Waipara River at two locations, one upstream of the diversion and further up the catchment (at Stringers Road) to understand if the elevated microbial inputs were entering the river from farther upstream. Samples were collected weekly in conjunction with routine recreational monitoring; however, they started in late December rather than at the beginning of the monitoring period.

Over the period of sampling additional sites, only the first round of sampling had high *E. coli* concentrations (i.e., above action level). These results showed highest *E. coli* concentrations at the site immediately above the diversion to the swimming hole. Otherwise, the remainder of the sampling events showed little difference in *E. coli* concentrations between the three monitored sites. Therefore, Environment Canterbury's recommendation is to repeat the sampling carried out in 2022-23 for the 2023-24 season.



Appendix 4: Recreational Lakes within the Roto Kōhatu Reserve Investigation

Suitability of Contact Recreation Investigation – Roto Kōhatu Reserve Recreational Lakes

A4.1 Background of investigation

At the request of the Christchurch City Council Park Rangers at the end of the previous season, we add two monitoring sites within Roto Kōhatu Reserve – one site at Lake Rua (which is popular for swimming) and one site at the canoe lake. This is to understand the suitability of all the lakes within the Roto Kōhatu Reserve. Environment Canterbury currently monitors Lake Tahī, which is used by powered craft (largely jet skis). It has been suggested that we move the main monitoring site within the reserve to Lake Rua because it is the primary swimming lake and its increasing popularity which is likely to grow as Christchurch City Council improves access and facilities at the reserve.

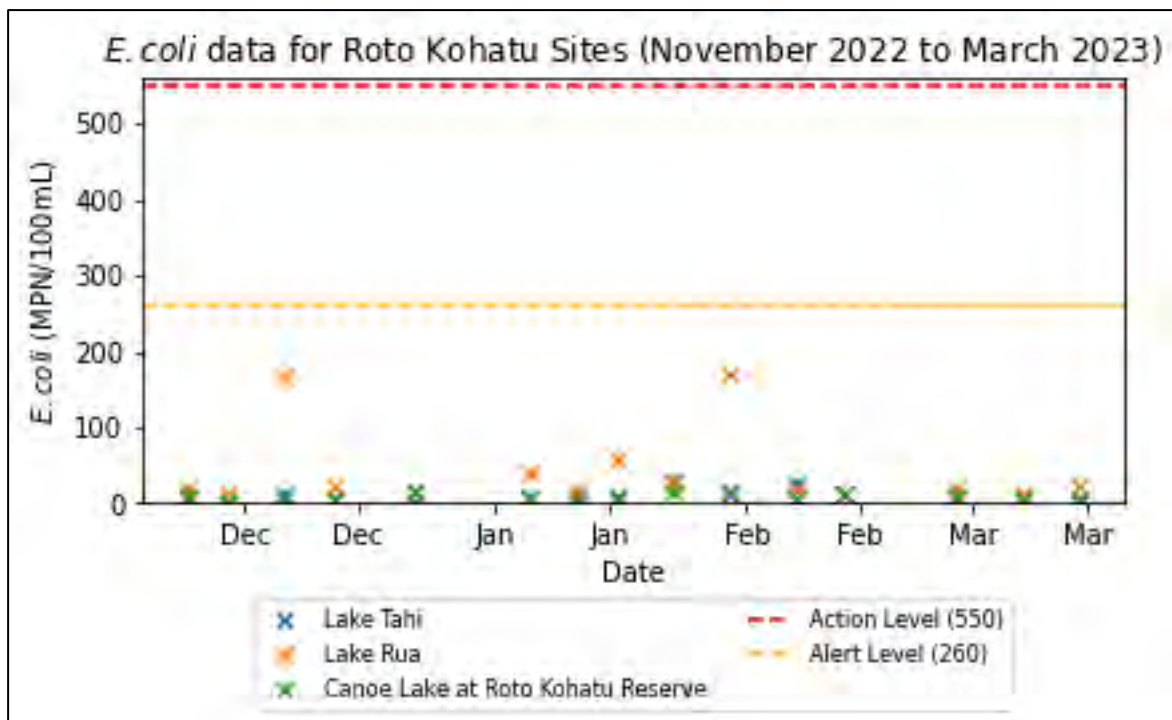
A4.2 Purpose

To understand the risk of moving the main recreational monitoring site from Lake Tahī to Lake Rua, while understanding the water quality between all three lakes.

A4.3 Results and recommendations

Environment Canterbury monitored a site on the three lakes within the reserve, Lake Tahī, the canoe lake (attached to Lake Tahī) and Lake Rua. These lakes are primarily fed by groundwater infiltration and rainfall, as well as having a visible connection with water flowing from Lake Tahī to Lake Rua.

Data collected during the 2022-23 season show that the three lakes have similar water quality, with all samples below the alert threshold (260 MPN/100mL) and majority of the samples below 50 MPN/100mL. Lake Rua had a few samples which had higher results (see table below), which may indicate that Lake Rua may be more vulnerable to contamination events.



Based on the results of sampling, and the purpose of the lakes (as outlined by Christchurch City Council), Environment Canterbury recommends changing the main monitoring site for contact recreation within the Roto Kohatu Reserve to be at Lake Rua. The weekly monitoring would cease at Lake Tahi during the summer season. This site will need a sanitary inspection and two more years of monitoring before it has a suitability for recreation grade.

Appendix 5: Memo on Lyttelton/Whakaraupō and Akaroa Faecal Source Tracking Investigation

Investigation of faecal contamination sources at popular swimming sites in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa during the 2022-23 swimming season

A5.1 Background

Environment Canterbury monitors water quality at popular recreational areas over the summertime to establish if they are suitable for swimming. At the end of the 2021/2022 swimming season the number of sites in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa with a long-term 'suitability for recreation' grade of 'poor' or 'very poor' had increased (Table 1). These grades provide an indication of the general condition of a beach and the risk of becoming sick from swimming. Sites graded 'poor' or 'very poor' are generally unsuitable for swimming (Gray, 2022).

Table 4: Suitability for recreation grades at sites within Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa, Banks Peninsula, over the past five seasons

| Site | Suitability for Recreation Grade (*excludes rainfall data - adjustment ceased 2020) | | | | | Change in grade |
|---|--|-----------|-----------|---------|---------|-----------------|
| | 2017/18 | 2018/19 | 2019/20 | 2020/21 | 2021/22 | |
| Lyttelton Harbour | | | | | | |
| Cass Bay | Good | Good | Good | Good | Fair | ↓ |
| Church Bay | Good | Fair | Fair | Fair | Fair | |
| Corsair Bay | Good | Good* | Good* | Fair | Poor | ↓ |
| Diamond Harbour Beach | Fair | Fair | Good* | Fair | Poor | ↓ |
| Paradise Beach | Good | Good | Good | Good | Good | |
| Purau Bay | Good | Good | Good | Good | Poor | ↓ |
| Rāpaki Bay | Good | Good | Good* | Fair | Poor | ↓ |
| Sandy Bay | Good | Fair | Poor | Poor | Poor | |
| Akaroa Harbour and Banks Peninsula | | | | | | |
| Akaroa main beach | Good | Good | Good | Good | Poor | ↓ |
| Duvauchelle Bay | Good | Good | Good | Good | Good | |
| French Farm Bay Boatsheds | Very Good | Very Good | Very Good | Good | Good | |
| Glen Bay | Good | Good | Good | Good | Fair | ↓ |
| Okains Bay Estuary | Good | Good* | Good* | Good | Fair | ↓ |
| Takamatua Beach | Good | Fair | Fair | Fair | Fair | |
| Tikao Bay | Good | Fair | Fair | Fair | Fair | |
| Wainui Beach | Good | Good | Good* | Fair | Fair | |

Rainfall was considered a contributor to the increase in faecal indicator bacteria (FIB) (such as *E. coli* or enterococci) and the overall poor long-term site gradings in 2021/2022 (Gray 2022). However, not all elevated FIB results could be linked to rainfall and the source of the faecal contamination was unknown.

Furthermore, at the start of the 2022/2023 swimming season a routine sample at Cass Bay had numbers of enterococci (2720 MPN/100mL) that exceeded the human health action level guidelines (>280 MPN/100 mL) (Ministry for the Environment and Ministry of Health, 2003). The timing of this sample did not coincide with a wet weather event or a reported wastewater overflow. Te Mana Ora issued a temporary public health warning on the 30 December 2022 which remained in place until two consecutive samples had results below the guidelines. The temporary health warning was lifted on the 10 January 2023.

The continued decline in the water quality at swimming sites in Lyttelton Harbour/Whakaraupō and Akaroa Harbour/Whakaroa as well as the unknown sources of faecal contamination has led Environment Canterbury to investigate the source of the faecal pollution at selected sites.

The purpose of the investigation was to:

1. Identify the source and pathways of faecal contamination at each of the selected sites;
2. Understand what weather conditions contribute to high numbers of faecal indicator bacteria;
3. To work with Te Mana Ora, the Christchurch City Council and local rūnanga on a multi-agency approach to understanding, managing, and communicating the results of this investigation to the local community and public.

A5.2 Sampling Approach

A5.2.1 Pathways of faecal contamination

Faecal contamination can enter the beaches and bays through a variety of pathways. Heavy rain falling on land grazed by stock and other animals can result in overland flow of faecal material into streams and stormwater network pipes that discharge into the beaches. Sewage overflows, mistaken cross connections between wastewater and stormwater pipes, leaky wastewater pipes, or leaky septic tanks can result in sewage flowing overland into the stormwater network, or discharging directly to streams, beaches, or infiltrating into groundwater that eventually enters the beaches. Dog or bird faeces either on the beach, pedestrian paths, or roads can be washed into the stormwater system. People freedom camping, recreating at the beach, or on boats and not using public restroom facilities can also be a source of faecal contamination.

In addition to the routine water quality sampling that was undertaken at all contact recreation sites on a weekly basis during the swimming season of November 2022 to March 2023, investigation sampling was undertaken to identify how faecal contamination was entering the beaches (i.e., pathways) and the weather conditions that contribute to high numbers of faecal indicator bacteria.

Investigation samples were collected at 12 beaches and 9 streams and/or stormwater outfalls following heavy rainfall (Table 2) and analysed for FIB (enterococci and *E. coli*). The sites selected for wet weather investigation sampling either had a long-term grade of 'poor', 'very poor', or had unexplained occurrences of high FIB. Streams and stormwater pipes entering each of the beaches were also included in the wet weather investigation sampling to understand the pathways which faecal contamination was entering the beaches. Table 2 outlines the sites where investigation wet weather sampling was undertaken and Figures 1 and 2 show the locations.

Table 5: Routine and wet weather investigation sampling sites

| Routine Monitoring Sites | Additional Wet Weather Investigation Sites |
|--|---|
| Corsair Bay beach (SQ30684) Corsair Bay jetty (SQ30683) | Corsair Bay Stream (SQ34899) |
| Cass Bay at boat ramp (SQ30640) Cass Bay at mid beach (SQ36763) | Unnamed Stream at Cass Bay west (SQ34707) |
| | Cass Bay west stormwater outfall pipe (SQ36764) |
| | Cass Bay Stream at beach outlet (SQ30638) |
| Rāpaki Bay beach (SQ30647) | Rāpaki Bay jetty (SQ35065) |
| | Rāpaki outfall at Korara Tahi Road (SQ36765) |
| | Omaru Stream above bottom bridge (SQ35237) |
| Governors Bay at Sandy Bay (SQ30649) | Sandy Bay Stream above private road (SQ34570) |
| | Sandy Bay beach between W and E streams (SQ35245) |
| | Zephyr Stream at the beach (SQ35244) |
| Diamond Harbour beach (SQ30665) | Morgan's Gully Stream immediately above beach (SQ34118) |
| Purau Bay beach (SQ32595) | Purau Stream at the road bridge (above beach) (SQ30670) |
| Glen Bay boat ramp (SQ35233) | - |
| Akaroa at main beach (SQ32610) | - |

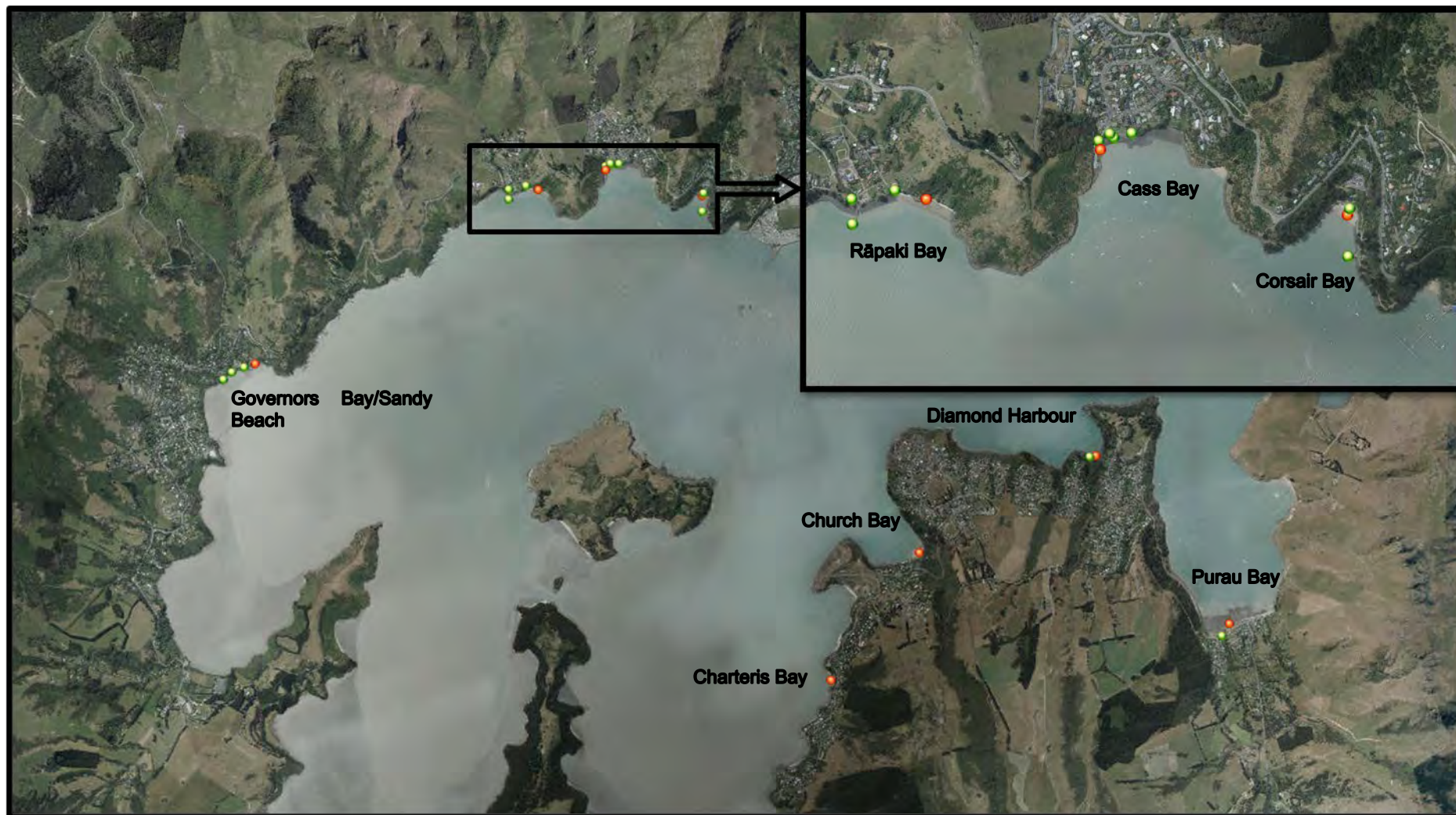


Figure 1: Routine (red dots) and investigation sampling sites (green dots) in Lyttelton Harbour/Whakaraupō



Figure 2: Routine and investigation sampling sites in Glen Bay and Akaroa main beach, Akaroa Harbour/Whakaroa

Sampling was undertaken in Lyttelton Harbour/Whakaraupō on the 15 February 2023 after 41 mm of rain, and the 23 February 2023 after 44 mm of rain had fallen within the previous 24 hours, as recorded at Coopers Knob rainfall station (Figure 3). In Akaroa Harbour/Whakaroa sampling was undertaken on the 15 February 2023 after 64 mm of rain had fallen in the previous 24 hours, as recorded at NIWA's Akaroa weather station (Figure 3).



Figure 3: Location of Coopers Knob and Akaroa EWS rainfall stations in Banks Peninsula

Sampling continued daily after the 15 February rain event until the 18 February to understand how long it takes for the level of contamination and health risk to reduce. This also aligns with the timeframe for health advice to swimmers (i.e., do not swim for 48 hours after heavy rain fall).

Investigation samples were also collected during hot weather (air temperature >20°C), when there were peak numbers of people and dogs recreating at the beach. This was to identify if there was link between high numbers of swimmers and dogs at the beach and elevated faecal contamination. Three hot weather investigations were undertaken at Cass and Corsair Bay on the 20 and 26 of January, and around Waitangi weekend (3 to 6 February 2023).

Identifying the origin of faecal contamination

Faecal Source Tracking (FST) is a way of identifying whether the faecal material in a sample has originated from humans, ruminant (goats, cows, sheep), dogs or avian (birds), as the microorganisms present in faeces are specific to the animal hosts. DNA is extracted from the microorganisms in a water sample and compared against DNA samples for humans, herbivores, dogs and birds by Environmental Science and Research (ESR). Water samples for faecal source tracking were collected at all sites during the routine weekly monitoring as well as the sites selected for wet weather and hot weather investigation sampling (Table 2).

A5.3 Sampling Methodology, Sample Storage and Analysis

All sampling occurred between mid and high tide and was undertaken in accordance with Environment Canterbury's recreational water quality monitoring procedures. All samples for analysis of FIB were stored in chilli bins with icepacks and taken to Hill laboratories on the same day as sampling. If this was not possible, they were stored in the sample storage fridge at Environment Canterbury and taken to the laboratory first thing the following morning and within 24 hours of collection of the sample.

Successful FST analysis is dependent on processing fresh samples (either immediate DNA extraction or sample filtration and freezing) as bacteria and markers degrade over time (within days), but they also need to contain high numbers of FIB to enable extraction of DNA markers. It takes 24-48 hours to receive the results of the FIB analysis from Hill Laboratories. This means that to preserve the integrity of the samples intended for FST analysis they need to be filtered and frozen prior to receiving FIB results. It is costly to filter and freeze all samples, considering some may have insufficient FIB. After discussion with ESR, it was decided that we would refrigerate the samples in the Environment Canterbury sample storage fridge until the FIB results received. If high numbers of FIB (~ >500 enterococci MPN/100ml) were present, the stored samples would be sent as soon as possible to ESR for filtering and freezing (usually a delay of 1-2 days from sample collection).

However, there were some samples that were collected at Cass and Corsair Bay during wet weather that were taken straight to ESR for filtering and freezing on the day of sampling. This was because of the increased public interest at these sites.

At the end of the swimming season, the filtered, frozen, and stored FST samples with the highest numbers of FIB from each of the sites listed in Table 2 were selected for FST analysis.

A5.4 Results

The FIB results of the routine weekly sampling are discussed and reported in the Annual Recreational Water Quality Report. A full record of FIB sample results from this investigation can be found in Appendix 1. The results of the hot weather sampling did not show elevated numbers of FIB (Figure 4, Appendix 1) and therefore the samples were not suitable for FST analysis.

Sixty-nine samples were collected at 12 beaches and 9 streams and/or stormwater outfall pipes over the two wet-weather sampling events (Appendix 1). All nineteen (100%) of the streams and/or stormwater network samples had generally high numbers of FIB with many samples having numbers >1,000 *E. coli*/100ml (64% of samples) indicating high FIB loads into the bays during rainfall events (Figure 5).

Of the beach sites sampled during the two wet weather events, 26% of samples collected exceeded either the action level guideline for enterococci (>280 MPN/100 mL) (Figure 6), or *E. coli* (>550 MPN/100 mL), or both. Another 8% samples exceeded the alert level guidelines for either enterococci (140-280 MPN/100 mL), *E. coli* (260-550 MPN/100 mL), or both.

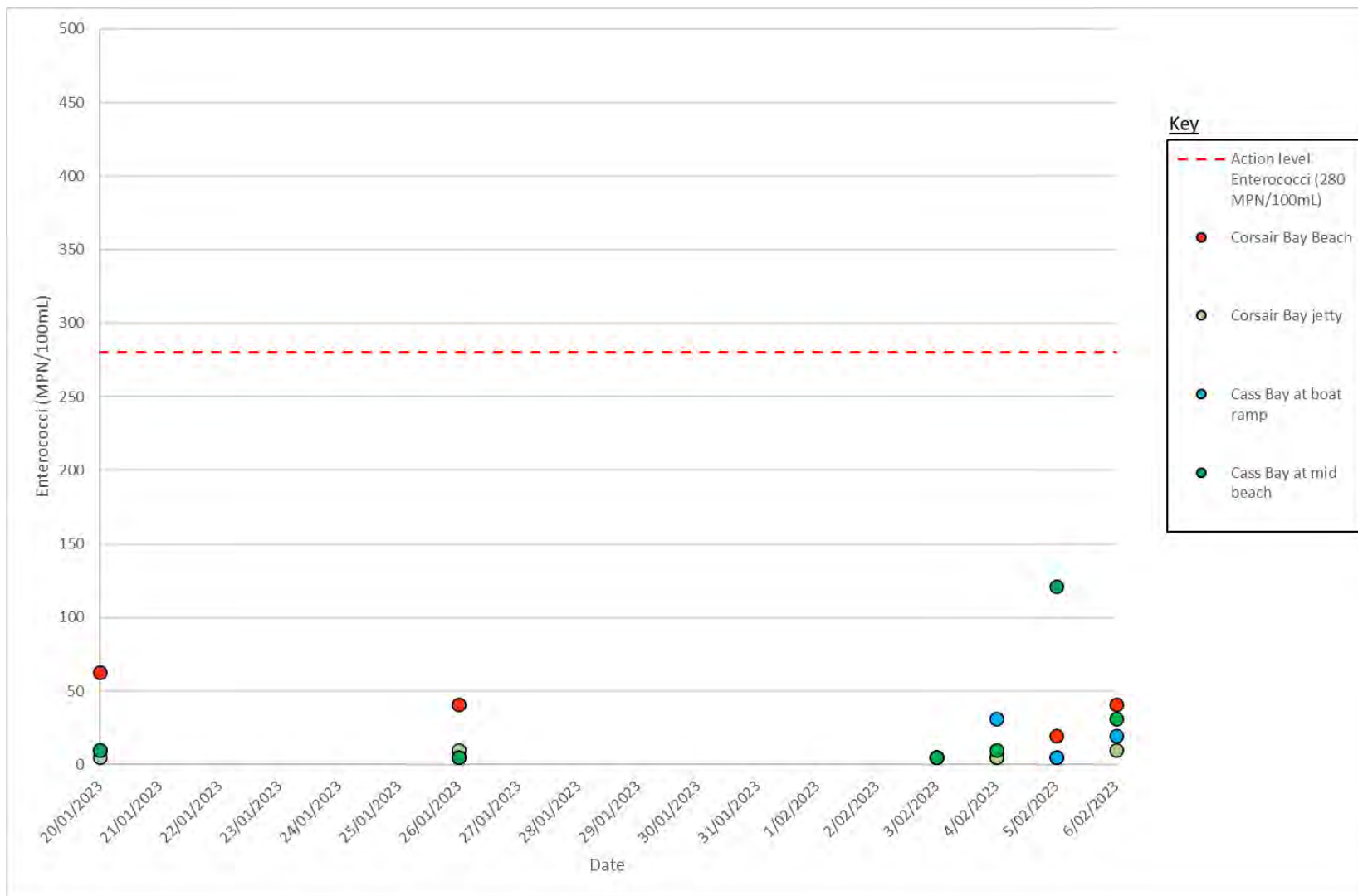


Figure 4: Enterococci results from beaches sampled during hot weather investigations in the 2022-2023

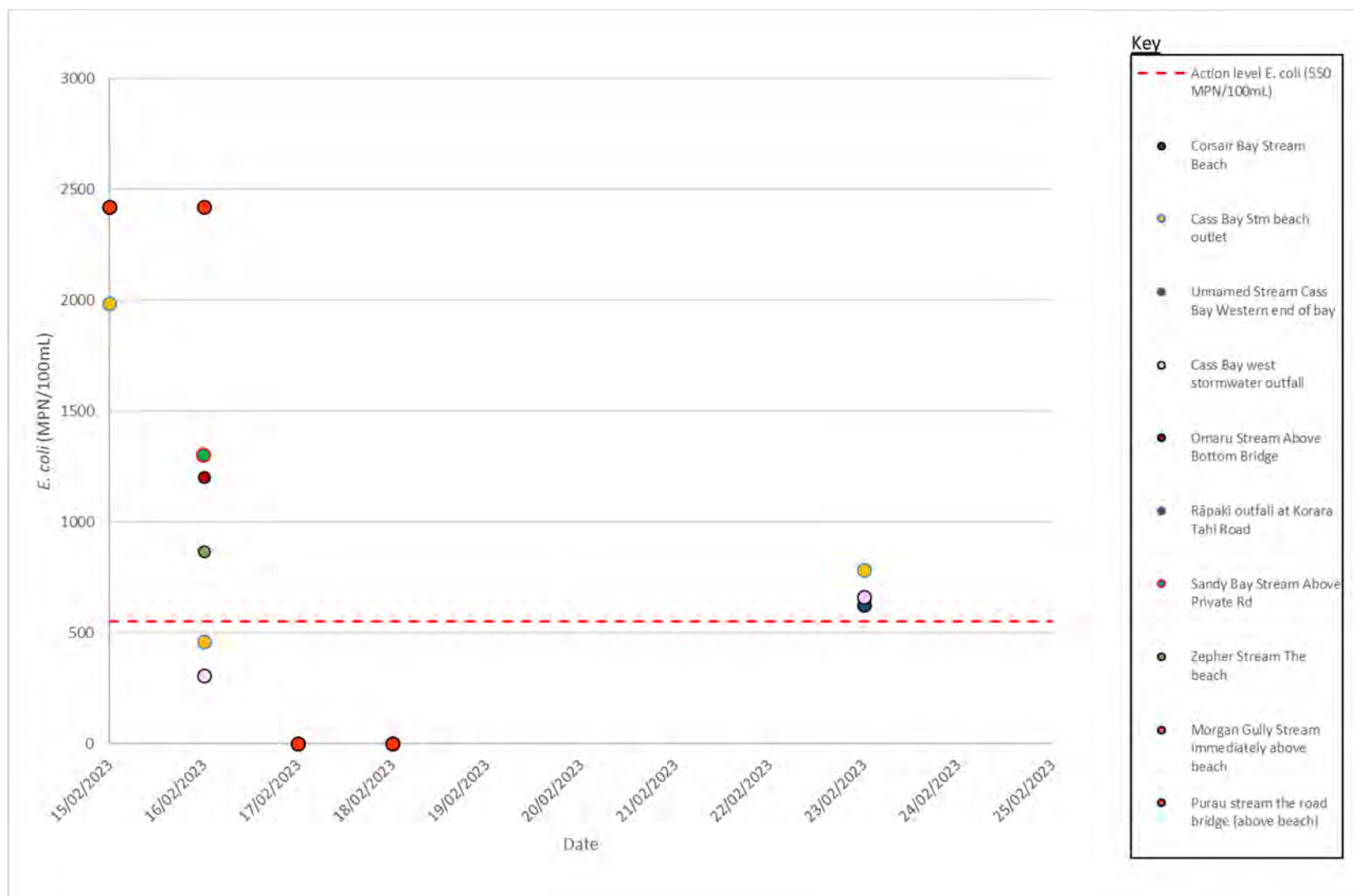


Figure 5: *E. coli* results from streams and stormwater outfall pipes sampled for wet weather investigations in the 2022-2023

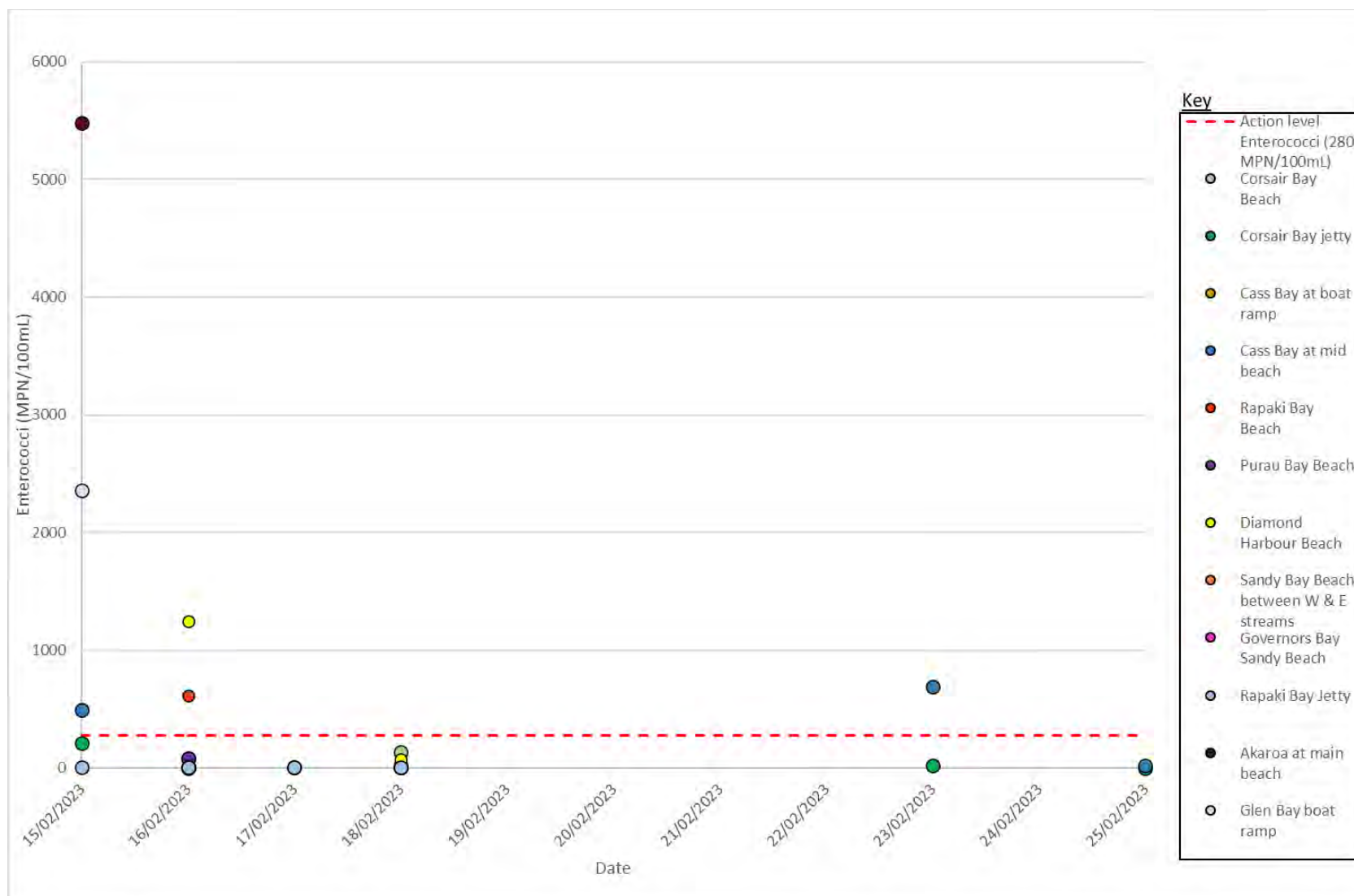


Figure 6: Enterococci results from beaches sampled for wet weather investigations in the 2022-2023



Figure 7: Faecal Source Tracking sites in Lyttelton Harbour/Whakaraupō

Samples from both the routine and wet weather investigation were collected for FST analysis. There were twenty-four samples that were suitable for FST analysis (some beaches had more than one suitable sample) (Figure 7).

Table 3 outlines the results of the FST sampling. Some markers had a weak or low detection signature, these could be due to historic contamination and therefore cannot be considered as a conclusive result.

Corsair Bay

The results of the FST analysis during wet weather events at Corsair Bay beach indicate that there is faecal contamination from human, ruminants, dogs, and bird sources entering the bay. The proportion of contribution from ruminant source was estimated as <1%. Corsair Bay Stream contributed to the source of human, ruminants, and bird faecal contamination at the beach during the wet weather event on the 15 February 2023. The source of dog faecal contamination at the beach is likely due to dog faeces from either the walking tracks or intertidal area at the beach being directly washed into the water during heavy rain fall, rather than transported down via the stream.

Cass Bay

The FST samples collected at Cass Bay at the boat ramp during routine sampling had insufficient faecal material to enable positive identification of faecal sources.

The results of samples collected at Cass Bay at mid beach on the 15 February 2023 had low FIB numbers (<500 MPN/100 mL) for FST analysis and only showed a weak marker for human sources. Whereas samples collected on 23 February had high FIB numbers and showed positive faecal contamination sources from humans and birds.

The unnamed stream at Cass Bay West and Cass Bay West stormwater outfall pipe sampled on 15 February 2023 showed human faecal contamination, along with dog faecal source detected in the unnamed stream sample. The Cass Bay Stream at beach outlet also had a low detection of human source. There was no faecal contamination from ruminants detected at any of the sites sampled.

Rāpaki Beach

The results of FST sampling at Rāpaki Bay beach collected on 15 February 2023 had moderately high FIB numbers (650 enterococci/100 ml) for FST analysis, but only showed a weak human source.

The Rāpaki outfall at Korara Tahi Road was positive for the presence of human faecal contamination as well as birds. Omaru Stream did not have any evidence of human faecal contamination but was positive for ruminants and birds. None of the sites in Rāpaki were positive for dog faecal contamination.

Governors Bay

A dry weather sample collected from Governors Bay at Sandy Bay on 21 November 2022 was positive for ruminants, dogs, and birds. A wet weather sample collected from Sandy Bay on 15 February 2023 showed positive dog and bird sources, and weak ruminant source. Neither of the samples from Sandy Bay showed human faecal sources.

Sandy Bay Stream above the private road could be contributing to the source of ruminant and dog faecal contamination in the bay as it was positive for these markers in samples from 15 February 2023. Zephyr Stream was positive for the presence of human, ruminants, and dog faecal contamination. Zephyr Stream discharges into Governors Bay around 300 m south of the Sandy Bay sampling point, any faecal contamination is likely diluted with the water within the bay prior to reaching Sandy Bay.

Sandy Bay Beach between West and East streams showed no positive results for faecal human contamination despite elevated FIB numbers.

Diamond Harbour

Diamond Harbour beach was positive for the presence of human, ruminant and dog faecal sources in wet weather samples collected on 15 February 2023. Morgan's Gully Stream is likely contributing to the faecal contamination from these sources as also it tested positive for all these markers as well as birds.

Purau Bay

Purau beach had a low detection of human faecal contamination but was not considered by ESR to confirm the presence of human faecal sources. Purau Beach was positive for ruminants and birds. The Purau Stream is likely contributing to these sources of faecal contamination as it tested positive for ruminant and bird markers.

Akaroa Harbour

Akaroa at main beach and Glen Bay all tested positive for human, ruminant and bird markers. No streams or outfall pipes were tested near these sampling sites, so we can't be certain of the pathway for entering the beach.

Canterbury water quality monitoring for contact recreation – Annual summary report 2022/23

Table 6: Faecal tracking results from wet weather investigation and routine sampling

Key: ✓ - detected ⚠ - low detection ⚠* - low detection, but not considered positive ✗ - not detected, results in grey shading had insufficient faecal indicators for positive source identification.

| Site ID | Site Name | Site Type | Date of sample | Enterococci/100mL | <i>E. coli</i> /100mL | Sampling type | GenBac/100mL | Human | Ruminant | Dog | Avian |
|---------|------------------------------------|-----------|----------------|-------------------|-----------------------|---------------------------|--------------|-------|----------|-----|-------|
| SQ30684 | Corsair Bay Beach | Beach | 15/02/2023 | 1,918 | NA | Routine (raining) | 26,000 | ✓ | ⚠ | ✓ | ✓ |
| SQ30684 | Corsair Bay Beach | Beach | 23/02/2023 | 4,880 | 3,080 | Routine (raining) | 26,000 | ✓ | ✓ | ✓ | ✓ |
| SQ34899 | Corsair Bay Stream Beach | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 440,000 | ✓ | ✓ | ✗ | ✓ |
| SQ30640 | Cass Bay at boat ramp | Beach | 10/01/2023 | 404 | NA | Routine | 2,500 | ✗ | ✗ | ✗ | ✗ |
| SQ30640 | Cass Bay at boat ramp | Beach | 10/02/2023 | 404 | NA | Routine | 4,900 | ✗ | ✗ | ✗ | ✗ |
| SQ36763 | Cass Bay at mid beach | Beach | 15/02/2023 | 495 | 458 | Wet weather investigation | 5,600 | ⚠ | ✗ | ✗ | ✗ |
| SQ36763 | Cass Bay at mid beach | Beach | 23/02/2023 | 691 | 744 | Wet weather investigation | 26,000 | ✓ | ✗ | ✗ | ✓ |
| SQ34707 | Unnamed Stream at Cass Bay West | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 420,000 | ✓ | ✗ | ✓ | ✗ |
| SQ36764 | Cass Bay west stormwater outfall | Pipe | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 790,000 | ✓ | ✗ | ✗ | ✗ |
| SQ30638 | Cass Bay Stream at beach outlet | Stream | 15/02/2023 | 1,986 | >2,420 | Wet weather investigation | 99,000 | ⚠ | ✗ | ✗ | ✗ |
| SQ30647 | Rāpaki Bay Beach | Beach | 15/02/2023 | 650 | NA | Routine (raining) | 10,000 | ⚠ | ✗ | ✗ | ✗ |
| SQ36765 | Rāpaki outfall at Korara Tahī Road | Pipe | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 340,000 | ✓ | ✗ | ✗ | ✓ |
| SQ35237 | Omaru Stream above Bottom Bridge | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 1,300,000 | ✗ | ✓ | ✗ | ✓ |

Canterbury water quality monitoring for contact recreation – Annual summary report 2022/23

| Site ID | Site Name | Site Type | Date of sample | Enterococci/100mL | <i>E. coli</i> /100mL | Sampling type | GenBac/100mL | Human | Ruminant | Dog | Avian |
|---------|---|-----------|----------------|-------------------|-----------------------|---------------------------|--------------|-------|----------|-----|-------|
| SQ30649 | Governors Bay Sandy Beach | Beach | 21/11/2022 | 1,396 | NA | Routine | 5,100 | ✗ | ✓ | ✓ | ✓ |
| SQ30649 | Governors Bay Sandy Beach | Beach | 15/02/2023 | 1,789 | NA | Routine (raining) | 7,600 | ✗ | ⚠ | ✗ | ✗ |
| SQ34570 | Sandy Bay Stream Above Private Rd | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 170,000 | ✗ | ✓ | ✓ | ✗ |
| SQ35245 | Sandy Bay Beach between W & E streams | Beach | 15/02/2023 | 2,360 | 677 | Wet weather investigation | 7,500 | ✗ | ✗ | ✗ | ✗ |
| SQ35244 | Zephyr Stream The beach | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 200,000 | ✓ | ✓ | ✓ | ✗ |
| SQ30665 | Diamond Harbour Beach | Beach | 15/02/2023 | 5,170 | NA | Routine (raining) | 13,000 | ✓ | ✓ | ✓ | ✗ |
| SQ34118 | Morgan's Gully Stream immediately above beach | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 96,000 | ✓ | ✓ | ✓ | ✓ |
| SQ30670 | Purau stream the road bridge (above beach) | Stream | 15/02/2023 | >2,420 | >2,420 | Wet weather investigation | 1,500,000 | ✓ | ✓ | ✗ | ✓ |
| SQ32595 | Purau Bay Beach | Beach | 15/02/2023 | 3,260 | NA | Routine (raining) | 28,000 | ⚠* | ✓ | ✗ | ✓ |
| SQ35233 | Glen Bay boat ramp | Beach | 15/02/2023 | 2,360 | NA | Routine (raining) | 95,000 | ✓ | ✓ | ✗ | ✓ |
| SQ32610 | Akaroa at main beach | Beach | 15/02/2023 | 5,480 | NA | Routine (raining) | 38,000 | ✓ | ✓ | ✗ | ✓ |

A5.5 Conclusion

Wet weather was a strong contributor to increased numbers of faecal indicator bacteria in the streams/stormwater outfalls and at the beaches in each of the harbours.

Fine weather with large numbers of people swimming at the beaches or dogs on the beach did not result in high numbers of faecal indicator bacteria in our targeted hot weather sampling investigation. However, the high FIB numbers that occurred on the 29 December 2022 at Cass and Corsair bays indicate that some unknown potential source of faecal contamination can occur during fine weather.

At Corsair Bay, Cass Bay, and Diamond Harbour Beach in Lyttelton Harbour/Whakaraupō and Glen Bay and Akaroa Main Beach in Akaroa Harbour/Whakaroa there is evidence of human faecal contamination in water at the beaches.

Streams or stormwater outfall pipes are likely key contributors to human faecal contamination at Corsair Bay, Cass Bay, and Diamond Harbour beaches during wet weather events.

Faecal contamination from ruminants is entering the beaches indirectly via the waterways at Corsair Bay, Sandy Bay, Diamond Harbour and Purau Bay. Faecal contamination from dogs is entering the beach directly at Corsair Bay or indirectly via streams/stormwater pipes at Sandy Bay and Diamond Harbour. Faecal contamination from birds is entering the beach directly at Cass Bay and Sandy Bay, or indirectly via streams/stormwater pipes at Corsair Bay and Purau Bay.

A5.6 Next Steps

Environment Canterbury have communicated the results of this investigation with Te Mana Ora, Christchurch City Council, Te Hapū o Ngāti Wheke and the Banks Peninsula Zone Committee. Environment Canterbury support the work that the Christchurch City Council are undertaking to investigate the sources of human faecal contamination that are entering the beaches via the streams and stormwater outfall pipes and eliminate/fix these sources. We also acknowledge that these works will take some time to identify and remediate.

There are also other actions that landowners and members of the public can do to help to reduce or eliminate sources of faecal contamination, such as picking up dog faeces and disposing of them appropriately, use the toilet facilities provided, and exclude stock from waterways as per the Land and Water Regional Plan rules or Resource Management Act regulations.

In the meantime, Environment Canterbury are working towards developing a model that can provide real time information to the public to advise them whether a beach is safe to swim. This model will use rainfall information (measured and/or forecasted) to determine the likelihood of faecal contamination at a site. However, it may take a year or two to validate this model and implement the new monitoring system. Alongside the development of a model, Environment Canterbury will work with Te Mana Ora and Christchurch City Council to develop an effective means of communication on health risks at popular swimming sites.

A5.7 References

Gray, E.C.M (2022). *Microbial water quality for contact recreation: Annual grade summary report 2021-22 season*. Environment Canterbury, Christchurch.

Ministry for the Environment and Ministry of Health (2003). *Microbiological water quality guidelines for marine and freshwater recreational areas*. Ministry for the Environment, Wellington.

A5.8 Appendix 1 – Microbial results

A5.8.1 Wet Weather sampling results

Key: Red cells are above action threshold, yellow cells are above alert threshold (Ministry of Health and Ministry for the Environment, 2003).

| Site Name | Date | Time | Rain 24 hrs prior to sampling (mm) | <i>E. coli</i> (MPN/100 mL) | Enterococci (MPN/100 mL) | Swimmers | People on the Beach |
|--|------------|----------|------------------------------------|-----------------------------|--------------------------|----------|---------------------|
| Cass Bay at boat ramp | 15/02/2023 | 1:57 pm | 40 | | 74 | 0 | 0 |
| Cass Bay at boat ramp | 16/02/2023 | 2:51 pm | 39 | 20 | <10 | 0 | 0 |
| Cass Bay at boat ramp | 17/02/2023 | 12:19 pm | 0 | | 10 | 0 | 1 |
| Cass Bay at boat ramp | 18/02/2023 | 1:38 pm | 0 | 41 | <10 | 0 | 0 |
| Cass Bay at boat ramp | 23/02/2023 | 7:06 am | 44 | 148 | 185 | 0 | 1 |
| Cass Bay at boat ramp | 25/02/2023 | 8:37 am | 0 | <10 | <10 | 0 | 6 |
| Cass Bay at mid beach | 15/02/2023 | 2:08 pm | 41 | 458 | 495 | 0 | 0 |
| Cass Bay at mid beach | 16/02/2023 | 3:14 pm | 38 | 10 | 10 | 0 | 0 |
| Cass Bay at mid beach | 17/02/2023 | 12:30 pm | 0 | <10 | 10 | 0 | 0 |
| Cass Bay at mid beach | 18/02/2023 | 1:47 pm | 0 | 20 | <10 | 1 | 12 |
| Cass Bay at mid beach | 23/02/2023 | 6:50 am | 44 | 744 | 691 | 0 | 0 |
| Cass Bay at mid beach | 25/02/2023 | 8:45 am | 0 | 72 | 20 | 2 | 6 |
| Cass Bay Stream at beach outlet | 15/02/2023 | 2:15 pm | 41 | 1986 | >2420 | NA | NA |
| Cass Bay Stream at beach outlet | 16/02/2023 | 3:17 pm | 38 | 461 | 1203 | NA | NA |
| Cass Bay Stream at beach outlet | 23/02/2023 | 6:45 am | 44 | 784 | 3260 | NA | NA |
| Cass Bay west stormwater outfall | 15/02/2023 | 2:05 pm | 41 | >2420 | >2420 | NA | NA |
| Cass Bay west stormwater outfall | 16/02/2023 | 3:04 pm | 38 | 308 | 1414 | NA | NA |
| Cass Bay west stormwater outfall | 23/02/2023 | 7:00 am | 44 | 663 | 1014 | NA | NA |
| Unnamed Stream Cass Bay Western end of bay | 15/02/2023 | 2:10 pm | 41 | >2420 | >2420 | NA | NA |
| Corsair Bay Beach | 15/02/2023 | 2:45 pm | 41 | | 1918 | 0 | 0 |
| Corsair Bay Beach | 16/02/2023 | 3:38 pm | 38 | 31 | 84 | 1 | 2 |
| Corsair Bay Beach | 17/02/2023 | 11:51 am | 0 | | 10 | 0 | 0 |
| Corsair Bay Beach | 18/02/2023 | 1:03 pm | 0 | 588 | 135 | | 25 |
| Corsair Bay Beach | 23/02/2023 | 6:19 am | 44 | 3080 | 4880 | 0 | 1 |
| Corsair Bay Beach | 25/02/2023 | 8:22 am | 0 | 10 | 10 | 6 | 2 |
| Corsair Bay jetty | 15/02/2023 | 2:34 pm | 41 | 121 | 216 | 0 | 0 |
| Corsair Bay jetty | 17/02/2023 | 12:01 pm | 0 | <10 | <10 | 0 | 0 |
| Corsair Bay jetty | 18/02/2023 | 1:15 pm | 0 | <10 | <10 | 2 | 6 |
| Corsair Bay jetty | 23/02/2023 | 6:14 am | 44 | <10 | 20 | | |
| Corsair Bay Stream at Beach | 15/02/2023 | 2:41 pm | 41 | >2420 | >2420 | NA | NA |
| Corsair Bay Stream at Beach | 16/02/2023 | 3:33 pm | 38 | 2420 | 980 | NA | NA |
| Corsair Bay Stream at Beach | 23/02/2023 | 7:21 am | 44 | 624 | 314 | NA | NA |
| Diamond Harbour Beach | 15/02/2023 | 11:41 am | 33 | | 5170 | 0 | 0 |
| Diamond Harbour Beach | 16/02/2023 | 12:26 pm | 42 | 683 | 1250 | 0 | 0 |

Canterbury water quality monitoring for contact recreation – Annual summary report 2022/23

| Site Name | Date | Time | Rain 24 hrs prior to sampling (mm) | <i>E. coli</i> (MPN/100 mL) | Enterococci (MPN/100 mL) | Swimmers | People on the Beach |
|---|------------|----------|------------------------------------|-----------------------------|--------------------------|----------|---------------------|
| Diamond Harbour Beach | 17/02/2023 | 2:57 pm | 0 | | 216 | 0 | 2 |
| Diamond Harbour Beach | 18/02/2023 | 4:21 pm | 0 | 31 | 74 | 0 | 1 |
| Morgan's Gully Stream immediately above beach | 15/02/2023 | 11:44 am | 33 | >2420 | >2420 | NA | NA |
| Morgan's Gully Stream immediately above beach | 16/02/2023 | 12:31 pm | 42 | >2420 | >2420 | NA | NA |
| Governors Bay Sandy Beach | 15/02/2023 | 12:40 pm | 38 | | 1789 | 0 | 0 |
| Governors Bay Sandy Beach | 16/02/2023 | 1:18 pm | 40 | 10 | 20 | 0 | 0 |
| Governors Bay Sandy Beach | 17/02/2023 | 1:30 pm | 0 | | 52 | 0 | 0 |
| Governors Bay Sandy Beach | 18/02/2023 | 2:51 pm | 0 | <10 | 10 | 0 | 5 |
| Sandy Bay Beach between W & E streams | 15/02/2023 | 12:56 pm | 38 | 677 | 2360 | 0 | 0 |
| Sandy Bay Beach between W & E streams | 16/02/2023 | 1:37 pm | 40 | 63 | 31 | 0 | 0 |
| Sandy Bay Beach between W & E streams | 17/02/2023 | 1:40 pm | 0 | <10 | 20 | 0 | 0 |
| Sandy Bay Stream Above Private Rd | 15/02/2023 | 12:38 pm | 38 | >2420 | | NA | NA |
| Sandy Bay Stream Above Private Rd | 16/02/2023 | 1:26 pm | 40 | 1300 | 2420 | NA | NA |
| Purau Bay Beach | 15/02/2023 | 11:19 am | 33 | | 3260 | 0 | 0 |
| Purau Bay Beach | 16/02/2023 | 11:45 am | 47 | 420 | 86 | 0 | 0 |
| Purau Bay Beach | 17/02/2023 | 3:15 pm | 0 | | <10 | 0 | 0 |
| Purau Bay Beach | 18/02/2023 | 4:43 pm | 0 | <10 | 20 | 1 | 0 |
| Purau stream the road bridge (above beach) | 15/02/2023 | 11:22 am | 33 | >2420 | >2420 | NA | NA |
| Purau stream the road bridge (above beach) | 16/02/2023 | 11:54 am | 47 | >2420 | >2420 | NA | NA |
| Rāpaki Bay Beach | 15/02/2023 | 1:25 pm | 40 | | 650 | 0 | 0 |
| Rāpaki Bay Beach | 16/02/2023 | 2:12 pm | 39 | 63 | 613 | 0 | 0 |
| Rāpaki Bay Beach | 17/02/2023 | 12:58 pm | 0 | | <10 | 0 | 0 |
| Rāpaki Bay Beach | 18/02/2023 | 2:16 pm | 0 | 10 | <10 | 1 | 10 |
| Rāpaki Bay Beach | 25/02/2023 | 9:14 am | 0 | <10 | <10 | 0 | 0 |
| Rāpaki Bay Jetty | 15/02/2023 | 1:41 pm | 40 | 20 | 10 | 0 | 0 |
| Rāpaki Bay Jetty | 16/02/2023 | 2:25 pm | 39 | 31 | <10 | 0 | 0 |
| Rāpaki Bay Jetty | 17/02/2023 | 1:08 pm | 0 | 20 | <10 | 0 | 0 |
| Rāpaki Bay Jetty | 18/02/2023 | 2:28 pm | 0 | <10 | <10 | 0 | 3 |
| Rāpaki outfall at Korara Tah Road | 15/02/2023 | 1:22 pm | 40 | >2420 | >2420 | NA | NA |
| Omaru Stream Above Bottom Bridge | 15/02/2023 | 1:37 pm | 40 | >2420 | | NA | NA |
| Omaru Stream Above Bottom Bridge | 16/02/2023 | 2:32 pm | 39 | 1203 | 1120 | NA | NA |
| Akaroa at main beach | 15/02/2023 | 12:09 pm | 64 | | 5480 | 0 | 0 |
| Akaroa at main beach | 17/02/2023 | 1:30 pm | 0 | | 20 | 0 | 3 |
| Glen Bay boat ramp | 15/02/2023 | 12:21 pm | 64 | | 2360 | 0 | 0 |
| Glen Bay boat ramp | 17/02/2023 | 1:50 pm | 0 | | <10 | 0 | 0 |

Canterbury water quality monitoring for contact recreation – Annual summary report 2022/23

A5.8.2 Hot weather microbial sample results

Key: Red cells are above action threshold, yellow cell is above alert threshold (Ministry of Health and Ministry for the Environment, 2003).

| Site Name | Date | Time | Temperature (°C) and Wind Direction | Rain 24hrs prior to monitoring (mm) | <i>E. coli</i> (MPN/100mL) | Enterococci (MPN/100mL) | Swimmers | People on the Beach |
|-----------------------|------------|---------|-------------------------------------|-------------------------------------|----------------------------|-------------------------|----------|---------------------|
| Cass Bay at boat ramp | 20/01/2023 | 2:12 pm | 21°C ENE | 0 | 20 | 10 | 11 | 3 |
| Cass Bay at boat ramp | 26/01/2023 | 4:51 pm | 23°C ENE | 0 | <10 | <10 | 14 | 14 |
| Cass Bay at boat ramp | 3/02/2023 | 2:15 pm | 25°C ENE | 0 | 20 | <10 | 0 | 4 |
| Cass Bay at boat ramp | 4/02/2023 | 1:44 pm | 25°C ENE | 0 | 144 | 31 | 35 | 20 |
| Cass Bay at boat ramp | 5/02/2023 | 3:39 pm | 24°C ENE | 0 | <10 | <10 | 0 | 0 |
| Cass Bay at boat ramp | 6/02/2023 | 3:43 pm | 29°C ENE | 0 | 340 | 20 | 6 | 0 |
| Cass Bay at mid beach | 20/01/2023 | 2:21 pm | 21°C ENE | 0 | 20 | 10 | 15 | 45 |
| Cass Bay at mid beach | 26/01/2023 | 4:56 pm | 23°C ENE | 0 | 41 | <10 | | |
| Cass Bay at mid beach | 3/02/2023 | 2:10 pm | 25°C ENE | 0 | <10 | <10 | 10 | 13 |
| Cass Bay at mid beach | 4/02/2023 | 1:50 pm | 25°C ENE | 0 | 52 | 10 | 19 | 70 |
| Cass Bay at mid beach | 5/02/2023 | 3:29 pm | 25°C ENE | 0 | 86 | 121 | 0 | 0 |
| Cass Bay at mid beach | 6/02/2023 | 3:50 pm | 26°C ENE | 0 | 52 | 31 | 70 | 114 |
| Corsair Bay Beach | 20/01/2023 | 1:42 pm | 21°C ENE | 0 | <10 | 63 | 19 | 26 |
| Corsair Bay Beach | 26/01/2023 | 5:09 pm | 23°C ENE | 0 | 74 | 41 | | |
| Corsair Bay Beach | 3/02/2023 | 1:53 pm | 25°C ENE | 0 | <10 | <10 | 40 | 20 |
| Corsair Bay Beach | 4/02/2023 | 2:21 pm | 25°C ENE | 0 | <10 | <10 | 60 | 150 |
| Corsair Bay Beach | 5/02/2023 | 3:59 pm | 24°C ENE | 0 | <10 | 20 | 3 | 10 |
| Corsair Bay Beach | 6/02/2023 | 3:17 pm | 30°C N | 0 | 20 | 41 | 57 | 191 |
| Corsair Bay jetty | 20/01/2023 | 1:52 pm | 21°C ENE | 0 | 10 | <10 | 1 | 13 |
| Corsair Bay jetty | 26/01/2023 | 5:16 pm | 23°C ENE | 0 | 52 | 10 | | |
| Corsair Bay jetty | 3/02/2023 | 1:48 pm | 25°C ENE | 0 | <10 | <10 | 6 | 10 |
| Corsair Bay jetty | 4/02/2023 | 2:10 pm | 25°C ENE | 0 | 10 | <10 | 30 | 29 |
| Corsair Bay jetty | 5/02/2023 | 4:10 pm | 23°C ENE | 0 | <10 | <10 | 0 | 1 |
| Corsair Bay jetty | 6/02/2023 | 3:10 pm | 30°C N | 0 | 689 | 10 | 7 | 32 |

Environment Canterbury offices

Christchurch

200 Tuam Street
PO Box 345
Christchurch 8140

P 0800 324 636

Timaru

75 Church Street
Timaru 7940

Kaikōura

96 West End
Kaikōura 7340

© Environment Canterbury 2022



WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO: 230516070164

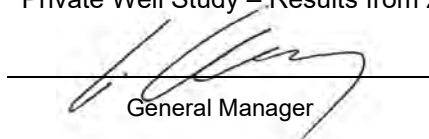
REPORT TO: UTILITIES AND ROADING COMMITTEE

DATE OF MEETING: 15 August 2023

AUTHOR(S): Angela Burton – Water Environment Advisor (Fixed Term)
Sophie Allen – Water Environment Advisor

SUBJECT: Private Well Study – Results from 2022 study

ENDORSED BY:
(for Reports to Council,
Committees or Boards)


General Manager


Chief Executive

1. SUMMARY

- 1.1. Waimakariri District Council (WDC), alongside Environment Canterbury and Canterbury District Health Board, have been recommended in the Zone Implementation Programme Addendum (ZIPA) to develop a programme for testing and reporting of water quality in private drinking water supply wells. This testing is particularly for the contaminant nitrate, due to a developing field of research on the effects of high nitrate consumption.
- 1.2. This report summarises the findings of the WDC private well study for 2022 and compares to results from 2019, 2020 and 2021. Studies were initially carried out for wells in the Eyreton and Cust sampling areas, with Carleton and Swannanoa as sampling areas that were added to the study from 2021. Nitrate and other chemical parameters were sampled in 27 wells in total: six in Cust (same wells as in 2019, 2020 and 2021), nine in Eyreton (same wells as 2019, 2020 and 2021), five in Carleton and seven in Swannanoa. It is noted that the total amount of samples taken in the 2022 study was less than previous studies due to lower participant turnout.
- 1.3. The nitrate mean and median for Cust and Eyreton samples has fluctuated over the 2019-22 period. It is not possible to conclude any long-term trend in nitrate levels from only four data points for each well. Note that not all wells were resampled and variability of results could be due to the small sample size.
- 1.4. Carleton and Swannanoa areas that were sampled for the first time in the 2021 study, with nitrate medians lower than that found for Cust and Eyreton. The 2022 mean and median results for Carleton and Swannanoa decreased when compared to the 2021 study mean and median. Note that not all wells were resampled and variability of results could be due to the small sample size.
- 1.5. In the 2022 study, no wells measured above the Maximum Acceptable Value (MAV) for Nitrate-Nitrogen of 11.3 mg/L. The MAV is set in the Drinking-water Standards for New Zealand (2022). It should be noted that private wells that are domestic self-suppliers do not need to comply with the standards except at the building consent stage, however, are used for guidance values in this report.
- 1.6. A median value of half of the MAV (5.65 mg/L) has been set as a target in Plan Change 7 of the Land and Water Regional Plan for private water supply wells. 44% of the wells in Eyreton, 67% in Cust, 40% in Carleton and 29% in Swannanoa were above half the MAV

(5.65 mg/L) for nitrate-nitrogen in the 2022 study. The median nitrate concentration for Cust and Eyreton, as sampled in the 2022 study would exceed the limit of a median of 5.65 mg/L nitrate-nitrogen (half of the MAV). Carleton and Swannanoa median nitrate concentration for the 2022/23 study were less than 5.65 mg/L (half of the MAV).

- 1.7. In the 2022 study, a weak correlation was found between the increasing well depth and decreasing nitrate levels. In 2021, there was no correlation, however in 2019 and 2020 a weak correlation was found for this relationship. Other factors such as geochemical processes, nitrate recharge sources and date of sampling likely play a larger role than depth.
- 1.8. Other chemical parameters analysed in the 2022 study are not presented in this report for brevity. Other contaminants that were found to be over a MAV were turbidity and pH. The Aesthetic Value (AV) for iron was also exceeded in some wells. Microbiological testing was not carried out due to the risk of contaminating a sample if not trained appropriately.
- 1.9. This nitrate study is intended be repeated in spring 2023 to allow for assessment of trends over time. Well owners from the 2019-22 sample rounds will be approached again for repeat annual sampling.
- 1.10. A pamphlet about managing a private well water supply has been produced by Waimakariri District Council, with the support of the groundwater team at Environment Canterbury. This pamphlet has been updated to add in information about the Water Services Act (2021), and requirements for drinking water suppliers. This includes those who share water supplies or have a commercial premise (i.e. anyone who is not considered a domestic self-supplier).

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

- (a) **Receives** Report No. 230516070164.
- (b) **Notes** the findings of the 2022 study, with no wells above the nitrate-nitrogen Maximum Acceptable Value (MAV) set in the Drinking Water Standards for New Zealand (2022). Of the wells sampled 44% in Eyreton, 67% in Cust, 40% in Carleton and 29% in Swannanoa sampling areas were above half of the MAV (5.65 mg/L).
- (c) **Notes** that the median nitrate concentration for the Eyreton and Cust sampling areas, as sampled in the 2022 study, exceed the limit of a median of 5.65 mg/L nitrate-nitrogen set in Plan Change 7 of the Land and Water Regional Plan for private water supply wells. The Swannanoa and Carleton sampling areas did meet this limit.
- (d) **Notes** that Waimakariri District Council and Environment Canterbury staff will continue to raise awareness of the health impacts of high nitrates, and to encourage private well owners to test water regularly, including updating and wider distribution of the publication of a 'managing a private well supply' pamphlet for the District.
- (e) **Notes** that Waimakariri District Council proposes to repeat this study in spring 2023 (with 10 wells in each of the four sampling areas (40 wells total). Well owners from the previous sample rounds will be approached for repeat annual sampling, to allow for assessment of trends over time. New well owners will be approached to replace those who no longer want to participate in the study. The new well owners will be randomly selected within the sample areas.
- (f) **Notes** that trends for nitrate concentration over time are not able to be concluded from data for only four years, or two years of data for Swannanoa and Carleton sampling areas.

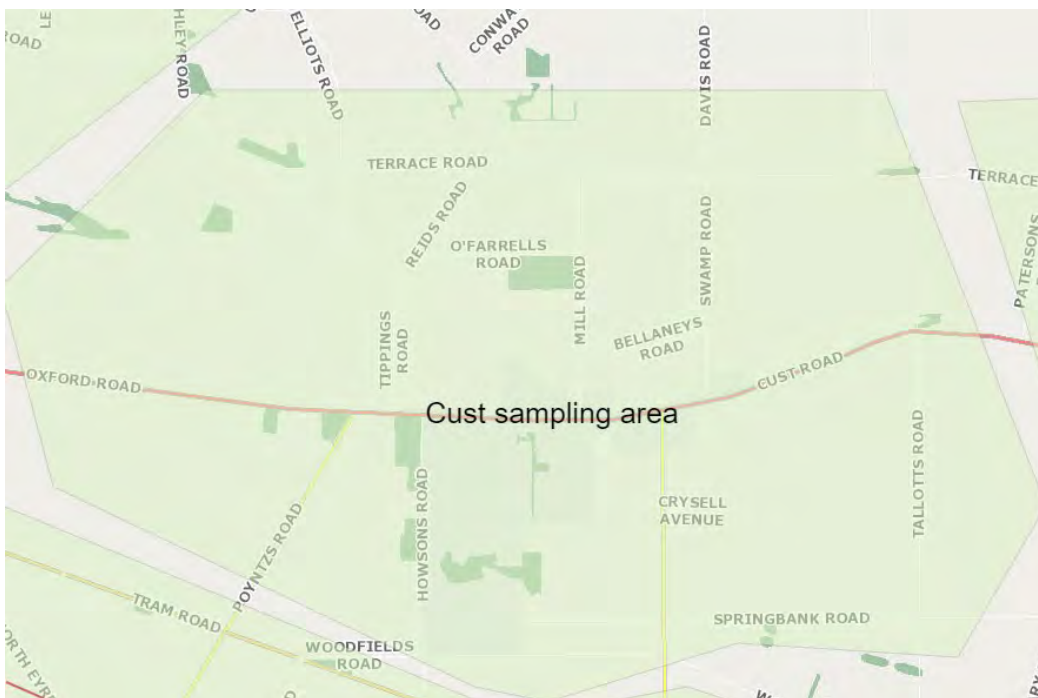
- (g) **Circulates** this report to the Council, Community Boards and the Waimakariri Water Zone Committee for information.

3. **BACKGROUND**

- 3.1 Drinking-water safety is the joint responsibility of territorial authorities, the Regional Council (Environment Canterbury) and Te Whatu Ora Community and Public Health. Environment Canterbury manages the quality at source. Territorial Authorities, such as WDC, manage the quality of water coming out of the tap. For public supplies, this is through management of the supply, storage, and distribution network. For private supplies, this is through the issuing of a resource consent for new developments (which will specify how water is to be sourced) and issuing of a building consent for new dwellings which confirms that the water is potable at the time of issuing the consent. Te Whatu Ora manages the impact of the water quality on public health and can give advice on the health impacts of water quality. Taumata Arowai is the regulator responsible for drinking water regulation-related activities in New Zealand.
- 3.2 Recent overseas research suggests that the drinking water standard MAV for nitrate-nitrogen could be reviewed to much lower, such as 1.0 mg/L rather than the current 11.3 mg/l. The current 11.3 mg/L value is based on avoidance of Blue Baby Syndrome, however studies also suggest a correlation with colo-rectal cancers from drinking water consumption starting at levels as low as 1.0 mg/L nitrate-nitrogen. Ecological studies have also shown that with increasing nitrate levels, biodiversity begins to decline. New Zealand-based studies by the University of Otago (led by Dr Tim Chambers) are underway.
- 3.3 Nitrate levels in private wells has been raised by Waimakariri community members, such as at an event hosted by the Mandeville residents and Greenpeace in 2022 where free nitrate testing of water samples was offered.
- 3.4 A pilot study of nitrate levels in private wells in the Cust and Eyreton areas was carried out in late 2019 and late 2020, by WDC for nitrate and a range of other chemical parameters. Carleton and Swannanoa were added to the study in 2021. Refer to Maps 1-4 for the definition of the Eyreton, Cust, Carleton and Swannanoa sampling areas.
- 3.5 The purpose of the private well study is to work towards implementing the Zone Implementation Programme Addendum (ZIPA) Recommendation 3.16, adopted by Council in December 2018. Recommendation 3.16 states 'That Environment Canterbury, Waimakariri District Council and Canterbury District Health Board work together to:
- a. Develop a programme for testing and reporting of water quality in private drinking water supply wells, and
 - b. Raise awareness of health impacts from high nitrates in drinking water.'
- 3.6 Cust (Map 1) and Eyreton (Map 2) were recommended as the two areas for the pilot study in 2019 due to previous high nitrate levels reported in Environment Canterbury monitoring wells and reports from private well owners. Nitrate levels had been reported to Council in 2018, by private well owners in the Eyreton area, that were close to the Maximum Acceptable Value (MAV) of 11.3 mg/L of nitrate-nitrogen as defined in the Drinking-water Standards for New Zealand (2022).
- 3.7 The sampling areas of Carleton (Map 3) and Swannanoa (Map 4) were added to the study in 2021. These areas were selected as areas that will be modelled by Environment Canterbury groundwater scientists in preparation for Plan Change 7 of the Canterbury Land and Water Regional Plan to potentially see the greatest future rises in nitrate-nitrogen levels within the Waimakariri Water Zone.



Map 1: Eyreton private well sampling area for groundwater within the Waimakariri Water Zone, as defined in the Zone Implementation Programme Addendum (ZIPA)



Map 2: Cust private well sampling area for groundwater within the Waimakariri Water Zone, as defined in the Zone Implementation Programme Addendum (ZIPA).



Map 3: Carleton private well sampling area for groundwater within the Waimakariri Water Zone, as defined in the Zone Implementation Programme Addendum (ZIPA).



Map 4: Swannanoa private well sampling area for groundwater within the Waimakariri Water Zone, as defined in the Zone Implementation Programme Addendum (ZIPA).

4. **ISSUES AND OPTIONS**

- 4.1. The nitrate concentrations for Cust and Eyreton wells, as sampled in the 2022 study do not meet the limit of a median of 5.65 mg/L nitrate-nitrogen in Plan Change 7 of the Land and Water Regional Plan for private water supply wells. The nitrate-nitrogen median measured for Cust was 7.05 mg/L, a slight decrease from 7.76 mg/L in 2019, 7.11 mg/L in 2020 and 7.76 mg/L in 2021 (see Figure 1). Eyreton wells sampled had a median of 6.27 mg/L, a decrease from 6.96 mg/L in the 2019 study and 6.98 mg/L in the 2021 study but higher than 5.03 mg/L in the 2020 study. The Eyreton median excludes a well that was already known to have a high nitrate level, to avoid sampling bias of results. Carlton wells sampled had a median of 1.33 mg/L which was a decrease from 3.78 mg/L in 2021, and the Swannanoa area median was 4.3 mg/L which was a decrease from 5.62 mg/L in 2021. Note that wells were selected based on a geographic spread over an area and for a range of well depths.

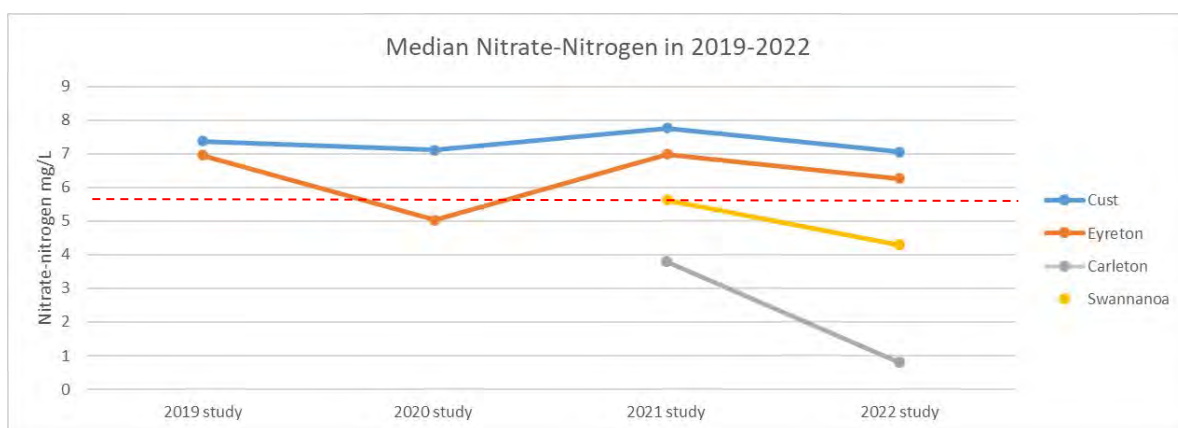


Figure 1: Median nitrate-nitrogen (mg/L) found in wells for the private well study 2019-2022 for Eyreton, Carleton, and Swannanoa. Red dotted indicates $\frac{1}{2}$ MAV for nitrate-nitrogen (5.65 mg/L). One well was excluded from the median calculation in Eyreton as high nitrate levels were already known to be present before the study.

- 4.2. No wells measured over the MAV of 11.3 mg/L for nitrate-nitrogen. It is likely that there are other private wells, not sampled in this study, that exceed the nitrate MAV in some wells in some wells in the sampling areas, however this proportion has not been estimated in this study. Environment Canterbury released in 2022 an updated risk map for nitrate concentrations in Canterbury Groundwater where Cust, Eyreton, Swannanoa and Carleton are within the 'moderate risk' area. About 10% of the shallow wells sampled in the 'Moderate Risk' area in the last 20 years were found to exceed the nitrate MAV, however specific nitrate MAV exceedances in certain areas cannot be predicted. Due to this risk of nitrate levels over the MAV in private wells, WDC, together with Environment Canterbury and Te Whatu Ora Community Public Health, will continue to raise awareness of the health impacts of nitrate, and the need for regular testing of well water.

Engagement with Private Well Supply Owners

- 4.3. WDC staff have collaborated with Environment Canterbury to produce a well testing advice booklet, which advises on testing of water, as well as mapping indicative areas where issues such as high nitrate and arsenic could be an issue for proposed new wells. This booklet is in the process of being updated to include information from the Water Services Act (2021) regarding the definitions of domestic self-supplier and water supplier. It is anticipated that an increased number of water suppliers will no longer be defined as domestic self-supplier (i.e. if a water supply is shared, or for commercial use), with duties under the Water Services Act (2021), such as to meet the Drinking Water Standards for New Zealand (2022).

Sample Collection

- 4.1. Although efforts were made to select private wells randomly based on geographic spread over the sampling areas and for a range of depths, there is likely to have been some selection bias of the wells. Some locations within the chosen sampling areas have reticulated water, and therefore were not included in the sampling area.
- 4.2. In total, 27 study participants were willing to participate and were able to take and return water samples in the study timeframe. This sample size is smaller than previous years (39 study participants in 2021). Reasons for a smaller sample size include participants requesting to be removed from the study, no response, or sample bottles not returned to the laboratory. It is noted that the value of the study is generally appreciated by the participants. This repetitive sampling of the same wells allows for better assessment of trends over time.

Trend Analysis

- 4.3. It is not possible to assess trends in nitrate concentration from only four data points for Eyreton and Cust wells, and two data points for Carleton and Swannanoa wells (see Figures 2-5). Nitrate leaching into groundwater is known to increase due to higher precipitation levels. Precipitation records for Rangiora and Kaiapoi show that 2022 was New Zealand's 8th wettest year on record. July 2022 recorded a total of 311 mm in parts of Canterbury. Cust wells appear to have more stability in nitrate concentrations over time than Eyreton wells. In 2022, Swannanoa wells were consistently around 5 mg/L nitrate-nitrogen. The outlier well from 2021 (16 mg/L) was 6.5 mg/L in the 2022 study.

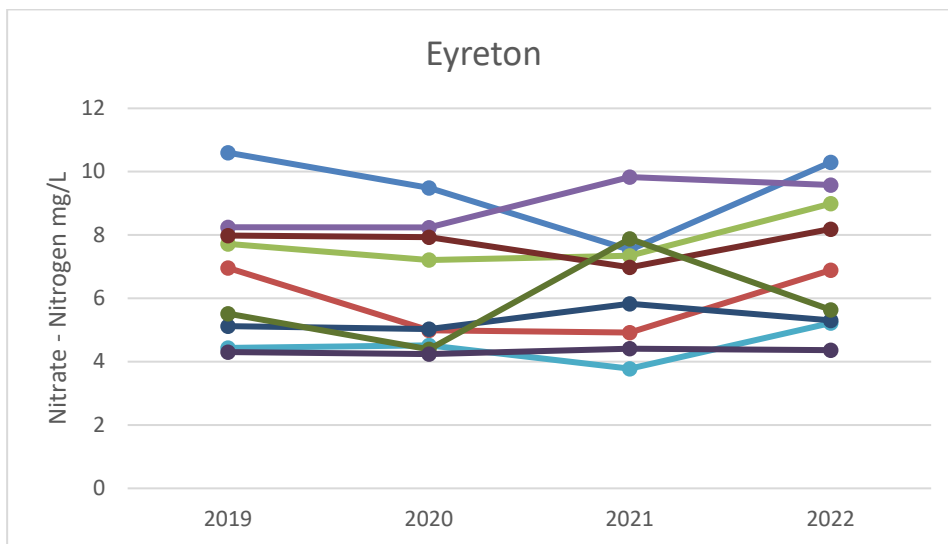


Figure 2: Eyreton well results for 2019-22. Each colour is an individual well in the study.

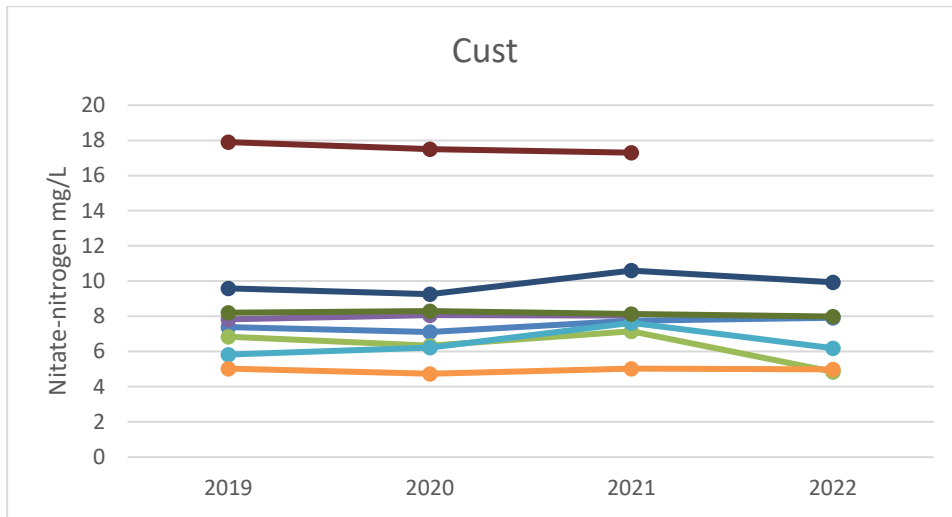


Figure 3: Cust well results for 2019 – 2022. Each colour is an individual well in the study.

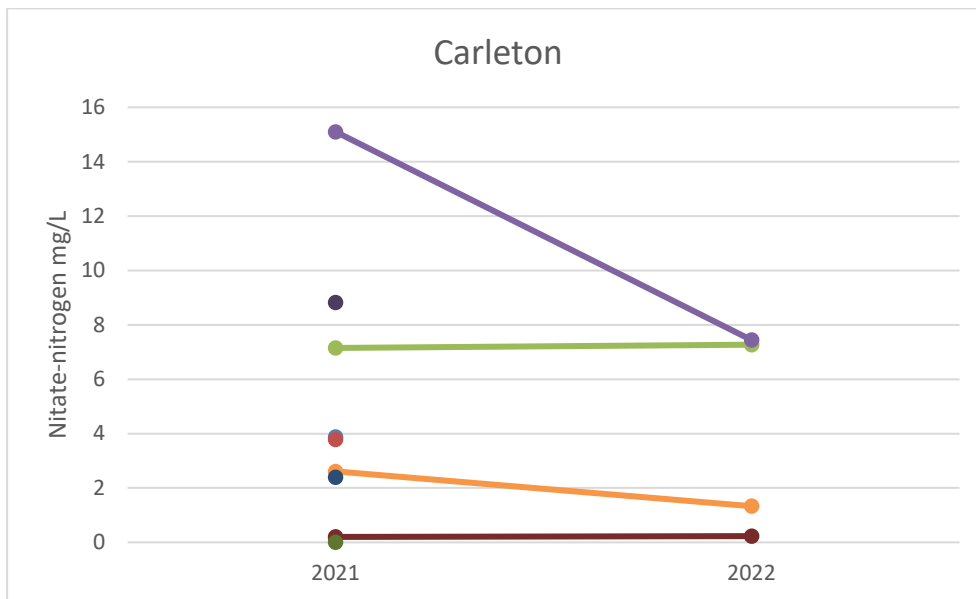


Figure 4: Carleton well results for 2021 – 2022. Each colour is an individual well in the study.

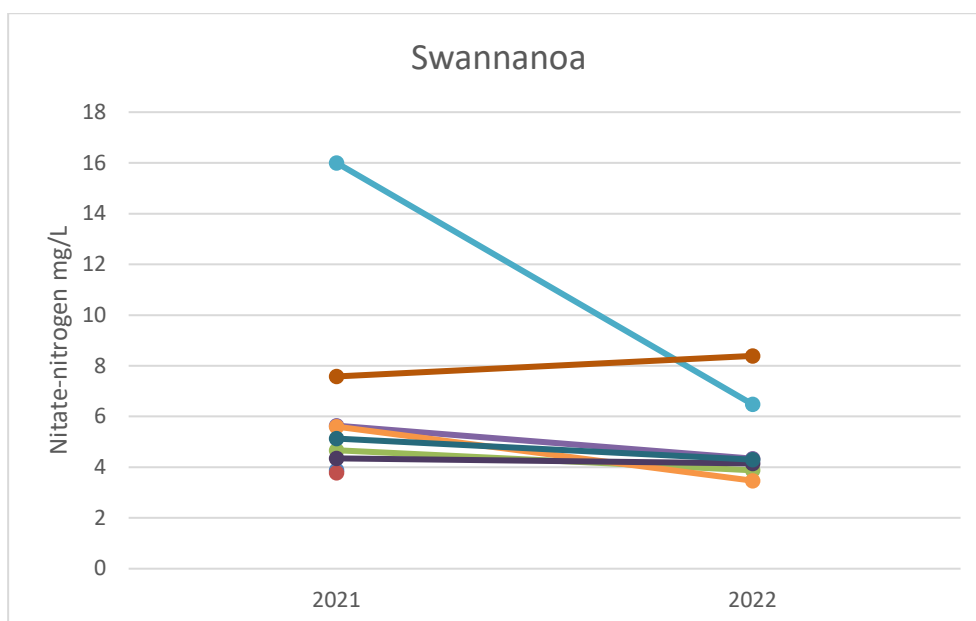


Figure 5: Swannanoa well results for 2021 – 2022. Each colour is an individual well in the study.

Well Depth

- 4.4. As with the 2019, 2020 and 2021 study results, the highest three nitrate-nitrogen concentrations in 2022 were found in relatively shallow wells (11.3 m, 13 m and 23.8 m deep). Increasing well depth was found to have a weak correlation with nitrate-nitrogen levels in 2022.

Next steps

- 4.5. Well owners who took part in the study have been contacted by WDC to communicate test results and advised to contact a water treatment specialist if found to be over a MAV in the Drinking Water Standards of New Zealand (2022).
- 4.6. It was intended that this study would test the sampling methodology for a potential wider and more extensive private well sampling programme of 180 wells (covering all 18 groundwater areas identified for Plan Change 7, with 10 wells from each area). Some refining of sampling methodology was able to be carried out in the 2020 and 2021 studies, however further refinement, and discussion with Environment Canterbury around cost-sharing is required. It is intended for WDC to continue a programme of 40 wells in 2023-24 in the four existing sampling areas. However, if cost-sharing could be obtained, WDC staff could recommend a roll-out of a more extensive programme (i.e., gradually scaling up to 180 wells) from 2023-24 onwards.
- 4.7. The Water Services Act (2021) has changed the role of Territorial Authorities to take on responsibility to support private well owners with supplies that are shared between households to be compliant with the Drinking Water Standards for New Zealand (i.e any supply that is not a domestic self-supply). Individual water supplies (i.e. domestic self-supplies), remain the responsibility of the landowner under the Water Services Act (2021), and are not required to meet the Drinking Water Standards for New Zealand.
- 4.8. Waimakariri District Council is working together with other organisations, such as Environment Canterbury, Dairy NZ, and Waimakariri Irrigation Ltd to collate existing District groundwater data in a project led by Waimakariri Landcare Trust (via Aqualinc Ltd). This project intends to give a wider picture of groundwater quality, including areas not covered by the annual WDC private well study.

Implications for Community Wellbeing

- 4.9. There are implications for community wellbeing by the issues and options that are the subject matter of this report, such as providing guidance on the current and future safety of private drinking well supplies in the Waimakariri District.
- 4.10. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are likely to be affected by or have an interest in the subject matter of this report. This study helps enable the vision of Te Mana o Te Wai – prioritising the health of groundwater as a priority.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report, such as resident associations for the sampling areas.

5.3. Wider Community

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report, unless they are supplied water from a private well.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are no financial implications of the decisions sought by this report.

This budget is an existing budget (as part of the Zone Implementation Programme Addendum budget) included in the Annual Plan.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts. The management and safe use of groundwater will sustain rural communities into the future.

6.3. Risk Management

There are no risks arising from the adoption/implementation of the recommendations in this report.

6.3 Health and Safety

There are no health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

Health Act 1956 and Water Services (Drinking Water Standards for New Zealand) Regulations 2022 set the Maximum Allowable Value (MAV) for nitrate-nitrogen in drinking water at 11.3 mg/L.

7.3. Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

7.3.1. There is a healthy and sustainable environment for all.

7.3.2. Cultural values relating to water are acknowledged and respected.

7.3.3. Harm to the environment from the spread of contaminants into ground water and surface water is minimised.

7.4. Authorising Delegations

No delegations apply to this report, as this report is for information only.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO: WAT-10-14 / 230623094211

REPORT TO: UTILITIES AND ROADING COMMITTEE


DATE OF MEETING: 18 July 2023

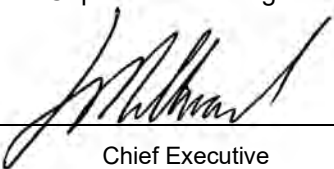
AUTHOR(S): Sophie Allen – Water Environment Advisor

SUBJECT: Zone Implementation Programme Addendum Capital Works Programme – 2023-24

ENDORSED BY:

(for Reports to Council, Committees or Boards)


General Manager


Chief Executive

1. SUMMARY

- 1.1 This report details the proposed Waimakariri District Council (WDC) capital works programme for 2023-24 as developed from the Zone Implementation Programme Addendum (ZIPA), including;
- i. Fish passage improvements on the North Brook tributary at Cotter Lane in Rangiora.
 - ii. Biodiversity and amenity improvements for the South Brook at Townsend Fields, Rangiora.
 - iii. Terrestrial planting along the Kaiapoi River.
 - iv. Improvements to inanga (whitebait) spawning areas located on land owned by Waimakariri District Council along the McIntosh Drain, Benzies Creek (a tributary of Saltwater Creek, and Courtenay Stream.
 - v. Native planting and installation of walkway culverts for a recreational esplanade strip along the North Brook, Rangiora (North Brook Trail project).
 - vi. Riparian planting at Taranaki Stream Reserve, Waikuku Beach.
- 1.2 There is a capital expenditure allocation of \$100,000 per annum from 2021-31 in the Long Term Plan, from the Zone Implementation Programme Addendum (ZIPA) budget from the general rate.
- 1.3 Capital expenditure ZIPA projects have been scoped and presented to the Land and Water Committee, subsequently the Utilities and Roading Committee from 2023-24, ideally prior to the commencement of each financial year.

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

- (a) **Receives** report No. 230623094211.
- (b) **Approves** the proposed 2023-24 Waimakariri District Council capital expenditure work programme, based on the Zone Implementation Programme Addendum (ZIPA) recommendations.
- (c) **Circulates** this report to Council, Community Boards, WDC-Rūnanga liaison meeting and the Waimakariri Water Zone Committee for their information.

3. BACKGROUND

- 3.1 A report was presented on 29 January 2019 to Council, seeking a decision on the role of WDC in ZIPA implementation, staff resourcing, and funding of projects (refer to TRIM 181217148924).
- 3.2 A total of \$100,000 per annum for capital works was approved by Council for 2019-21 on 28 May 2019 (refer to TRIM 190501061992).
- 3.3 A ZIPA role and budget allocation review was carried out in 2021 for the Long Term Plan 2021-31, which was presented to the Land and Water Committee at the 20 July 2021 meeting.

4. ISSUES AND OPTIONS

- 4.1. \$100,000 is allocated to capital expenditure (CAPEX) projects in the 2021-31 Long Term Plan (see Table 1),

Table 1: Summary of capital expenditure proposed for 2023-24 for WDC ZIPA works

| CAPEX project | ZIPA recommendation | Budgeted amount |
|--|----------------------------|---|
| Fish passage improvements – Rock ramp on the Northbrook tributary at Cotter Lane in Rangiora | 1.8 | \$10,000 |
| Biodiversity and amenity improvements in Waimakariri River tributaries – South Brook Townsend Fields project | 1.26 | \$10,000 (Environment Canterbury providing an additional 500 native plants and plant guards) |
| Terrestrial riparian plantings along the Kaiapoi River | 1.27 | \$10,000 (Environment Canterbury providing an additional 500 native plants and plant guards) |

| | | |
|---|------|--|
| McIntosh Drain inanga spawning habitat improvements – bank rebattering and planting to the north of the newly-installed pump station. | 2.11 | \$20,000 (An additional \$5,575 provided by Environment Canterbury) |
| Courtenay Stream inanga spawning area improvements - willow regrowth removal | 2.11 | \$5,000 |
| Benzies Stream - inanga spawning area improvements - willow poisoning and raspberry removal | 2.11 | \$10,000 |
| Taranaki Stream Reserve – riparian planting | 1.21 | \$5,000 |
| Northbrook Trail culvert installation and planting | 1.26 | \$30,000 |
| TOTAL | | \$100,000 |

Fish Passage

- 4.2. A concrete apron structure on a tributary of the North Brook (corner of Cotter Lane and Northbrook Road) is proposed to have a rock ramp installed below it (placement of loose cobbles and boulders) which will create a pooled area above the concrete apron where there is currently a shallow, fast-flowing drop (see Figure 1). This concrete apron is believed to prevent some migratory species such as Inanga from being able to move upstream, based on survey data from Aquatic Ecology Ltd and spotlighting data from WDC staff. An example of a constructed rock ramp is shown in Figure 2.



Figure 1: Likely partial fish passage barrier on a North Brook tributary – Corner of Cotter Lane and Northbrook Road



Figure 2: A rock ramp constructed to enable fish passage through a culvert by creating a pool downstream. (Photo credit: NIWA)

Biodiversity and amenity – South Brook Townsend Fields

- 4.3. WDC staff have been working in this area since 2019 on improving a WDC-owned esplanade reserve on the South Brook beside the Townsend Fields Stormwater Management Area (see Figure 3). It is recommended to continue planting with eco-sourced indigenous plants directly upstream of current plantings, and to install signage that informs users that the area is WDC esplanade reserve with public access. This work

will continue to be led by the WDC Greenspace Team and rangers in 2023-24. Environment Canterbury has donated 500 native plant seedlings and plant guards to this site, which is in addition to the WDC budget allocation.

- 4.4. The surrounding area is undergoing development of urban housing, including the placement of a nearby retirement village. The area on the south side was cleared of willows in August 2019, with some of the areas planted with native plants in 2019-21. An area on the northern bank was recently cleared of exotic trees, and will be planted in natives this winter. The planting areas are suitable terrain for community planting events to be held.
- 4.5. Budget for plant maintenance, such as weeding around plants and weed control (e.g. blackberry) is available under the ZIPA operational budget for 2023-24.



Figure 3: Existing native planting along the South Brook beside the Townsend Fields Stormwater Management Area (April 2022)

Terrestrial plantings on the Kaiapoi River

- 4.6. The Greenspace team has produced a Kaiapoi River spatial planting plan, which incorporates both terrestrial and aquatic tidal plantings. This plan takes into consideration Kaiapoi town planning, Kaiapoi Regeneration Zone planning, and Environment Canterbury priorities.
- 4.7. \$10,000 is proposed be allocated in the 2023-24 year to Kaiapoi River riparian planting. Environment Canterbury has also donated 500 native plant seedlings and plant guards to this site, which is in addition to the WDC allocated budget.
- 4.8. WDC staff and Environment Canterbury (as landowner) have been progressively planting native species along the riparian margins and also intertidal flats of the Kaiapoi River since the Canterbury earthquake sequence as part of earthquake recovery, as well as for biodiversity and amenity improvements. The intertidal planting been completed by WDC staff, with existing plantings predicted to spread in size and distribution over time. Therefore there is only requirement for further terrestrial plantings, with no further intertidal plantings.

McIntosh Drain, Courtenay Stream, Benzies Creek - Inanga spawning habitat improvements

- 4.9. There are significant inanga spawning sites located on WDC land, such as at Taranaki Stream, Courtenay Stream and McIntosh Drain. These sites have received ZIPA in previous years for inanga habitat improvements to increase spawning success, as recommended by Aquatic Ecology Ltd. Benzies Creek (a tributary of Saltwater Creek) and Courtenay Stream works for 2023-24 are on Waka Kōtahi and private land respectively, however are also proposed for ZIPA funding as they will give the best ecological outcomes for financial input.
- 4.10. Aquatic Ecology Ltd (AEL) reviewed inanga spawning sites and quality of habitat in the Waimakariri District in reports from 2017, 2019, 2021 and 2023, with recommendations for management.
- 4.11. Rebattering and native planting works are proposed to be carried out, following recommendations from AEL, at McIntosh Drain (Figure 4) directly upstream of a newly-commissioned pump station. There is a proposal under discussion to widen the length of McIntosh Drain from Beach Road downstream to the pump station. These inanga spawning habitat works would likely be consistent with any further drain widening works.



Figure 4: The location of the proposed bank re-grading, followed by native planting on the McIntosh Drain, north of a newly-commissioned pump station.

- 4.12. Co-funding for the McIntosh Drain project has been secured from the Environment Canterbury Regional Fish Habitat Fund for \$5,575 (excluding GST) towards the cost of bank regrading to at least a 1:3 ratio, and planting of native inanga spawning grasses (such as *Carex virgata* and *Cyperus ustulatus*). This is in addition to the WDC budget of \$20,000.

- 4.13. Initially bank regrading and planting was proposed from ZIPA budget in 2019-20, however was paused due to unconfirmed plans for the area as part of the Kaiapoi flood improvements project i.e. 'Shovel Ready' project for the McIntosh Drain. With finalised Shovel Ready plans excluding re-battering and planting of the bank to the north of the pump station, this is now proposed again to be provided from ZIPA budget in 2023-24. The Shovel Ready project has re-battered and planted natives along the inlet to the pump station, as required by resource consent conditions.
- 4.14. Courtenay Stream has willow re-growth on the true right bank above the floodgate. AEL has recommended that this is removed to prevent shading of inanga spawning habitat before the willows become large. This land is in private ownership. The owner has confirmed permission that willow removal works may be carried out. WDC Rangers will likely complete this work with removal of the willow tops and poisoning of the stumps *in situ* this spring/summer.
- 4.15. Benzies Stream (a tributary of Saltwater Creek) has willows along the inanga spawning reach. AEL has recommended that these are removed to prevent shading of inanga spawning habitat. This land is owned by Waka Kōtahi, who will be approached for permission for the willow removal works to be carried out by WDC. The works are setback from the road corridor (see Figure 5). WDC Rangers will likely complete this work by drilling holes into the trunks for herbicide application this spring/summer, with the willows left *in situ* to die. There is also some blackberry included for removal and/or poisoning with herbicide.



Figure 5: Location of the willows at the Benzies Stream inanga spawning area for removal or poisoning *in situ*.

Taranaki Stream Reserve riparian planting

- 4.16. Taranaki Stream Reserve has been progressively planted with natives along the true left above the floodgate by Greenspace and the local reserve committee members. A \$5,000 budget is proposed in addition to the annual \$2,000 Greenspace budget to assist with continued planting in this area.

Northbrook Trail culvert installation and planting

- 4.17. The Spark family and Waimakariri Landcare Trust have initiated a project for a trail along a section of the North Brook, which was endorsed by the WDC Land and Water Committee on 16 November 2021 for support (TRIM211027173045). The first step to create the trail requires installation of 3 or 4 small culverts over drains that feed into the North Brook. Legal access for the general public has not yet been finalised as an esplanade strip, however would be required by WDC staff as a condition for release of the \$30,000 budget for culvert installation. WDC staff have proposed to design and install the culverts under consent CRC195065 for Maintenance and Minor Works in Waterways.
- 4.18. Native riparian planting commenced in 2022 along the Northbrook Trail. Any remaining funds after culvert installation would be allocated to the existing native riparian planting programme managed by the Waimakariri Landcare Trust.

Alignment with the Waimakariri Water Zone Committee Action Plan 2021-24

- 4.19. The Capex projects proposed in this report align with the WWZC Action Plan goals of:
- 4.19.1. Increased indigenous biodiversity in the zone.
 - 4.19.2. Protection and enhancement of recreation in the zone.
 - 4.19.3. Improved mahinga kai within the Waimakariri Water Zone.

Implications for Community Wellbeing

- 4.20. There are implications on community wellbeing by the issues and options that are the subject matter of this report. The ZIPA recommendations and budget allocations are to meet targets in the Canterbury Water Management Strategy for recreation and amenity, biodiversity and mahinga kai provision for example.
- 4.21. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report. Ngāi Tūāhuriri representatives of the Waimakariri Water Zone Committee will be circulated this report, and it will be circulated at a WDC- Rūnanga monthly meeting.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

- 5.2.1. Waimakariri Water Zone Committee – Updates on the progress of ZIPA projects are presented to the Waimakariri Water Zone Committee for comment and discussion.

5.3. **Wider Community**

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report. The wider community was consulted on the role of WDC and budget allocation for the ZIPA in the draft Annual Plan public consultation in March-April 2019.

6. **OTHER IMPLICATIONS AND RISK MANAGEMENT**

6.1. **Financial Implications**

There are no financial implications of the decisions sought by this report. Budget has already been approved in the Long Term Plan for 2021-31. This report is for more detailed specifics of the proposed projects for 2023-24.

6.2. **Sustainability and Climate Change Impacts**

The recommendations in this report do have sustainability and/or climate change impacts. The projects for planting of trees will help to sequester carbon. Fish passage remediation will aid the sustainable future of local fish populations that are migratory species.

6.3 **Risk Management**

There are no risks arising from the adoption/implementation of the recommendations in this report.

ZIPA capex spend is reported on quarterly in a summary capital expenditure report to the Audit and Risk Committee. This provides governance with information of any risk of an under or overspend.

Health and Safety

There are no health and safety risks arising from the adoption/implementation of the recommendations in this report.

ZIPA capital expenditure project implementation will follow established health and safety processes. There are no new health and safety risks or hazards that have been identified.

7. **CONTEXT**

7.1. **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. **Authorising Legislation**

Resource Management Act (1991). All capital expenditure works requiring consent are anticipated to be covered by the 'Maintenance and Minor Works in Waterways' global consent (CRC195065, CRC195066, CRC195067) that WDC has been granted from Environment Canterbury, and the Waimakariri District Council consent RC19143 for works beside waterways.

7.3. **Consistency with Community Outcomes**

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

7.4. **Authorising Delegations**

The Utilities and Roading Committee hold the delegation for the allocation of the ZIPA budget.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO: WAT-10-14 / 230817125849

REPORT TO: UTILITIES AND ROADING COMMITTEE

DATE OF MEETING: 19 September 2023

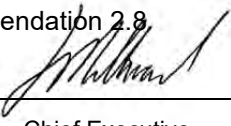
AUTHOR(S): Sophie Allen – Water Environment Advisor

SUBJECT: Community biodiversity funding – ZIPA Recommendation 2.8

ENDORSED BY:
(for Reports to Council,
Committees or Boards)



Department Manager



Chief Executive

1. SUMMARY

- 1.1. This report seeks approval for the allocation of the \$20,000 Zone Implementation Programme Addendum (ZIPA) budget to the Waimakariri Biodiversity Trust.
- 1.2. \$20,000 per year is earmarked for community group support to carry out biodiversity work under ZIPA recommendation 2.8.
- 1.3. This report set out the criteria for assessment and recommends the allocation of the \$20,000 in 2023-24 to the Waimakariri Biodiversity Trust, with a review for the allocation of funding proposed in 2024-25 to be a contestable fund, and with additional alignment to the draft Waimakariri District Council Natural Environment Strategy when finalised.
- 1.4. The criteria used to prioritise allocation of the funding are;
 - 1.4.1. The community organisation must be a legal entity, such as an incorporated society or charitable trust.
 - 1.4.2. The organisational vision and proposed projects must align with the Waimakariri Water Zone Committee Action Plan 2021-24 (Attachment i)
 - 1.4.3. The community organisation must have the ability to coordinate an overarching vision and discussion opportunities for the Waimakariri Community.
 - 1.4.4. The community organisation must be able to provide community engagement support for WDC-endorsed projects.
 - 1.4.5. The community organisation must provide community education and advice to Waimakariri District landowners for indigenous biodiversity projects.
- 1.5. The funding is proposed as organisational support for the Waimakariri Biodiversity Trust in 2023-24, specifically the following deliverables:
 - 1.5.1. Wages and expenses of a part-time coordinator for the Trust.
 - 1.5.2. Support for indigenous biodiversity projects in the district.
 - 1.5.3. Mapping and detailing current biodiversity initiatives in the region.
 - 1.5.4. Event coordination, including the preparation of communication material, and communication with the various biodiversity groups in the Waimakariri District.
 - 1.5.5. Website creation, hosting and upgrades to communicate the vision and projects of the Trust.

- 1.5.6. Response to requests from private landowners for advice about, and help with, indigenous biodiversity, planting and restoration projects.
 - 1.5.7. Provision of third-party expert ecological and/or hydrological advice to support project planning.
- 1.6. An open (contestable) funding round is recommended for the allocation of the \$20,000 per annum from 2024-25, possibly administered together with the WDC Greenspace Biodiversity Fund (for landowners with significant natural areas), which could consider multi-year funding options.

Attachments:

- i. Waimakariri Water Zone Committee Action Plan 2021-2024 (TRIM 211015167102)

2. **RECOMMENDATION**

THAT the Utilities and Roothing Committee

- (a) **Receives** Report No 230817125849.
- (b) **Approves** the allocation of \$20,000 to the Waimakariri Biodiversity Trust for operational expenses from the existing 2023-24 Zone Implementation Programme Addendum (ZIPA) Opex budget.
- (c) **Supports** creation of an open (contestable) funding round for 2024-25 and future budget allocations for ZIPA recommendation 2.8, if Waimakariri District Council staff resourcing is sufficient to administer an open fund.
- (d) **Circulates** this report to the Waimakariri Water Zone Committee and the WDC-Rūnanga Liaison meeting for information.

3. **BACKGROUND**

- 3.1. Waimakariri District Council approved the Zone Implementation Programme Addendum (ZIPA), developed by the Waimakariri Water Zone Committee in December 2018 (181115135055[v2]).
- 3.2. Recommendation 2.8 of the Zone Implementation Programme Addendum (ZIPA), states:

That Environment Canterbury and the Waimakariri District Council work with community groups to address indigenous biodiversity protection and enhancement by means such as:

 - *Provision of administrative support;*
 - *Provision of financial assistance;*
 - *Identification of funding sources;*
 - *Provision of technical advice; and*
 - *Endorsement of projects.*
- 3.3. An allocation of \$20,000 per year has been earmarked to this recommendation in the Waimakariri District Council Long Term Plan 2021-31 (TRIM 210401054372). This allocation of funding is anticipated to strengthen community-led biodiversity work in the District in the future.
- 3.4. The Waimakariri Biodiversity Trust received the \$20,000 allocation in 2021-22. The budget was not allocated in 2022-23.

- 3.5. The proposal for a Waimakariri Biodiversity Trust was raised by the Biodiversity Working Group of the Waimakariri Water Zone Committee (WWZC). Judith Roper-Lindsay, a former community member of the WWZC, offered to establish the Trust and sought expressions of interest from the public to be trustees.
- 3.6. The Waimakariri Biodiversity Trust received registration as a charitable trust in March 2022 with the following trustees as officers of the Trust:
- *Judith Roper-Lindsay of Ashley, retired ecologist;*
 - *Simon Rutherford of Kaiapoi, business owner and weaver;*
 - *Sandra Stewart of Summerhill, Kaiapoi – Tuahiwi Community Board member;*
 - *Peter Courtney of Rangiora, a secondary school teacher;*
 - *Fiona van Petegem of Ashley, an engineer;*
 - *Matt Lester of Waikuku Beach, a landscape architect; and*
 - *Felicity Wolfe of Rangiora, a journalist and communications specialist.*
- 3.7. The draft Waimakariri Biodiversity Trust deed states:

*The **VISION** of the Trust is to see vibrant, healthy, indigenous ecosystems valued across the Waimakariri District.*

*The **PURPOSE** of the Trust is to provide the necessary information, education and resources to enable the community to protect, restore, create and sustainably manage indigenous biodiversity in the Waimakariri District. To achieve this purpose the trustees will:*

- i. value the principles of mātauranga Māori and of ecological science in implementing a Ki uta ki tai – Mountains to Sea approach to indigenous biodiversity protection and restoration across the Waimakariri District*
- ii. work collaboratively and with honesty, integrity and professionalism;*
- iii. bring a positive message and approach to inspire and encourage;*
- iv. respect cultural diversity and the principles of the Treaty of Waitangi;*
- v. in the course of the Trust’s activities commit to limiting any adverse environmental impact.*
- vi. develop guidelines for the operation of the Trust, against which all Trustee activity is measured. These are to be reviewed annually or as required and updated, if necessary.*

Progress to-date

- 3.8. The Trust has recruited a coordinator, created a website, and commenced operations from the \$20,000 budget received in 2021-22 among other funding sources. The ZIPA budget received by WDC in 2021-22 has been key seed funding for establishment of the trust in its infancy. Supported by funding from the Waimakariri Water Zone Committee’s Action Plan budget, the Trust has initiated a wetland restoration project with Daiken New Zealand at Sefton. The co-ordinator is currently working with three private landowners to develop project proposals to a level for which funding can be sought. In addition the coordinator is working with Waimakariri Irrigation Ltd to identify ways in which the Trust can support their biodiversity aims.
- 3.9. The Trust has worked closely with Council staff to present two series of community talks on biodiversity. In 2022 a “Winter Series” was held in Rangiora Town Hall with approximately 50 people attending each talk. This year talks are being held across the District. In July three speakers presented information about indigenous biodiversity in the rural area (West Eyreton). In August the event was in Oxford and in September will be in

Waikuku Beach. These are opportunities to raise awareness in the wider community about local biodiversity.

4. **ISSUES AND OPTIONS**

Criteria for biodiversity funding within the District

- 4.1. There were five key criteria whereby the Waimakariri Biodiversity Trust was assessed for funding from the ZIPA Recommendation 2.8 budget:
- 4.1.1. The community organisation must be a legal entity, such as an incorporated society or charitable trust.
 - 4.1.2. The organisational vision and proposed projects must align with the Waimakariri Water Zone Committee Action Plan 2021-24 (Attachment i)
 - 4.1.3. The ability to coordinate an overarching biodiversity vision and discussion opportunities for the Waimakariri Community.
 - 4.1.4. The ability to provide community engagement support for WDC-endorsed projects.
 - 4.1.5. The ability to provide community education and advice to Waimakariri District landowners for indigenous biodiversity projects.
- 4.2. The Waimakariri Biodiversity Trust has been incorporated as a charitable trust in March 2022, and therefore is a legal entity.
- 4.3. Funding of the Waimakariri Biodiversity Trust aligns with the Zone Committee's Action Plan 2021-2024, thereby meeting the second funding criterion. Specifically, the target for increased indigenous biodiversity in the Zone is met by:
- *Facilitating the establishment of a Waimakariri Biodiversity Trust and provide ongoing support to this Trust;*
 - *Provide ongoing support and encouragement to groups in the zone advancing indigenous biodiversity values.*
- 4.4. The Waimakariri Biodiversity Trust is well-placed to coordinate biodiversity networking opportunities within the district, meeting the third criterion. Best-practice for events, such forums, is to be community-led, due to increased durability and ability to be held at an 'arms-length' from the Council.
- 4.5. The Waimakariri Biodiversity Trust is well-placed to provide community engagement support for WDC-endorsed projects, as well as education and advice for indigenous biodiversity projects- meeting the fourth and fifth criteria for funding. It should be noted that this is not a unique role, i.e. there are other trusts such as the Waimakariri Landcare Trust, Landcare Trust and other place-based trusts that are also be well-placed to provide such a service in the District. As the Waimakariri Biodiversity Trust is primarily focused on indigenous biodiversity it is deemed to be the best organisation to meet the criteria, whereas the Landcare Trust and Waimakariri Landcare Trust have additional aims centred around support for farming communities.

Proposed funding deliverables of the Waimakariri Biodiversity Trust

- 4.6. It is proposed that the \$20,000 of funding is allocated to the following deliverables, which are proposed to be expended by the Waimakariri Biodiversity Trust by 30 June 2024:

- 4.6.1. Recruitment and wages of a part-time coordinator for the Trust. A part-time coordinator has been contracted by the Trust since November 2022. The coordinator is responsible for day-to-day operational activities such as meeting landowners, liaising with schools and other organisations and administering the Trust's website and communications.
- 4.6.2. Support for indigenous biodiversity projects in the district.
- 4.6.3. Communications planning to visually and verbally communicate the vision of the trust.
- 4.6.4. Continue to map and detail current indigenous biodiversity initiatives in the region. The Trust has worked with WDC and ECan staff to prepare a map which is accessible through the Trust website.
- 4.6.5. Event coordination, including the preparation of communication material, and communication with the various biodiversity groups in the Waimakariri District.
- 4.6.6. Website creation, hosting and web designer fees. The Trust now has a website as well as a presence on numerous social media platforms.
- 4.6.7. Response to requests from private landowners for advice about, and help with, indigenous biodiversity, planting and restoration projects.

Next Steps

- 4.7. Accountability reporting of outcomes achieved are proposed be submitted for sixth monthly reporting from the Waimakariri Biodiversity Trust to WDC Biodiversity staff. This accountability reporting will then be included in reporting to a Utilities and Roading Committee meeting, potentially via a report from WDC Biodiversity staff and/or a deputation by the Waimakariri Biodiversity Trust. Reporting will be also circulated to the Waimakariri Water Zone Committee.

Natural Environment Strategy

- 4.8. A current draft of the WDC Natural Environment Strategy (version as of September 2023), proposes operational funding for the Waimakariri Biodiversity Trust from 2024-25 for three years. The shift to a contestable fund for the ZIPA Recommendation 2.8 budget from 2024-25 will ensure that there will not be a double-up of seed funding. The Natural Environment Strategy is intended to be sent out for a first round of consultation in November 2023, so it should be noted that this budget allocation may change. Criteria for allocation of the ZIPA Recommendation 2.8 budget could be expanded from 2024-25 to include deliverables from the Natural Environment Strategy as well as the Waimakariri Water Zone Committee Action Plan.

Contestable fund creation

- 4.9. An open (i.e. contestable) fund is recommended be created from 2024-25 onwards for allocation of the ZIPA 2.8 budget (\$20,000 per year) for greater transparency with existing community and environmental groups within the District. The creation of a contestable fund is feasible for 2024-2025 onwards, particular if administered together with an existing fund such as the Biodiversity Fund for Significant Natural Areas. The budget would remain tagged for organisational support, rather than specific projects. Contestable funds usually have a high staff resource cost to administer. To reduce administration and for better financial stability for organisations, multi-year funding should be considered (for example the allocation of budget for three years, 2024-27).

Implications for Community Wellbeing

There are implications on community wellbeing by the issues and options that are the subject matter of this report. Community wellbeing will be enhanced by well-supported organisations working to improve the indigenous biodiversity in our District.

- 4.10. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report. It will be circulated for information at a Rūnanga-WDC Liaison meeting.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report, such as biodiversity organisations within the District who are seeking operational funding.

5.3. Wider Community

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are no financial implications of the decisions sought by this report. The budget is existing budget allocated in the Long Term Plan 2021-31. This report is regarding allocation of the budget to a community group.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts. Successful allocation of the ZIPA Recommendation 2.8 budget to a community biodiversity group could achieve sustainability and/or climate change mitigation and adaptation outcomes.

6.3 Risk Management

There are minor risks arising from the adoption/implementation of the recommendations in this report that proposed outcomes will not be achieved by the recommended community group. This is mitigated by requiring accountability reporting of the Waimakariri Biodiversity Trust that enables a review of effectiveness.

6.3 Health and Safety

There are no health and safety risks for the Council arising from the adoption/implementation of the recommendations in this report. The health and safety of the coordinator role at the Waimakariri Biodiversity Trust would fall with the Trust if an employee, as defined as a Person Conducting a Business or Undertaking (PCBU), or with a contractor for the trust.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

7.2.1. No applicable legislation.

7.3. Consistency with Community Outcomes

7.3.1. The Council's community outcomes are relevant to the actions arising from recommendations in this report.

7.4. **Authorising Delegations**

7.4.1. The Utilities and Roading Committee holds the delegation for the allocation of the Zone Implementation Programme Addendum (ZIPA) budget.

Waimakariri Water Zone Committee

Action Plan July 2021–June 2024



Image – Ashley River / Rakahuri

This summary highlights the key actions agreed by the zone committee for the next three years.

For more detail on the zone committee and plan, visit ecan.govt.nz/waimakariri-water-zone.

Our purpose:

To uphold the mana of the freshwater bodies within the Waimakariri Water Zone by facilitating enduring land and water management solutions that give effect to the Canterbury Water Management Strategy (CWMS) vision, principles and targets in our zone.

The CWMS aims to enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework.

Our functions:

Community engagement – continuing an active programme of engaging with communities on freshwater management matters and facilitating the provision of advice to councils (relevant territorial authorities and Environment Canterbury) and others (e.g. private sector) contributing to freshwater management.

Enhancing delivery capability and coalition of the willing – working with stakeholders across all sectors to extend the resources available to implement the CWMS, including securing additional resources and seeking opportunities to promote, support, leverage and expand catchment-based initiatives that advance CWMS implementation.

Progress reporting – annual progress reporting to councils on progress towards delivery of the zone-specific priorities and CWMS target areas identified in the Zone Committee Action Plan.

Our Councils' priorities for our zone committee are:

Waimakariri District Council

Ecosystem Health and Biodiversity

- To maintain or improve existing high-quality indigenous dryland ecosystems in intermontane basins and on the plains;
- Reduction of threatened or at-risk status of indigenous fish species compared with 2020;
- All coastal lagoons, hāpua and estuaries show improvement in key ecosystem health indicators compared with 2010.

Drinking Water

- Implementation programmes in place for each zone to achieve catchment load limits;
- Achieve nutrient efficiency targets for the zone on all new irrigated land and 80% of other land in major rural land uses (pasture, major arable, and major horticulture crops, and have 100% of rural properties working towards these targets (and for properties within urban boundaries that apply nutrients over significant areas).

Recreation and Amenity Opportunities

- Cyanobacterial risk for priority contact recreation sites in Canterbury rivers and lakes is understood and managed for public health;
- Manage water demand through meeting requirements under the Land & Water Regional Plan and continue regular community education/behaviour change campaigns on water use management and conservation.

Environment Canterbury

Kaitiakitanga Wāhi Taonga and mahinga kai targets

Grow support and resources to achieve the goal of five mahinga kai projects.

Ecosystem health and biodiversity targets

- Increased riparian management to protect aquatic ecosystems;
- Reducing the number of fish barriers;
- Protection and enhancement of wetlands.

Recreation and amenity targets

Achieving the 2025 target to restore priority freshwater recreation opportunities in each zone.



This taniko (woven pattern for clothing) Pātikitiki, represents lashing or binding together. The smaller diamonds represent pātiki (flounder). The Aramoana are white chevron shaped spaces representing the ocean waves. Together they represent the sustainment of our waters and the binding organisations that protect them. Pātiki is also the symbol for abundance.

– Ariki Creative

Waimakariri Water Zone Committee

Action Plan 2021–2024

Improved monitoring of groundwater and surface water in the zone

To encourage community understanding and awareness of monitoring and clarify future monitoring requirements in the zone by:

- Facilitating collaboration to develop a wider monitoring network in the zone;
- Encouraging more monitoring by catchment and landcare groups.

We will measure this by:

- Establishing a working group to bring together relevant organisations to review existing freshwater monitoring in the zone and address future monitoring requirements across the zone;
- Promoting the benefits of monitoring and establish options for the community to be involved in monitoring;
- Working with ECan and WDC to ensure monitoring results are accessible and understandable to the community;
- Facilitate catchment and landcare groups and the wider community working together with Councils to expand the freshwater monitoring in the Waimakariri and share information.

Increased indigenous biodiversity in the zone

To protect and improve the indigenous biodiversity, habitat or ecosystems in the zone through:

- Managing and eliminating plant and animal pest species;
- Assisting all landowners and managers to integrate indigenous biodiversity management into the wider aspects of land and water (catchment) management.

We will measure this by:

- Facilitating the establishment of a Waimakariri Biodiversity Trust and provide ongoing support to this Trust;
- Provide ongoing support and encouragement to groups in the zone advancing indigenous biodiversity values;
- Encourage catchment and landcare groups to protect, enhance and create more indigenous biodiversity habitat on properties;
- Promoting greater community understanding about biodiversity, and wetlands, and the benefits of their protection and enhancement.

Promoting the natural braided character and increased flow of the Ashley River/Rakahuri

To protect the braided river values associated with the Ashley River/Rakahuri, ki uta ki tai, by:

- Promoting an improved community understanding of land and water use impacts on braided river character and the lower catchment ecosystems;
- Working to make the Ashley River/Rakahuri safe for contact recreation, with improved river habitat, fish passage and customary use, and flows that support natural coastal processes.

We will measure this by:

- Encouraging the improved understanding of landowners and wider community of climate change impacts on the Ashley River/Rakahuri;
- Encouraging landowners and agencies to protect the landscape and indigenous biodiversity values in the upper catchment;
- Supporting weed control in the upper and middle sections of the catchment;
- Supporting an investigation into existing consents and water use in the Ashley River/Rakahuri catchment;
- Encouraging landowner and agency efforts to improve the habitat health of lowland spring-fed tributaries;
- Supporting investigations focused on understanding and improving the ecosystem health of Te Aka Aka/Ashley estuary.

Protection and enhancement of recreation in the zone

To protect and manage the natural landscape and recreation resources in the Waimakariri Water Zone by:

- Facilitating the extension of recreation corridors and amenity space in the zone;
- Encouraging awareness of land use impacts on high value landscapes in the zone.

We will measure this by:

- Supporting the completion of the Silverstream loop;
- Supporting specific Arohatia te Awa marginal strip recreation works;
- Encouraging investigation into the causes of cyanobacteria blooms;
- Encouraging reductions in pollutants/contaminants to help reduce nuisance algal growths in waterways.



Image – Burgess Stream, near Eyreton

Improved Mahinga Kai within the Waimakariri Water Zone

To protect and enhance mahinga kai practices in waterways within the Waimakariri Water Zone, while also:

- Encouraging a wider understanding of mahinga kai practices in the community;
- Increasing Mahinga kai enhancement and access on the plains.

We will measure this by:

- Supporting the Ngāi Tūāhuriri mahinga kai enhancement projects on the plains and in lowland waterways;
- Encouraging catchment and landcare groups to protect and improve riparian habitat to support mahinga kai practices on the plains and lowland waterways;
- Supporting mahinga kai workshops across the zone.

Want to get involved?

Head to ecan.govt.nz/waimakariri-water-zone



Image courtesy of N Ledgard & G Davey



New committee member, Martha Jolly

**MINUTES OF THE MEETING OF THE CANTERBURY WATER MANAGEMENT STRATEGY
WAIMAKARIRI ZONE COMMITTEE HELD IN THE COUNCIL CHAMBER, RANGIORA SERVICE
CENTRE, 215 HIGH STREET, RANGIORA, ON MONDAY 3 JULY 2023 AT 3.30PM.**

PRESENT

C Latham (Chairperson), M Jolly, E Harvey, J Cook (Te Ngāi Tūāhuriri Rūnanga), Councillor T Fulton (WDC Councillor) and Councillor C McKay (ECan Councillor), R Gill-Clifford (Youth Representative) (from 3.57pm).

IN ATTENDANCE

WDC Councillor P Redmond, S Allen (WDC Water Environment Advisor), N Theinhardt (ECan Zone Delivery Lead Waimakariri), J Grant (ECan CWMS Facilitator), A Smith (Governance Coordinator), J Benn (Department of Conservation), B Walton (Waimakariri Irrigation Ltd).

The following members of the ECan Waimakariri Zone Delivery Team were present for part of the meeting to speak on their roles (Agenda Item 3.1): James Schaap (present in person), the following staff attended via Teams: Kiri Kirkwood (Senior Incident Response Officer), Steph Scheirlinck (Incident Response Officer), Robert Anding (Resource Management Officer), Anna Veltman (Land Management Advisor), Sam Thompson (Land Management Advisor).

KARAKIA

J Grant provided a Karakia to open the meeting.

1. BUSINESS

1.1 Apologies

Moved: C Latham

Seconded: Councillor T Fulton

THAT apologies for absence be received and sustained from committee members A Reuben and C Aldhamland.

CARRIED

1.2 Welcome and Introductions

Chairperson C Latham welcomed all to the meeting.

1.3 Acknowledgments

Chairperson C Latham acknowledged the recent sad passing of committee member and former Vice Chairperson Michael Blackwell and former Te Ngāi Tūāhuriri Runanga representative on the committee Clare Williams.

Michael Blackwell represented the community on the Zone Committee from 2017 and was Chairperson from August 2019. He was well liked and respected by all and passionate about the environment, particularly wetlands and waterways. Michael would be greatly missed and the thoughts of the committee were with all of his family. Clare Williams represented Te Ngāi Tūāhuriri Rūnanga on the Zone Committee from its inception in November 2010 through to 2017. Clare was also well liked and respected by all and her collaborative leadership approach helped establish links between the Runanga, other organisations and community bodies involved with water and the environment. Clare was recognised with a Waimakariri Community Service Award in 2019 for her many years of service and dedication to the community. The thoughts of the committee go out to Clare's whānau.

ECan Councillor McKay added that Michael and Clare were both valued members of the community and made a significant contribution during their time on the Zone Committee.

1.4 **Register of Interests**

ECan Councillor McKay advised the removal of the following items from the Register:

Dairy farming/grazing
Woodfields Partnership
Water take and use consents CRC: 990908.1, 102890, 185900.
Effluent discharge consents CRC: 990910.4 210035.

WDC Councillor Fulton advised that he was contracted to write a book for Dairy Holdings Ltd.

2. **OPPORTUNITY FOR THE PUBLIC TO SPEAK**

Brent Walton, Waimakariri Irrigation (WIL)

B Walton provided an update on the Wrights Road water storage project which had reached a point where there was a construction contract with Rooney Earthmoving Ltd and agreement on most of the terms of the contract. It was hoped that the contract would be signed and construction commenced by December 2023 with a final shareholders vote before then. It had become more apparent that environmental outcomes would not be achieved unless there was water storage available, as one of the tools in the kit. There still needed to be discussions held with some shareholders to get their understanding of this need.

Plan Change 7 – WIL had come up with a solutions package which would produce good outcomes in lowland streams and would provide a good step forward. The water storage project would be required to progress any Managed Aquifer Recharge and Targeted Stream Augmentation.

Currently there are 98% of farms in the WIL scheme with A and B farm audit grades. Two had C audits, one of which had now converted to a sheep operation. Issues associated with the other C audit was still being worked through. The target was to have all farms at A and B audit grades.

Regarding the Regional Policy Statement, ECan had approached WIL regarding consultation on the RPS, and particularly in relation to Freshwater Management Units (FMUs). There were currently two FMUs in the Waimakariri zone because of the long community consultation process for Plan Change 7 and there would need to be good justification to change this. It was noted that ECan's public consultation on the RPS would take place in several stages, and that there could be benefit in a broader community collaboration as the consultation proceeds.

ECan's winter crop grazing fly overs and subsequent farmer interaction had been received positively.

Councillor Tim Fulton enquired whether there had been any impact on farm practices and were there fewer stock now grazing winter feed crops. B Walton said when the Farm Plans were introduced in 2016, winter crop grazing wasn't a specific topic at that time as it is now, but had still been identified as a risk, so farmers were already aware of this. The audit process in the last two years had helped to clarify the risks and identify actions for improvement.

John Benn – Department of Conservation

J Benn advised he had attended a meeting recently with ECan, Arowhenua Runanga, and Irrigators in Central Canterbury between the Rangitata and Rakaia Rivers to discuss Freshwater Management Units. Identifying FMUs was quite challenging as the irrigation scheme crosses several catchments.

3. REPORTS

The input of the public was valued by the Waimakariri Zone Committee, and to allow the public to ask questions on the reports presented, the Chairperson put the following recommendation.

Moved C Latham Seconded J Cook

THAT the CWMS Waimakariri Zone Committee

- (a) **Agrees** that Sections 9.4 of the Standing Orders be suspended for items 3 and 4 to allow members of the public to ask questions prior to the item being moved.

CARRIED
Cr Fulton against

To clarify this position, C Latham advised that once the Zone Committee members had discussed and asked any questions and prior to the motion being moved, the public would be invited to ask questions. Questions must be directed to the Chair and if the public wished to make a statement rather than ask a question, the place to do that, would be in the “Opportunity for the Public to Speak” section. C Latham commented that it was probable that this recommendation would be a standard item on future Zone Committee Agendas, and it would be a recurring exemption from the Councils Standing Orders.

3.1 Waimakariri Zone Delivery Team Environment Canterbury – Update – M Griffin (CWMS Facilitator, ECan)

N Theinhardt presented this report introducing the Waimakariri Zone Delivery team members who were responsible for attending pollution events, monitoring consents, land management advice and delivering biodiversity projects. They each provided an update on their roles and current priorities.

James Schaap, who was present at the meeting, spoke on his role as a Biodiversity and Land Management Advisor. He was involved with biodiversity projects and involvement with farmers regarding good management practices. He had worked in the Dairy industry for several years and done some research work prior to starting with ECan.

Via Teams, Sam Thompson (Land Management Advisor) spoke on his role with Zone Delivery in North Canterbury and as an instructor and mentor for the Hurunui SCAR (Soil Conservation and Revegetation programme), noting that as from 1 July 2023 this initiative would be commencing in the Waimakariri district. The project involved supporting landowners on their land with the tools to manage and mitigate erosion and sediment entering waterways. It was important to invest in partnerships with others in the community and all looked for the same outcomes.

Via Teams, Steph Scheirlinck (Incident Response Officer), worked closely with Kiri Kirkwood managing Hurunui and Waimakariri, looking at properties where there had been an event or incident that had consent and educated property owners on the appropriate consent process, if that was required.

Via Teams, Robert Anding (Resource Management Officer), noted he dealt with global consents for compliance regarding wastewater treatment and storm water for

Waimakariri and the Northern mega zone of Hurunui and Kaikoura.

Via Teams, Kiri Kirkwood (Senior Incident Response Officer), stated she responded to any incidents checking to see if it was compliant with the legislation or not, primarily under the RMA. This would be essentially anything that did not have consent and was non-compliant. This would provide an opportunity to educate the public or landowner. An example of this was in 2022 a campaign was run in the Selwyn area on who could or could not do outdoor burning which was deemed a successful campaign. Any property under two hectares are not allowed to have an outdoor burn. A similar campaign was held in Waimakariri this year, with leaflets being distributed in May advising what was and was not allowed in the area. Another successful campaign in recent years, was the removal of non-compliant white baiting structures in the Cam River. Some of these structures were poor quality and removal of them had improved the appearance of the river.

Via Teams, Anna Veltman (Land Management Advisor), informed the Committee she runs the Waimakariri North Primary Industry Network Group meeting and engaged with farmers who might require assistance with land use consents and helped people to reach the required standards for farm environment plans and audits. She worked alongside the sector groups, such as catchment groups and Waimakariri Irrigation Ltd, which may involve running field days, or drop in sessions on specific topics.

Councillor Fulton noted there was a range of roles covered by these staff members providing education on compliance. How would engagement be undertaken if there needed to be advice or education offered to a property owner on any activity on their property, suggesting that some property owners could become resistant to this. S Thompson advised the focus would be on early intervention and engagement with farmers and building the relationship. The response would also be relative to the issue – it would be a different response if it was a recurring matter as opposed to a one-off mistake having been made.

Councillor C McKay took the opportunity to acknowledge the work of ECan staff in their areas and stated she constantly heard positive comments from the Land Management Advisors.

C Latham advised that as this was now a new Action Plan Funding Year, there was \$75,000 funding available, and the Committee would welcome any advice from Zone Team members of any projects that could be eligible to apply for this funding.

Moved: Councillor T Fulton

Seconded: M Jolly.

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** this update for information taking into consideration the Committee's 2021/24 Acton Plan priorities.

CARRIED

3.2 **Taranaki Stream Inanga Spawning Improvement Project Final Update – M Griffin (CWMS Facilitator, ECan) and S Allen (Water Environment Advisor, WDC)**

S Allen presented this report which provided a report and final update on the Taranaki Stream Inanga Spawning Improvement project. Waimakariri District Council received \$9,000 funding from the Water Zone Committee in the last financial year for Phase 2 of the Inanga Spawning Improvement project, which was used for planting. Guards were still on the plants so there would be more growth once the guards were removed. There was potential for this site to provide very effective inanga spawning habitat once the plantings were fully established. There were other streams that also had action planned soon and a report would be going to the Council's Utilities and Roading

Committee meeting on 18 July 2023.

C Latham enquired if it was still planned to undertake sediment removal in Taranaki Stream. S Allen replied that because of the shape, using an excavator was not possible and other options were being considered. The shape of the bays means that sediment would settle again. It was planned for the bays to continue to be surveyed every two years.

Moved: M Jolly Seconded: E Harvie

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** this report for information taking into consideration the Committee's CWMS Action Plan priorities in 2023-24.

CARRIED

3.3 **CWMS Action Plan Budget Initiatives 2023/24 – for decision – M Griffin (CWMS Facilitator, ECan)**

C Latham presented this report, which sought support of the Committee for a funding application received from Ashley Rakahuri Rivercare Group for \$9,000, from the Action Plan funding for the 2023/24 financial year. Information on this project was received in April 2023 and the decision to carry this over was confirmed as part of the final recommendations for projects in the 2022/22 financial year.

There were no questions.

Moved: E Harvey Seconded: R Gill-Clifford

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** the information provided on the proposed CWMS Action Plan Budget project initiatives to support for the 2023/24 financial year.

CARRIED

Moved: C Latham Seconded: E Harvey

THAT the CWMS Waimakariri Zone Committee:

- (b) **Approves** its support for this project initiative based on the \$75,000 CWMS Action Plan Budget allocated for each CWMS Water Zone for the 2023/24 financial year.

CARRIED

C Latham advised that the proposed project builds on the previously funded work undertaken and aligns with Action Plan Priority Number 2, which was to protect and improve the indigenous biodiversity habitat or ecosystems in the zone.

4. COMMITTEE UPDATES – M GRIFFIN (CWMS FACILITATOR, ECAN)

4.1 **Co-opting an advisory member onto the Waimakariri Water Zone Committee through to the 2024 community member refresh process.**

Since the appointment of Kirk Blumers was made at the last community member refresh, he had not been able to attend any meetings due to a change in his situation. There had also been the loss of committee member Michael Blackwell. This had reduced the number of community appointed members of the committee, (currently four

out of a possible seven), just as an important consultation phase on the Regional Policy Statement was approaching and several other important projects approaching. The reduced community representation diminished the committee and there could also be issues with meeting a quorum at meetings. It had been suggested that a past community member could be co-opted on to the committee. The benefit of having an experienced person on the Committee was discussed. Options could be further discussed at the Zone Committee Briefing in August 2023 with a view to confirming any appointment at the September meeting.

C Latham advised that the 2024 refresh was originally planned for April, but this may be brought forward to February, however it would still be June before new member/s were appointed.

4.2 **Zone Committee Working Groups.**

Biodiversity Working Group update provided – meeting next Monday to discuss the upcoming Environmental Awards and the exact date of awards was still to be confirmed. Media communications are scheduled for July/August 2023 for applications and nominations, with judging likely to be in September 2023.

Lifestyle Block Working Group

A copy of the final draft of the Top Ten Tips for Lifestylers was included in the meeting agenda. The methods for distribution were currently being worked on, and members were asked to contact C Latham if they wished to make any suggestions for the document, or would like hard copies.

Monitoring Working Group

E Harvie took the report as read and advised that there should be an update available this week on the initial monitoring analysis. Agreement for the funding had been received and signed by the Waimakariri Landcare Trust.

4.3 **Farmers Field Trip for Mahinga Kai – 21 June 2023.**

C Latham, Councillor T Fulton and E Harvie from the Zone Committee attended this field trip. The trip was very interesting, starting on a farm in the foothills at the top of the Cust River and finishing at the confluence of the Cust Main Drain, Silverstream and Ohoka Stream. The attendees learnt about the principles of mahinga kai and good management practices to protect water quality. On the way there was a stop at a lifestyle property to view the owner's planting project along the riverbank and an opportunity to feed long fin eels. Makarini Rupene hosted the field trip, and C Latham noted points of interest were the protection of mahinga kai, planting on the north side of waterways to provide shade for the waterway, reducing weeds, protecting biodiversity remnants, and avoiding nutrient loading of waterways.

Councillor Tim Fulton thought that the three locations for the field trip stops were well chosen and very educational. He observed that planting was beneficial, but that it was important to be planting the right plants in the right location. Referring to discussion that took place at one of the stops on this field trip, Councillor Fulton commented that that there would always be debate between different groups with different points of view on planting and natural restoration of streambanks versus using mechanical clearing of stream beds.

N Theinhardt observed the difference between scientific monitoring and mātauranga Māori monitoring, suggesting that the latter gave a more overall view. In conclusion, it was considered that this was a successful field trip and there may be further similar field trips arranged in future.

4.4 **Committee Communications Update – June Quarter 2023**

The update was taken as read and that the next newsletter would be coming out later in July. It was suggested that there could be advice included in the newsletter of the new Action Plan Funding available and a link included to an application. The July newsletter was already well populated, and it was suggested that this information could be included in the following newsletter.

4.5 **ECan Water and Land Committee Meeting – 28 June 2023.**

ECan Councillor McKay encouraged people to take the time to read the CWMS Zone reports and the groundwater responses to the Nutrient Reduction Policy. Another paper looked at lag times, with people asking when there would be some noticeable improvements from the actions that had already occurred. ECan had some evidence of land use change (e.g. border dyke to irrigation, or forestry to farming) but there was not yet any evidence of a decrease in pollutants. It was not just the wider community asking these questions, but people who were making the changes wanted to see that their actions were making a difference. Councillor McKay noted that there was also an overview of the SCAR project presented at the meeting.

Councillor Fulton referred the overview report provided by WDC staff on the land on Lineside Road. This provided a good balance of providing a technical overview and what was known about the land to date, and keeping people informed. The important point noted was that it was early days on how this land would be used and developed.

4.6 **Rangiora Reach – Masterplan Final.**

The plan was taken as read and there were no questions or comments from members.

4.7 **A New Regional Integrated Plan – Opportunities to Contribute.**

C Latham spoke on Environment Canterbury commencing with the first phase of the public campaign aimed at creating a new Regional Integrated planning framework. Councillor McKay noted that there were 17 papers going onto the Environment Canterbury website today as part of the new Plan. There were a series of webinars and the first one for the Northern Zone committees would be on 11 July. The consultation would be a mix of drop-in sessions, webinars, and meetings with sector groups. The webinars were about engagement, and provided an early opportunity for people to discuss visions and what their aspirations were for their areas as part of the development of the Regional Policy Statement (RPS). There would be two rounds between now and the end of the year and two in 2024. J Grant highlighted the topics of these webinars, and it was envisaged there would be multiple opportunities for individuals and groups to engage in the development of the RPS. Erin Harvie noted disappointment that border security wasn't included in the consultation.

Following a question from Councillor Fulton, Councillor McKay confirmed that recordings of the webinars would be available online.

4.8 **Otuwharekai / Ashburton Lakes Lesson-Learnt Report.**

This report was received for information, there were no questions.

4.9 **Further Information Links.**

Links were received for information.

4.10 **Action Points from the Previous Zone Committee Meetings.**

C Latham noted that several points were still pending.

The 2023/24 CWMS Action Plan budget had been confirmed at \$75,000 for each Water Zone through the Environment Canterbury 2023/24 Annual Plan.

Moved: J Cook Seconded: Councillor Fulton

THAT the CWMS Waimakariri Zone Committee:

- (a) **Receives** these updates for information.

CARRIED

Moved: C Latham Seconded: E Harvie

- (b) **Requests** an option for co-opting an advisory member onto the Zone Committee to be confirmed at the 4 September Zone Committee meeting.

CARRIED

5. CONFIRMATION OF MINUTES

5.1 Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee Meeting – 1 May 2023

Moved: M Jolly Seconded: Councillor C McKay

THAT the CWMS Waimakariri Zone Committee:

- (a) **Confirms** the Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 1 May 2023, as a true and accurate record.

CARRIED

There were no matters arising from the minutes.

6. GENERAL BUSINESS

There were no items of general business.

KARAKIA

J Grant provided a Karakia to close the meeting.

NEXT MEETING

The next meeting of the CWMS Waimakariri Water Zone Committee is scheduled for 4 September 2023 at 3:30pm.

There being no further business, the meeting closed at 5.01pm.

CONFIRMED

Chairperson
Carolyne Latham

Date